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„Mykenische Funde auf Sardinien. Zu den transkulturellen Kontakten im 2. Jahrtausend v. Chr.“

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VIVERE NON EST NECESSE,

NAVIGARE EST NECESSE.

Per aver ritrovato Itaca e la felicità nella mia isola.
Al vento che muove le vele, al mare che mi circonda.
A Mamma, a Babbo.
a Massimo (Salvatore),
alla mia terra, alle mie origini.

“MYCENAEAN FINDS IN SARDINIA. CROSS-CULTURAL CONTACTS IN THE 2ND MILLENIUM B.C.”

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Introduction

The following pages include a passionate (and maybe a bit guileless) attempt to study one of the most controversial and interesting connections between the apparently mysterious and isolated Nuragic world and the more dynamic and industrious Mycenaean world[1].

The "Mycenaeans and Sardinia" topic, addressed both as the study of the arrival of foreigners on the island, and as a journey toward the West, has always been very popular.

While studying available publications, the difficulty to provide a proper explanation to this topic became clearer and clearer, at the doctoral research carried on.
Indeed, such a wide, highly debated and critical issue for the Protohistoric Age turned out to be more than just a thorny matter.
Different interpretations on the reasons why the Mycenaeans and the Nuragic people started their affiliation will be taken into account: historical issues, material culture, production and economy-related dynamics, social transformations and cultural influences affecting the whole Mediterranean basin. All these perspectives contribute to go further in depth in the subject and do not allow for one single comprehensive interpretation.

The latest chronology based on recent publications (Depalmas 2009) may be accepted, keeping in mind that several historical issues remain unsolved, especially as far as the Late Bronze Age is concerned. Further studies should be carried out.
At the same time, an absolute dating sampling, wider than the one currently available, is still necessary, before attempting a new chronological approach to the period of time covered by this work.
It should be pointed out that the Bronze Age in Italy, as well as in Sardinia, has the following breakdown: "Bronzo antico" ("Early Bronze Age"), "Bronzo Medio" ("Middle Bronze Age"), "Bronzo Recente" ("Late Bronze Age), and "Bronzo Finale" ("Final Bronze Age"). That is, the "Late Bronze Age" used in the Aegean context includes both the "Bronzo Recente" and the "Bronzo Finale". As far as the Bronze Age in Sardinia in concerned, though its cultural outcome may not be defined as "Italic" and has features of its own, due to the start and the development of the Nuragic

[1] Thanks to Prof. Fritz Blakolmer. By suggesting me to carefully examine this particular issue, he whetted my curiosity for the dynamics of the contacts between different cultures in the Bronze Age Mediterranean region.

Civilization, the chronological breaking-up of the Bronze Age follows the Italian model, in all publications.

The Late Bronze Age seems to correspond to the Late Helladic IIIB (Lo Schiavo 2009, 226). In Sardinia, the chronology of the Late Bronze Age is perhaps most popular among scholars and, also, the most studied.

The following pages provide a reflection upon the state of the art - after 30 years since the first discovery of Mycenaean fragments in Sardinia – and is based on new acquired data on the Nuragic world (Ch.1) and some new perspectives on the relations between the two worlds.

The work could not explore all the issues related to the "Mycenaeans and Sardinia" topic, nor did it pretend to do so, due to the limited time and resources available, and my impossibility to carry out such a wide topic on my own.

The following pages focus on some specific aspects and research guidelines and, despite the limited scope of action, provide unexpected results.

An unbiased collection of historical data on the subject is presented, trying to evaluate all the available data and the models which have been developed over the years on this fascinating topic.

For this reason, a comprehensive perspective on the "where" issue is provided. Much work was therefore carried out on an original experimental investigation, comparing published research materials. Through landscape archaeology and applied Informatic, the Mycenaean remains found in Sardinia were studied, with excellent results in terms of methodology and generating wider research perspectives (Ch. 2)[2]. However, despite the lack of resources, an attempt was made to analyze the contexts related to both Mycenaean finds in Sardinia, and Nuragic findings in the Aegean region[3] (Ch. 3; Ch. 4). On the basis of contextual data and recent acquisitions, including unpublished excavations on the Nuragic world, new interpretations are provided to explain the nature of the contacts (Ch. 5).

[2]Tribute should be paid to Professor Antonia Arnoldus Huyzdenfeld who supported my work, providing new methodological instruments which turned out to be useful to carry out the experimental section of this work.

[3] Due to administrative and bureaucracy-related issued on IPR protection, only during the summer of 2010 was I able to examine the pottery found at the Sarroch Nuraghe Antigori site. As mentioned in the following pages, a number of Mycenaean artefacts found in Sardinia are now missing and cannot be found anywhere. Therefore, data are limited. Similarly, once again for administrative reasons related to the IPR protection, it was not possible to esamine the Nuragic findings of Kommos. However, I wish to thank the archaeologists who helped me carry out my research. In Sardinia, Mr. Alessandro Usai from the Superintendence for Archaeological Heritage of the Provinces of Cagliari and Oristano; Joseph W. Shaw and Maria Shaw from the University of Toronto.

A special tribute is paid to my friend and colleague Reinhard Jung, who has supported my research since the very beginning, introducing me to the study of Mycenaean pottery.

As this work explains, the Nuragic world could be studied more in depth, not only from the archaeological point of view, but also in terms of Proto-Mediterranean contextual analysis, if the scope of research is not limited to the geographical boundaries of the Island.

By posing new questions, archaeological data will be further studied, in order to explain why and how two different civilizations started a dialogue and met each other during the Bronze Age.

1 History of research

The link between the Mycenaean world and Nuragic Sardinia goes way beyond what the material findings and the literature based thereon might suggest to the archaeological scientific community.
Following an accurate analysis of relevant existing bibliographic resources, drawing a distinction between the history of studies and the history of Mycenaean findings in Sardinia seems to be a wise choice. An overview of the history of studies is provided, in order to understand why both research and suggested archaeological models do not seem to result directly from archaeological data. Instead there seems to be no clear connection between them.
Through a description of the history of the discoveries, I intend to show how the process of research has embraced or somehow rejected the "history of the findings", especially in consideration of the difficulties related to the review of the materials found.
While the first Mycenaean findings in Sardinia date back to about thirty years ago, the bibliographic link between the two archaeological contexts already existed in the early studies on Nuragic Sardinia.
The studies on the "Mycenaeans & Sardinia" subject may be divided into three subsequent phases:

- A *pre–findings* phase (prior to the 1980s) based on the so-called *diffusionismus* theories which identified a link between the building of the Nuragic towers and Mycenaean craftsmen.
- A phase contemporary to the findings, characterized by the discovery of Mycenaean pottery in Sardinia, in particular at Nuraghe Antigori, and its subsequent recognition as such in several other sites of the island.
- A *post–findings* phase, characterized and conditioned by the disruption of the excavation at Nuraghe Antigori.

1.1 Nuragic architecture and Mycenaean architecture: a long-lasting debate

While the first tangible discoveries of Mycenaean materials in Sardinia did not occur before the second half of last century, the idea of a connection between the Mycenaean world and Sardinia can be traced back to many years ago, almost when the studies on the Nuraghi and their architecture started (Petit Radel 1826, 21; La Marmora 1840, 63-64, Pais 1881, 270, 297-298, Patroni 1916, 145-168, Patroni 1919, 3). Actually, what impressed the archaeologists of last centuries was the architectural majesty of Sardinian Bronze Age monuments, rather than the study of archaeological artefacts[4].

[4] On Nuragic storiography, see Lilliu 1962 and Ugas 1980.

Sardinian architecture surely contributed to making the Nuragic *facies* appear less barbaric than it would have, if compared with the noble peoples of the Aegean Sea and according to studies[5] conducted prior to the achievements of *processualist* and *post processualist* archaeology, it inevitably resembled *cyclopean* shapes found in Eastern Mediterranean. Likewise, historical and (Greek and Latin)[6] literary sources on Sardinia influenced and strengthened the link between the Aegean Sea and the Western Mediterranean island and it encouraged the constructive origin and development of the Nuraghi as a result of a migration or of a cultural influence from Eastern Mediterranean[7].

Although historical sources follow by many centuries the Nuragic period[8], and although it is highly difficult to ascribe them to the archaeological findings, an attempt has resisted to date to establish a connection between the historical sources of the classic period and the archaeological data[9].

Since the middle of last century some studies explained that the comparisons between the two forms of architecture are groundless (Levi 1943, 640-641), but the denomination of *tholos/oi* referred to the covering of Nuragic towers is the proof of how, over time, a certain ideological position has been influential enough to dramatically affect the nomenclature and leave it unchanged to date.

The confusion among historical and literary sources on the one hand and archaeological data on the other hand, in addition to an increasing tendency to simplistically compare the two architectures, generated a misleading line of research.

It is worth quoting, to this extent, the introduction by Barbro Santillo Frizell at the Proceedings of the First International Colloquium on Nuragic Architecture at the Swedish Institute in Rome in 1989. He wrote that his interest in the architecture of the nuraghi *"stemmed from the need to compare and contrast them with the Mycenaean dry masonry tholos tombs so as to better understand aspects of their construction [...] I felt that it was necessary to explore this aspect in greater depth. Subsequently, I realized that the construction technique of dry masonry domes, was*

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[5] *"Ormai del nuraghe si parla nei salotti londinesi e parigini, certo come qualcosa di 'barbaro' o di 'africano', ma se ne parla"* (Lilliu 1962, 270)

[6] For an overview of the classical sources on Sardinia, see Perra 1996 and Nicosia 1986, 423.

[7] The introduction by G. Pugliese Carratelli of the book "Ichnussa" is exemplary. He wrote the following on the historical tradition of Sardinia: ")"*Remote tradizioni storiche e leggende, insomma, convergono nel collocare l'Isola entro l'ampio orizzonte dei Greci dell'età micenea e di quella immediatamente successive*", ("Old historical traditions and legends, in fact, converge to position the island within the broad horizon of the Greeks of the Mycenaean age and of the ages immediately subsequent to that), (Pugliese Carrattelli 1985, XIII).

[8] In relation to the argument it is useful to see Pseudo Aristotheles, *The Mirabilibus auscultationibus*, 100 and Diodorus Siculus, IV.30-31. About the mythical relation between Jolaus and Sardinia see Pausanias, VII.2.2; IX.23.1; X.17.5; II.2; Diodorus Siculus, IV. 29.4-30; V.15.1-6: Strabo, V.2.7. For the relation between Aristaeus and Sardinia see Pausania X.17.3-4; Diodorus Siculus IV. 30-31 and IV. 82.IV, Sallustius, *Historiae*, II.6; Solinus, IV. 2)

[9] See for example Ugas 1987, 85-86 and Ugas 1996, 1607-1621, where the Greek and Latin literary sources on Sardinia seem to represent a 'historical' confirmation of the link between the two architectures.
Another example is Ugas 2005 table 2, p. 20: here data from ancient literary sources ("*Peoples, heroes and events*") and archaeological data ("*Period, archaeological phase"*) are compared, as if, by means of "*cultural indicators*", there might actually be a correspondence between them.

known in the Mediterranean as early as the Neolithic, this technique alone is not a valid parameter for seeing the origins of the nuraghi in the Mycenaean tholos tombs (Santillo Frizell 1991, 14). Likewise, Ercole Contu, in his introduction at the proceeding of the "Convegno di studi - Un millennio di relazioni fra la Sardegna e i paesi del Mediterraneo" draws a picture of the topic and provides a solution for "*a problem that, for nearly a century and perhaps longer, has shaken historians and archaeologists*" (Contu 1992, 13).

Furthermore, during the conference "Sardinia and Mycenaean world" (Balmuth 1987, 39-134) an entire session was devoted to the issues of the Nuragic and Aegean architectures.

The ideas that have justified the Nuragic tholos (or rather the vaulted dome, false dome) as deriving directly from, or at least being the result of, a contact with the Mycenaean world, however, seem to persist, despite several denials and different opinions based on more rigorous scientific observations.

An overview of bibliographic information in the articles which oppose the position under consideration allows to identify several points in favour of the autonomy of Nuragic architecture from Mycenaean influence, which can be summarized as follows:

a) chronological reasons (Contu 1992, 13-40);
b) construction techniques are not specific to any single human group (Canavagh- Laxton 1983, 54);
c) different construction techniques and different static;
d) differences in the architectural genesis of Nuragic monuments and Mycenaean monuments (the former are a form of military architecture, while the latter are graves)[10];
e) the genesis of Nuragic tholos is a product of a previous Mediterranean neolithic experience (Santillo Frizell 1989, 8).

However, as M. Gras. wrote "*Où finit la réalité et où commence le mythe dans la représentation d'une telle Sardaigne?[…] "Reste à savoir s'il n'y a pas, dans la tradition littéraire, un écho du contact le plus ancien, celui de l'époque mycénienne*" (Gras 1985, 18-19).

Posing these questions is legitimate. As stated above, rarely has there been a review of material culture. This has led to the review of the bibliographic material, often not supported by analysis of materials and excavation data, including, in many cases, the mytho-literary source as a matter to be considered. Historical sources not contemporary to the period under examination can not be either the confirmation nor the disclaimer of a socio-cultural phenomenon emerging from archaeological

[10] Doro Levi already put emphasis on this aspect: "*The couchets and the bazinaso of Algeria and Tunisia have a circular base and sometimes are even provided with a vault similar to that of the nuraghi, but they are underground buildings, and of funerary character […]. The same differences, however, distinguish the nuraghi from the Aegean tholoi*" (Levi 1949, note 8. 640).

data. But the arguments briefly mentioned above justify the fact that it is possible to speak of a Mycenaean presence in Sardinia only when there is some proof. The material proof is represented by the archaeological artefacts, in this case the glaringly obvious Mycenaean findings. Therefore, the combined consideration of Mycenaean and Nuragic tholos is an issue resolved by now; it may constitute only a starting point for studies related to architecture, while it is useless to continue to discuss about it related to each other, for historical and archaeological purposes. As L. Vagnetti rightly pointed out, "While the relations between the Aegean and the big island were only hypothetical and not documented, the excavation at Nuraghe Antigori showed a big amount of Mycenaean Pottery" (Vagnetti 1996, 114).

Likewise, some previous studies on Nuragic Sardinia seem to have been a precursor of subsequent discoveries. Some ideas, for example, derive from some documents by Antonio Taramelli, dating back to the period between 1925 and 1929. These documents, kept in the Archivio Documenti (Soprintendenza per i Beni Archeologici di Cagliari), are a correspondence between the Soprintendente and the then Italian Ministry of Education, and illustrate Taramelli's insight into the potential Mycenaen discoveries at the Nuragic settlement in the Gulf of Cagliari. In his briefs to the Ministry, moved either by the desire to ennoble his research in order to attract the attention of the latter and to be granted the chance of carrying out archaeological investigations, or by a strong belief of the comparison between Mycenaean *tholoi* and Nuragic *tholoi*, or perhaps by the actual discovery of Mycenaean artefacts, he argued that the nuraghe Sa Domo 'e s'orku[11] could be one of the likely sites where Mycenaean discoveries might take place. He argues that Nuragic architecture played a pivotal role within the Mediterranean Basin, and that this particula nuraghe seemed to have served as a pole of attraction for Aegean peoples.

1.2 History of findings

A brief chronological reconstruction of the discoveries is an important starting point for the analysis of the studies on this issue.

Archaeological models are based on archaeological data. For this reason it is fundamental to know when and how this data have been produced in order to understand the following formulations.

[11] Similarly he wrote: "*situato presso la sponda del Golfo di questo nome, tra i territori delle due antiche colonie fenicio –puniche di Nora e di Caralis, poteva serbare le traccie dei primi rapporti tra indigeni proto sardi e gli immigranti trans marini e dare qualche elemento ad illuminare le vicende di tali relazioni ed a stabilire se esse fossero bruscamente terminate con la scomparsa della civiltà Nuragica dal litorale marino che vide svolgersi e fiorire le due ricche colonie marinare cartaginesi*" (Taramelli 1926).

1.2.1 Discoveries at the end of the 1970s

The end of the 1970s marked one of the key moments for the findings and the archaeological research on the relation between the so-called "Nuragic Civilization" and the "Mycenaean World."

In 1979 the first report of the discovery of Mycenaean pottery in the island reads: *"a fragment of a painted pottery assigned to the sub-Mycenaean*" (Basoli 1978, pp. 429-440; Ferrarese Ceruti 1979), afterwards defined as a local imitation[12] and found at Nuraghe Nastasi in the territory of Tertenia.

The absence of a picture or a drawing of the pottery's fragment makes it difficult to analyze all the findings of the nuraghe. We have knowledge that the excavation was carried out during the Seventies and what is referred as "*absence of stratigraphy*" places the findings in a rather dubious position which is difficult to interpret (Basoli 1978, p. 431), likewise the excavation's techniques, illustrated in the publication, are not likely to help recognize the phases of attendance to the monument.

Due to the difficulty to identify the stratigraphical location of the Mycenaean (or so called *sub-Mycenaean*) fragment, the analysis of the archaeological materials based just on the typological association, intended as an alternative method of study, represents a naive attempt of investigation that can hardly be accepted in consideration of the progress registered by the studies on the methodology of excavation during the 70s.

Meawhile, F. Lo Schiavo writes about on a particular episode dating back to 1976, that relates to the discovey of some pottery fragments in the Orosei's Area (Central-Eastern Sardinia), (Lo Schiavo 1979; Lo Schiavo-Vagnetti 1980, pp. 371-393). The fragments were delivered to the Soprintendenza Archaeologica and turned out to be the result of a clandestine excavation carried out in an unknown place in the Orosei area. The absence of recovery data created many difficulties in subsequent studies. At first, they were published during the 1982 "*Magna Grecia e Mondo Miceneo*" Taranto exhibition.

1.2.2 Discoveries during the 80s

Again in 1979 the fortunate discovery of the Mycenaean material at Nuraghe Antigori (Sarroch) took place. The discovery in this Nuraghe was the best testimony of the relation between Sardinia and the Mycenaean presence.

The excavation campaigns in Nuraghe Antigori were conducted from 1979 to 1985, with some short periods of discontinuance, with scarcity of resources and funding, but it is only thanks to these excavations that the Sardinian Bronze Age may be seen in a broader Mediterranean perspective of research.

[12] About the terminology "*imitazione locale*" other "local imitation", see note 163, p.138.

The discoveries of Mycenaean pottery and their identification as such opened the door to all the other Mycenaean findings in Sardinia and allowed a prolific scientific work during the 80s.

At the same time the short and limited excavations in Nuraghe Sa domo 'e s'orku[13] were carried out by M. L. Ferrarese Ceruti. These excavations led to small discoveries, however highlighting the geographical potential of the coastal area near Antigori.

In 1981, two sherd, found in hut 17 and hut 23 in the Nuragic site of Su Nuraxi (Barumini), were published (Ferrarese Ceruti 1981, 387): these sherds were considered a local imitation and their discovery brought to light the spread of this peculiar foreign pottery in the inner parts of the island.

In 1982, the phaiance/glass paste necklace beads found in tomb 1 in San Cosimo - Gonnosfanadiga were published (Ugas 1981, 7-20) together with the notice of the discovery of Mycenaean pottery, defined again as a "*local imitation*" in Corti Beccia (Sanluri). Both discoveries are matter of discussion as far as their real attribution to the Aegean context of the Bronze Age is concerned (Vagnetti 1982, 366)[14].

Two years later, in 1984, a very interesting discovery was revealed: a fragment of a ivory head warrior in Mitza Pùrdia (Sanna et al. 1984).

The findings of the 80s ended with the discovery of Mycenaean pottery[15] from the Nuragic settlement of Monte Zara- Bia de Monti- Monastir (Ugas 1987, 117-128) and of a pottery fragment from the hill of Murru Mannu, where the Nuragic settlement in the Phoenician-Punic city of Tharros is located (Bernardini 1989, 285-290)[16].

In 1987 others necklace beads made of precious metal and glass paste were discovered at the Nuragic tomb of Perda 'e Accuzzai - Villa San Pietro (Cocco Usai 1987, 187-199), as well as a cylinder seal of olivine at the Nuragic collective tomb at Su Fraigu - San Sperate (Ugas 1987b, 87)[17].

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[13] The first excavation in the Nuraghe Sa Domo 'e s'Orku was conducted by Antonio Taramelli in 1926 (Taramelli 1926, 405-456)

[14] L. Vagnetti casts some doubts on the real provenance of the necklace of beads from the Aegean, stressing the need to understand whether they are vague in faïence or glass paste, because this difference is key for their history. In fact the use of grains of segmented faïence was known in Europe before the establishment of the Mycenaean civilization (Vagnetti 1982, p. 366).

[15] "*Seven fragments of pottery, four of these are Argolic production of LH IIIB*" (Ugas, 1987, 119-120; Ugas 1996, 1604, note 2)

[16] The first notice was published in Acquaro 1982, 37-51; Acquaro 1983, 49-89. While initially the three fragments were considered "C*ypriot pottery with Mycenaean tradition*", only later were they recognized as more recent and published several times as such (Bernardini 1991; Lo Schiavo – Vagnetti 1993, p.137, nota 14).

[17] The findings of San Sperate were published also in 1993 (Ugas 1993, 105-107). Many open questions remain about the olivine's seal. The reading of the scene is very difficult, but Ugas wrote that the positive impression reflects two human figures one in front of the other. He identifies a sacred representation of the birth of a child with the mother, and another figure kneeling besides. He hypothesizes an eastern import and the following comparison: "*Sigilli cilindrici in steatite, materiale apparentemente simile all' olivina, ritenuti di produzione mitannica, vicini al nostro esemplare sul piano tipologico-dimensionale e qualche affinità sul piano stilistico, sono stati rinvenuti ad Ebla e a Ugarit e datati tra il 1450 e il 1300 a.c. […] File di globetti come quelli del cilindro di Su Fraigu, appaiono in sigilli di Nuzi, attribuiti anch'essi ad ambito mitannico-hurrita e riferiti alla 2° metà del XV secolo […] risentono del gusto figurativo miceneo e*

A new era of research on the possible relation between Sardinia and the Mycenaean world was inaugurated with an exhibition held in Taranto in 1982, curated by Lucia Vagnetti and entitled "*Magna Grecia e Mondo Miceneo. Nuovi Documenti"* at the *XXII Convegno di Studi sulla Magna Grecia*, then with a conference held in Palermo in 1984 on "*Traffici micenei nel Mediterraneo-Problemi storici e documentazione archeologica"* by Massimiliano Marazzi, Stefano Tusa e Lucia Vagnetti and finally with the Colloquium at the American Academy in Rome in 1986 sponsored by Miriam Balmuth on "*Sardinia and the Mycenaean World*".

These three events lead to the publication of new important results and prompted a renewed interest on the relation between Sardinian archaeology and Aegean archaeology. For the first time such relation was supported by reliable findings and not by the mere hypothesis of contacts between the Nuragic world and the Mycenaean world, which relied only on a "diffusionismus" theory.

The important news of the discovery of Nuragic pottery in the harbour town of Kommos in Crete also dates back to the late 80s (Watrous 1989, 69-79). This very important report was the confirmation of the two-way contacts between Sardinia and the Aegean[18].

1.2.3 Findings in the 90s

The beginning of the 90s was marked by the publication of the Mycenaean *alabastron* found in Nuraghe Arrubiu-Orroli[19]: from this site the oldest pottery finding emerged, dating back to LH III:A:2 (Lo Schiavo – Vagnetti 1993; Cossu et al. 2003)

The beginning of the decade was also marked by the death of archaeologist Maria Luisa Ferrarese Cerruti. She was the one who started the research on the Mycenaeans findings in Sardinia.

The year of her death (1993) represented an important step in the study: not only for the loss of a great point of reference for Nuragic archaeology, but also for the abrupt lull pause of research activities in Nuraghe Antigori and in Nuraghe Sa Domo 'e s'orku: Ferrarese Ceruti left a deep void in scientific literature.

Today, after thirty years of studies, all information related to the excavation in and the findings of both Nuraghi come from just eight existing scientific publications by M. L. Ferrarese Ceruti until 1987[20] and from two other articles by two students of hers[21]. These publications are the only ones

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cretese del XV-XIII secolo. Soprattutto colpisce la "vita sottile" delle due figure viste di profilo. Verrebbe da pensare che il sigillo sia stato prodotto a Creta, dove in questo periodo troviamo sigilli cilindrici in calcedonio" (Ugas 1987b, 113).

[18] On several occasions the Nuragic pottery found in Kommos was published (Watrous 1992; Rutter 2006).

[19] The first notice of the discovery dates between 1989 and 1990. (Lo Schiavo – D'Oriano 1989, 102; Lo Schiavo 1990, 40-45, fig. at p. 43).

20 Ferrarese Ceruti 1979, pp. 242-252, Ead. 1980, pp. 391-393; Ead. 1981, pp. 605-612; Ead. 1982a, pp. 167-176; Ead. 1982b, pp. 245-254; Ead. 1982c, pp. 167-176; Ead. 1983, pp. 187-206; Ead. 1986, pp. 183-188; Ferrarese Ceruti- Lo Schiavo-Vagnetti 1987, pp. 7-14.

21 Relli 1994, pp. 41-72; Forci-Relli 1995, pp. 121-136.

illustrating the quality and quantity of findings attributable to the Mycenaean material and the importance of the two above-mentioned sites for archaeological research. Indeed, as it often happens in the best novels, the protagonist's death took away not only a prominent scientific personality but also the secrets of her remarkable work. The main feature of her research, that made her a master on Mycenaean trafficking in West Mediterranean Sea, is in relation to Nuraghe Antigori, a history that has not come to an end yet.

In 1994 three fragments of pottery were found in the area of '*Macellum'* in the Punic- Roman city of Nora Pula-Cagliari. Only one fragment was published and attributed to the LH IIIC. The other two are still in phase of publication (Botto - Rendeli 1996, pp. 721, note 17).

Within the survey's project carried out by the Universities of Genoa, Padua, Pisa and Viterbo in the Nora Area, two fragment of pottery were found nearby Nuraghe Is Baccas- Pula and were published in 1996 (Botto - Rendeli 1996, pag. 723-736).

In 1996 G. Webster from the University of Pennsilvania published the notice of the discovery of two fragments from Nuraghe *Duos Nuraghes* Borore (Webster- Webster 1997, Webster 1998; Webster 2001). This is the northest Mycenaen finding of the Island, as the finding in Grotta del Guano are still questionable due to the absence of stratigraphy and valid elements of comparison (Lo Schiavo – Vagnetti 1986, pp. 199-204).

1.2.4 Findings since 2000

During a survey in the municipality of Tratalis a fragment was found in the area of Is Laias and published in 2006 (Bernardini 2006, pp. 109-149).

Also in south-west Sardinia in 2006, P. Bartoloni published three small pottery fragments from the archaeological excavation in Sulky. He remarks in his publication that "*si per confronto col materiale di Antigori potrebbero essere attribuiti al TE IIIC, ma che vista la tipologia e la cronologia dei frammenti, non ritengo particolarmente disdicevole che il recipiente di appartenenza possa essere identificato con una Cylindrical Bottle o con un Horn-Shaped Vessel oppure con una Gourd-Shaped Jar di matrice filistea, tutti per l'appunto in auge nell'XI secolo a.C."* (Bartoloni 2006, p.1601-1612)[22].

In 2009, other four fragments found in the Forum of Nora were published by Nicola Cucuzza. He hypothesized that one of them might be a fragment of an alabastron and it dates to LH IIIA:2 (Cucuzza 2009).

22 *"These fragments, P. Bartoloni writes, could be attributed by comparison to the pottery of Nuraghe Antigori dated LH IIIC. But due to the typology and chronology I do not think it unreasonable that this vessel could be identified with a Cylindrical Bottle', or with an horn-shaped vessel' or a 'Gourd-shaped jar' of the Philistines, all of them particularly in vogue in the 11th century BC"*

Another important discovery is the recent finding of an imported Mycenaean fragment from the area of Sulky[23].

The Mycenaean findings in Sardinia and the Nuragic findings in Crete have allowed:

a. to adopt a critical view on those positions which proposed that the Nuragic towers was a mere imitation of Mycenaean tholoi, and therefore on the chronological assumption stemming from such a belief;
b. to place the Sardinia of the second millennium BC within the scientific debate on the Mycenaean (or rather Aegean) expansion to the West.

What is the current state of recovered archaeological materials and of scientific publications deriving from their finding?

For the purposes of this study it is essential to examine the entire range of scientific literature written on this topic. This scientific debate started with the findings in Nuraghe Antigori.

Nuraghe Antigori is the only monument where systematic excavations have been conducted and significant data have been collected. The amount of material recovered and its variety, from what can be inferred from the publications of M. L. Ferrarese Ceruti, is unparalleled on the island.

1.3 History of Studies

In 1980, after the first discovery of Mycenaean materials in Sardinia, an article written by Lucia Vagnetti and Fulvia Lo Schiavo was published. While in this article the discoveries of Mycenaen material in Sardinia were questionable, Maria Luisa Ferrarese Ceruti's reply was a confirmation to them.

As P. Bernardini wrote: "[…] in chiusura di articolo un punto esclamativo ha potuto finalmente celebrare le nuove scoperte nei primi scavi nel nuraghe Antigori di Sarroch, la comparsa di ceramica micenea in un insediamento indigeno dell'età del Bronzo" (Bernardini 1991, 3).

The discovery of Mycenaean materials in Sardinia, was first presented during the 1982 Taranto exhibition. During this exhibition, the findings in Sardinia were presented for the first time to the international scientific community and, therefore, Bronze Age Sardinia was internationalized.

The words of R. Peroni in the proceedings of the exhibition (Peroni 1982, 211-284) are a very good point to start. He stresses that in his report the archaeological heterogeneity of Sardinia and Sicily prevents research to take them into consideration together with peninsular Italy; however he poses all the relevant questions to address research on the Mycenaean presence in Italy. If one of the

[23] Pompianu – Soro 2011 (forthcoming). Tribute must be paid to Elisa Pompianu, for granting access to the above-mentioned fragment, while writing this essay. More detailed information will be provided in following chapters.

famous questions about the Mycenaean presence in Italy was and is "How did this presence condition the indigenous culture?", Peroni rephrases the question as "*Le influenze micenee hanno costituito una condizione dello sviluppo, o invece uno dei suoi elementi determinanti, o infine la sua componente essenziale e decisiva?[…] in quali concrete situazioni cronologiche e territoriali esse volta a volta sono o non sono state l'una o l'altra cosa?*" (Peroni 1982, 211)[24]. His remark will prove useful and will always be kept in mind, as his questions coincide with the questions of this work.

The exhibition in Taranto marks the beginning of the great scientific ferment during the first quarter of the 80s. The findings of Mycenaean artefacts in the Western Mediterranean Sea are the starting point for studies which will deeply affect scientific activities. The findings represent also new starting points for studies on bronze production and distribution between the Eastern and Western Mediterranean Sea.

The *Convegno* in Palermo on May 11th-12th and December 3rd-6th 1964 entitled "Traffici Micenei nel Mediterraneo - Problemi storici e documentazione archeologica" (Marazzi Tusa Vagnetti 1986) sprang from the exhibition in Taranto, as a follow-up meeting on the issue of the Aegean-Mycenaean trade in the Mediterranean Sea. There was a need not only for comparing the individually achieved results, but also to expand geographical boundaries, because similar phenomena took place at the same time (late second millennium BC) in the Mediterranean Sea.

The main session of this conference was dedicated to the Western Mediterranean Sea. Referring to Sardinia, the article about the alleged Mycenaean finding at the Grotta del Guano in Pozzomaggiore was essential to understand the difficulties and the problems about the identification of "Myceanaen findings" and the example of this fragment gives us the typical discovery's situation of the so-called Mycenaean fragments in Sardinia. Lucia Vagnetti wrote "Il frammento di Pozzomaggiore […] rappresenta un caso molto interessante ed istruttivo per comprendere in modo concreto le difficoltà davanti alle quali si trova lo studioso di ceramica micenea, chiamato a definire frammenti molto mutili da essere difficilmente classificabili di per sé" (Lo Schiavo-Vagnetti 1986, 200). The attribution to a Mycenaean context was and remains questionable. Although the fragment presents some qualitative and typological similarities with Mycenaean pottery painting style, its belonging to a later orientalizing context cannot be excluded.

It lacked a stratigraphic association which could validate its chronological data (Lo Schiavo-Vagnetti 1986, 200).

[24] Did Mycenaean influence become a condition of development? Or did it become one of its crucial elements? Or, finally, did it become its essential and decisive component?*[…]* □n which specific historical and territorial situations have Mycenaean influences been the former or the latter?

The results of the chemical analysis related to the provenance of pottery presented by R. Jones were critical (Jones 1986, 205). The analysis was conducted by A. Riley in 1980 and aimed "to determine whether the Aegean-type pottery found in S. Italy and Sardinia is local or imported, and in the latter case where the production centres or regions were located" (Jones 1986a, 206). The results of the first analysis confirmed the hypothesis of autoptic studies, therefore the identification of three different groups of pottery in Antigori and the origin of the clay[25]. In the first group the clay comes from South Sardinia, in the second group from Western Crete and in the third group from the Peloponnese.

An important step for the research was the Colloquium curated by Miriam Balmuth "Nuragic Sardinia and the Mycenaean world / Sardegna Nuragica e il mondo miceneo", held at the American Academy in Rome on September 22nd-24th, 1986, as well as all the publications during the 80s.

The Colloquium, whose proceedings were published in 1987, brought to light the role played by Maria Luisa Ferrarese Cerruti as excavator, Lucia Vagnetti for the Mycenaean pottery and Fulvia Lo Schiavo for the metallurgy and attention focused on the findings in Sardinia. They are the pioneers of the studies and their paper in the proceedings of the Colloquium was the basis for the debate on Mycenaean findings in Sardinia.

In this report the fundamentals aspects of the following research: the identification of different classes of pottery[26], the identification of the clay sources by archaeometrical analysis (Jones - Day 1987) and the role of Sardinia and Nuragic culture during the Mediterranean Bronze Age.

In this Colloquium another interesting aspect was underscored: imports in Sardinia are not only typically Mycenaean but there are also several Cypriot and Minoan elements (Ferrarese Ceruti et al. 1987, 20-21). This aspect emerged already in the first exhibition and in time the hypothesis of the other components of foreign discoveries has been confirmed (Vagnetti 1982 b, 14). Obviously the Cypriot element, along with the Minoan one, played a major role in the interconnections within the Mediterranean Sea, either for cultural or for chronological reasons.

Lucia Vagnetti confirmed the participation of Crete in the Mycenaean traffic in the west and wrote about the Minoan presence in the pottery found in Nuraghe Antigori (Vagnetti 1985, 825-831) and Birgitta Pålsson Hallager chose Sardinia for her investigations on Minoan pottery (Pålsson Hallager 1985, 300). She concludes that "*ten sherds of the thirty-four published from Sardinia (ca.30%) can be recognized as Minoan and at least four of these attributed to the Kydonian workshop of LM IIIB*" (Pålsson Hallager 1985, 302).

[25] "*Two main groups of material were taken as samples […]suspected Aegean imports and 'Provincial Mycenaean' ware. In addition two examples of a rather coarse, large container and one example of wheel-made Impasto were included . Three composition groups were discernible*" (Jones 1986, 208).

[26] Three groups of imported pottery (Mycenaean, Minoan and Cypriot), a group of local imitated pottery and a class of peculiar local pottery production called "*grigio ardesia*" (Ferrarese Ceruti 1986).

The identified foreign pottery in Nuraghe Antigori and the notice of discovery of a *wish-bone handle* in Tower C was the confirmation of the presence of Cypriot pottery in Sardinia and of the relations between the two Islands of Mediterranean. The paper of F. Lo Schiavo, E. Macnamara and L. Vagnetti about the Late Cypriot import in Italy was a good starting point to explain how the Cypriot component had an influence in Sardinia too (Lo Schiavo 1985). This paper not only does mark a modern beginning of the "*Cypriot*" guidance for the studies on metallurgy in Sardinia, but it is also provides an unprecedented analysis of the Cypriot component in pottery imports, observing this new presence in Sardinia, known as the "*Levanto-Helladic*"or "*Levanto-Mycenaean*" pottery (Lo Schiavo 1985, 5). If the presence of Cypriot bronzes was already known through oxhide-ingots[27] (Lo Schiavo 1985, 10-11), the Cypriot pottery in Sardinia, in early '80s, is a novelty. For example, Lucia Vagnetti identified two different forms of importation of Cypriot pottery in Sardinia: two examples of "*Base ring II"* from Nuraghe Antigori[28] and probably a "*Red lustrous wheel made ware"* found at Su Nuraxi[29] (Lo Schiavo – Macnamara – Vagnetti 1985, 5).

While the 1986 report confirmed the almost total coincidence of results for the analysis[30] of the fragments found in Sardinia with what was expected on an archaeological basis (Vagnetti 1986, 10), the 1987 report "introducing the petrographic component to the analytical program" (Jones - Day 1987, 257) and confirmed "the movement of storage jars to Sardinia from Crete and, […] from Cyprus" (Jones - Day 1987, 263), the characterization of local wares.

The international scope connected to Mycenaean discoveries and ne long list of international conferences being held there, pressed for scientific meetings also in Sardinia. The research goes from the Aegean approach "Mycenaean in the West" to the Nuragical approach "understanding of the reception of oriental culture". The studies passed from the findings' analysis to the historical synthesis.

During the first conference in Selargius "La Sardegna nel Mediterraneo tra il Secondo e il Primo Millennio a.C." in 1986 the Sardinian point of view emerged, as several studies tried to establish a picture of Nuragic civilizations between the second and the first millennium from a Mediterranean perspective.

[27] The attention to the "ox-hide" ingots in Sardinia started with Spano and Pigorini between the late 1800 and the early 1900 and was the subject of several publications (Lo Schiavo 1985, 10)

[28] The Cypriot pottery from Nuraghe Antigori is a small base probably belonging to a closed vessel and found in room A (Lo Schiavo – Macnamara – Vagnetti 1985, 5, fig. 2.4, 6), a fragment of wish bone handle possibly belonging to a bowl from room C (Lo Schiavo 1985, 5, fig. 2.5, 6; Ferrarese Ceruti 1986, 439, fig. 9, 442).

[29] "In 1981 M. L. Ferrarese Ceruti published two sherds from the Nuragic village of Nuraghe Su Nuraxi. One of those sherds (Ferrarese Ceruti 1981, fig. M17), "certainly not Mycenaean, has been published as belonging to the lower part of an open vessel;" […] and after a first direct examination, Lucia Vagnetti proposed to assign it to *Red Lustrous Wheel made ware*, possibly traded via Cyprus".

[30] A critical analysis of the archaeometrical investigations will be conducted in the following chapter.

Giovanni Lilliu introduced the acts of the conference with a synoptic article where he tried to portrait the Nuragic civilization between the II and the I millennium B.C., in the period between the Late and Final Bronze Age (Lilliu 1987). After defining the historical and territorial framework of the Nuragic civilization, well placed within the contemporary socio-historical developments in the Mediterranean, he observes that there are no visible changes in the structures and customs of the Nuragic culture between the LBA and FBA. As regards this topic, it is interesting to pay attention to what he wrote about the material culture.

For example, while he compares cooking pieces of pottery, he writes about the pottery of tower *c* in Nuraghe Antigori and lists the Nuragic forms. Describing the Mycenaean pottery, he makes a classification, maybe unintentionally: "stava insieme a […] avanzi vascolari di importazione tardomicenea (pittura rossa o bruna lucente) e d'imitazione locale della medesima (pittura rosso violacea) prevalente" (Lilliu 1987, 19). He noted that there is not anymore decorated pottery in LBA, a typical feature of the ancient Bronze Age, but recovered during the LBA as applied colour, by "i vasai (o le vasaie?) Nuragici" with an imitation of the Mycenaean pottery (Lilliu 1987, 20). The first approximations on Mycenaean findings in Sardinia are highlighted. The article on tower C does not refer to the first classification of foreign pottery based exclusively on the color, and on which basis can we say that imitated pottery was made by Nuragic potters? An excess of synthesis produces a surplus of information of archaeological data. This explains the carelessness of articles related to the Mycenaean findings in Sardinia. In the same article, the points relating to the exploitation of metallurgy are discussed. Consequently, Lilliu argues that the discovery of ox-hide ingots near the places where the late Mycenaean pottery was found (Antigori) is a significant work of the "prospectors" in search of metals[31] (Lilliu 1987, 23). Although the studies and subsequent discoveries recalibrate the metallurgical studies, the statement on certain peculiarities of Sardinia is still valid. "*Seppur presenti importazioni dal Mediterraneo orientale, in modi particolare quelle micenee, proprio a causa del loro carattere epidermico, non acculturante, son ben lontane dal portare quell'impulso, derivante dall'impatto col mondo egeo, che nella Sicilia del Bronzo recente e finale (Pantalica, Sabucina ecc.) e nei centri proto urbani del proto villanoviano laziale (Sorgenti della Nova, Crostoletto di Lamone e altri:XII-X sec. A.C.) sfociavano nell'applicazione del modello palaziale*" (Lilliu 1987, 27).

The emphasis on the "peculiar" aspect of Sardinia fits well with the aforementioned words of Peroni.

[31] This idea has been a *leit motiv* until today, but as long as we do not have more information, the concept of "Late Mycenaean pottery" is not clear, because the contexts of discovery of "ox-hide" ingots are not useful to provide a clear chronological framework.

Lucia Vagnetti's paper in the Proceedings of the Conference reported considerations which became important passages in many scientific articles relating to Sardinia and the Mycenaean. Although she emphasizes that data still seem insufficient to understand when the first contacts between Sardinia and the Mycenaean world can be dated back to, she stresses the need for the systematic edition of all pottery found and finally she maintains: "per tentare di formulare ipotesi sull'identità degli artigiani che hanno prodotto la ceramica locale di tipo egeo, sia necessario affrontare questo problema in confronto con le analoghe situazioni rilevabili in Italia Meridionale" (Vagnetti 1987, 360). On the basis of archaeological data, she defines Nuraghe Antigori as a "*scalo internazionale*", an international hub, like Vivara and the Aeolian islands during the XVI and XV centuries (Vagnetti 1987, 360). In this period the notice of the discovery of 'Italian' pottery in the harbour of Kómmos (Crete) is issued (Watrous 1985, 7-11). Some interesting aspects emerged. The "Italian" presence in Crete, already presumed by Birgitta Pålsson Hallager (Pålsson Hallager 1983, 111-119) is confirmed and has a Sardinian component too. As at Kómmos grey ware was found and as the wheel made grey ware is typical in Italy, it was easy to infer an association between the gray ware of Kómmos and the "Italian" pottery; consequently the Nuragic findings are put together with the "Italian imports". This is the first aspect that emphasizes a *modus pensandi* and a research line which make a terminological mistake on which it is important to focus, even if both Peroni and Lilliu adopted different points of view. Although Birgita Pålsson Hallager wrote in her article "Even if some of the 110 sherds of this period called Mycenaean and found in Italy are in fact Cretan" (Pålsson Hallager 1985a, 293), she wants to explain there is a difference between "Mycenaean" and "Cretan" in the material culture and consequently in the name. Likewise, although before the exhibition in Taranto Sardinia was "*terra incognita"* for the Aegean Bronze Age (Pålsson Hallager 1985, 300), it would be better to qualify the gray pottery of Sardinia, whose provenance is acknowledged, as *Nuragic* rather than to ascribe it to of the civilizations living in the Italian peninsula[32]. Although there is a little thoughtlessness about Italian pottery and Nuragic pottery, during this period the guidelines of the studies emerged.

In 1987 Smith's work tried to reorganize the data about the Mycenaen findings in the Western Mediterranean Sea between 1600 and 1000 B.C. He wrote very thoroughly on the Western Mediterranean Sea and in his geographical analysis of the findings he differentiated well between peninsular and island issues. Then he rearranged the findings by category: pottery (types of ware), metals, amber, ecc. Finally he tried to identify patterns of the presence of Mycenaean pottery in the

[32] This is, in my opinion, a fundamental, though apparently harmless, mistake but still it is the basis of a lack of clarity. In the historic-archaeological analysis of the Aegean presence in Western Mediterranean there is indeed a widespread tendency to mix the peninsular and island contacts referring to what is now Italy, in its current political geographical sense but that does not correspond to an ancient proto-cultural uniformity.

Western Mediterranean Sea, divided into four chronological phases. He attested, on the basis of existing literature, the first arrival of Mycenaean pottery in Sardinia at the LH IIIB and a strong presence of the findings during the LH IIIC. He related the presence of Mycenaean IIIC pottery with the mineral resources that Sardinia had to offer and adopted the same approach for the sites on the Italian peninsula: "Sardinia becomes the major recipient of imported Mycenaean pottery in the Tyrrenian region" (Smith 1987, 123). He related this findings with the "upheavals in the East disrupted longstanding metal trade networks".

In this period the historical perception of a pre-Greece presence in Italy started, so did the idea of a Mycenaean colonisation. Similarly, two schools of thought emerge, or rather two points of view in research emerge: an "Aegean" and a Western Mediterranean "Italian" perspective.

In 1989 Bietti Sestrieri, after an analysis of the ideas and scholars in debate, underlined that there were "two different perspectives, apparently connected with two distinct archaeological points of view" (Bietti Sestrieri 1988, 23). She was the first to identify the existence of two literature perspectives. She tried to create a not simple and well-constructed model to explain the different social and political structures and the ways of contacts: a parallel analysis of the Mycenaean system between LH IIIA and LH IIIC and the cultures of Southern Italy and Sicily between the end of the second millennium and the beginning of the first, taking into account both the archaeological indicators and an interesting geographical component. Her archaeological model is restricted to Southern Italy and Sicily. Although the scientific system of the model is methodologically very interesting, Sardinia is considered only for few aspects and it is mentioned secondarily and it is not included in the model. This, though it may appear negative, indicates that there is the great understanding by the author of local cultural difference between Sardinia and the rest of the Tyrrhenian Sea.

In the same year the publication about Sardinia and Cyprus by Fulvia Lo Schiavo and Lucia Vagnetti is a good explanation of and a good follow-up to the 1985 article (Lo Schiavo – Macnamara – Vagnetti 1985). This article synthesizes some assumptions and fundamental questions. Rearranging the knowledge and reassessing the idea of Sardinia as a "paradise of metals", the authors make hypothesis to put in relation the findings of Cypriot pottery and the findings of metal products (as the ox-hide ingots and tripods). First, there is a "new evidence in a chronological order that also corresponds to the two classes of findings involved: pottery and metalwork […] with particular attention to the preliminary information about the Kaş (Ulu Burun) shipwreck" (Vagnetti - Lo Schiavo 1989, 217). "The few pottery imports, Lucia Vagnetti wrote, are earlier. Some of them could date back to the XIV century BC, and in no case do they appear later than the XIII century BC. […].. The presence of Cypriot pithos in Sardinia is strictly connected

with the evidence of the *pithoi* found in the Kaş - Uluburun shipwreck, where the pithoi were containers of glass beads or Cypriot pottery (Vagnetti – Lo Schiavo 1989, 221; Bass 1986, 279). The chemical analysis by Jones and Day confirmed that the composition of pithos matches examples from the central-southern part of Cyprus and it also seems very close to a similar pithos of Cypriot manufacture found at Kómmos in Crete (Vagnetti – Lo Schiavo 1989, 221): this is another link between Cyprus – Kómmos in Creta and Sardinia. "The pottery evidence is perhaps not enough to suggest an independent Cypriot component in the more general framework of Aegean (especially Mycenaean) trade with the West" (Vagnetti – Lo Schiavo 1989, 221), but the first contacts confirmed by the pottery during the XIV and XIII century BC are followed most likely by an evolution of metal mining and metal processing (Lo Schiavo - Vagnetti 1989, 233).

In this article the authors "are not suggesting a migration or a colonisation pattern, rather a restricted movement, mostly of craftsmen, towards a land already well known through traders' tales because of its abundance of metal ores".

In the article of the 1989 Conference "Wace and Blegen" published in 1993, L. Vagnetti remarks that "very often the Aegean evidence from Italy has been used to hypothesize a pattern of "colonisation". […] Archaeological findings of Aegean type in Italy have always been found in local settlements and account for a very small percentage of the total. There is no Mycenaean layer separate from local layers and no Mycenaean buildings among the local huts. […] Their arrival would have resulted in the introduction of Mycenaen technologies in the local communities, such as the potter's wheel or more sophisticated agricultural methods, but this can not be regarded as a colonization (Vagnetti 1993, 143-154).

Between the end of the 80s and the beginning of the 90s the idea of an Aegean "precolonization" was put forward, or better the idea of "Aegean prospectors", precursors of the subsequent Phoenician *colonization* in Sardinia.

P. Bernardini explains it very well in two articles in 1989 (Bernardini 1989) and in more detail in 1991(Bernardini 1991). He is the first one to portrait a history of findings and of studies: he reported the stratigraphic information of Nuraghe Antigori and he held that the Mycenaean presence in this Nuraghe was stable with pottery workshops and established by "Aegean prospectors". The aim of his article is to illustrate which significance the LHIIIC component with the Cypriot component had in Sardinia for the following Phoenician colonisation, and to sketch the pattern of flows in Sardinia between the XII and the IX century B.C. He emphasised "*I modi della frequentazione tardo micenea in Occidente ed in particolare I caratteri della presenza tardomicenea in Sardegna nel Miceneo IIIC, non possono essere valutati prescindendo dal dato di questa profonda catastrofe, tradizionalmente legata alla problematica questione dorica, soprattutto*

quando ci si interroghi su quali strutture politiche ed economiche sovrintendano l'approccio miceneo in Occidente in età precoloniale" (Bernardini 1991, 41). He wonders if it is possible to distinguish in a structural sense the *pre-colonial* and the *colonial* phase and to try to identify the characteristics that qualify both the formet and the latter. The presence of material of "pre-colonization" in native sites, in Nuragic sites, and not in "foreign" structured centers is essential. Bernardini proposes to draw a line to connect the Aegean and the East (and also Cyprus) peoples and Phoenician pre-colonization by identifying a homogeneous cultural process through carriers and routes. He believes that a number of "Aegean-East" findings has most probably a Levant origin. So the *vulgate* about the presence of material of the LH IIIC and consequently the Mycenaean participation to the race to the West after the fall of the palatial system begins. Maybe these groups were in search of metals due to a crisis in the Middle East and to the difficulties of metals trade. In this *vulgate* the Cypriot component joins the organization of the journeys from the East to the West and "*la sostanziale concordanza sul fatto che l'approvvigionamento dei metalli occidentali sia il dato fondamentale di natura economica valido a spiegare la presenza precoloniale egeo-orientale; […] è difficile staccare la situazione occidentale dai centri che tradizionalmente in Oriente detengono il primato commerciale di questo tipo di traffico, appunto Cipro con le sue ricchissime miniere di rame ed i prodotti levantini interessati alla rotta siriana dei metalli*" (Bernardini 1991, 43). The reconstructed picture of Sardinia between the XIV and the IX century B.C. by P. Bernardini can be considered plausible only in a wide-range chronological and territorial discourse[33].

After the discovery of Mycenaean pottery in the Iberian Peninsula, in Llanete de Los Moros in the Cordoba Province (Martin de la Cruz 1985), the barycentre of the Mediterranean for the spread of Mycenaean pottery changed.

The 1991 paper of Jones and Vagnetti demonstrated this assumption. In this article there are two new approaches to the debate on the spread of Mycenaean pottery in the Mediterranean. First, in relation to Italy - and consequently Sardinia – the authors write "Central Mediterranean". Second, they use conventionally the Aegean chronology and explain the concordance for peninsular Italy, but "the local sequence of Nuragic Sardinia in the Bronze Age is in the process of being refined with reference to areas of contact in the Mediterranean. Imported and imitated Aegean type pottery still form the essential framework for building a relative chronology, identifying four different periods within the second half of the second millennium BC" (Jones – Vagnetti 1991, 127).

[33] This paper explained a problem with data that persists till today: the presence of LH IIIC pottery in Antigori and in other sites of the Island. The publication on the findings in Antigori did not report many LH IIIC findings, but only two exemples (Ferrarese Ceruti - Lo Schiavo - Vagnetti 1985, p.14). The other samples of pottery ascriberd to the LH IIIC are local imitation. The question is: can we define local (Sardinian) Mycenaean imitated pottery resorting to the chronological and typological definition of the Greece Mainland?

Through the archaeological data and the archaeometric analysis they try to explain a pattern of traders and craftsmen during the II millennium in the Mediterranean Sea. Sardinia received a particular attention for the analysis of pottery and for the role played during the second millennium. After an illustration of archaeological evidence Jones and Vagnetti proposed a scheme of the spread of materials, traders and craftsmen. In relation to Sardinia and the trade: "at least from the early XIII century BC […] continuing in the XII, we are able to identify Aegean–type metalwork produced in Central Mediterranean" (Jones - Vagnetti 1991, 140). In Sardinia the different type of findings (not only pottery) distributed in many sites of the island (not only along the coast), the chronological period, the simultaneous coexistence of Nuragic pottery and imitated pottery (well made pottery in Italy and indigenous hand made pottery), have configured "the particular nature of the sites involved" . The area "is the Cagliari Gulf where the site of Antigori could reflect the activity of an emporium in the vicinity, having a better harbour" (Jones – Vagnetti 1991, 141).

Antigori played a role in the extensive trade network and had resident Mycenaean presence represented by traders and possibly craftsmen. (Jones – Vagnetti 1991, 141). This inevitably influenced "the decisive role played by Sardinia in long-distance trade during the final part of the second millennium […] the interesting evidence about the island's part in the much more elusive trade at the beginning of the Iron Age"[34].

With the findings of the alabastron in Nuraghe Arrubiu in Orroli, the reflexions on the chronological problems began. The alabastron is, with the fragment of the ivory head warrior, the most ancient Mycenaean finding of Sardinia and allows to identify quite easily the first contacts between Sardinia and the Mycenaean world. Indeed, the alabastron well matches with specimens of LHIIIA:2, either in the Helladic mainland or in the Mediterranean (Lo Schiavo – Vagnetti 1993, 134-137). The presence of Mycenaean imported pottery in an inland site of the island raised many questions about the geography of the findings: the distribution of the material, the possible location of landing places along the coast and the inland trade of the Aegean materialand so on and so forth (Lo Schiavo- Vagnetti 1993, 139 -142).

In the 90s, despite the discovery of other "Mycenaean" fragments in other parts of the island, the interruption of the excavations in Nuraghe Antigori caused a lack of new stratigraphic reference documents that might well place the new findings[35]. However a very significant aspect emerges in

[34] In a different way the last two articles analysed portray Sardinia as the elected place in the *pre-colonisation*. This *pre-colonisation* plays a fundamental role in establishing the interaction in the period which reached the highest in contacts between Sardinia and the Aegeum and in bronze production and mining. While metals are the trading goods between the end of the second millennium and the beginning of the first, the following chapters will aim at providing food for thought in order to better understand the contacts of the second half of the second millennium.

[35] For example, the difficulty about the stratigraphic situation at the top of the hill of Murru Mannu at Tharros (Bernardini 1989, 287). The stratigraphic context in which Aegean pottery was found is controversial, as is the chronology of the Nuragic pottery found together with it.

this period. The findings (Mycenaean pottery, ivory ecc.) date back between the XV and the XIII century B.C., however they seem to be regarded only as a springboard for subsequent articulated relations between the XII and the IX century. These relations would have quite plainly the metals as the undisputed protagonists of links between Sardinia and eastern Mediterranean.

As Lucia Vagnetti pointed out, the outcome of archaeometric activities still provided important information (Vagnetti 1993b). Archaeometry leads to the postulate: "Aegean / Mycenaean pottery = imported pottery ". It helped to identify the different pottery tradition in Italy, especially to conclude that, as she wrote, "*mentre i materiali esaminati archeometricamente di epoca più antica (XVI-XIV sec. a.C.) risultano tutti importati, le imitazioni cominciano ad affiancare le importazioni soprattutto a partire dal XIII secolo, fatto che ci impone di analizzare i due fenomeni sia in senso diacronico che sincronico*" (Vagnetti 1993, 47). In addition, the archaeometric analysis revealed that in Sardinia the production of Aegean-type pottery was manufactured in the same place and had existed at least since the XIII century B.C.: this proves that there are different characteristics, technologies and concepts in the production and that the circulation of the material is limited to the island.

In these years some archaeometrical investigations began to confirm that the ox-hide ingots found in Sardinia were manufactured with copper from Cyprus (Bernardini 1993, 29)[36].

In the same period a dibate started on the metallurgic activity of Nuragic Sardinia and about the chronology and type of a possible Cypriot influence or direct contribution in the Nuragic bronze work. The data presented in the article by Paolo Bernardini "*Considerazioni sui rapporti tra la Sardegna, Cipro e l'area egeo-orientale nell'età del Bronzo*" (Bernardini 1991, 29-67) highlight the difficulties and problems from the XII century B.C. until the early Iron Age concerning the movement of people and goods in a *pan-Mediterranean* view Copper and bronze production being the index fossil, he portrays Sardinia as one of the protagonists of the final bronze age and the early Iron age.

Bernardini suggests the idea that a Cyprus-Levantine carrier (rather than a Cretan-Mycenaean one) directed the flow of *pre-colonisation* in Sardinia after the XIV century. This could explain the continued presence of significant Cypriots findings even after the XII century and the following Phoenician penetration at the beginning of the Iron Age (Bernardini 1993, 51-52).

The end of direct study in Nuraghe Antigori marked a watershed in research activities. After the last publication on the excavation's data, time is ripe to write about the historical significance of archeological data.

[36] See the reported bibliography of Bernardini's article (Gale-Stos Gale 1987, 135-177; Stos Gale 1992, 317-346; Lo Schiavo- Maddin Merkel-Muhly – Stech 1990, 46-102)

The situation in Antigori was a lucky "unicum" (even though there remain many unanswered questions) but what Giardino wrote in his monography "West Mediterranean between XIV and VIII century B.C.- Mining and metallurgical spheres" is true (Giardino 1995).

Sardinia in the first half of the 90s still has a very problematic chronological framework, both because it was different from the other regions of the Italian Peninsula and Europe, and for the peculiarity of the Nuragic culture (Giardino 1995, 40). According to Giardino, there are very few elements to reconstruct a clear image of Nuragic culture during the Bronze age. He argues that there was only a table published by Contu in 1980 with absolute chronological data with radiocarbon calibration; the only indication about Nuragic culture was the classification in five Nuragical phases adopted by Lilliu in 1982 and based on the stratigraphic sequence of Su Nuraxi in Barumini; finally the data emerged from the "Mycenaean pottery" in Antigori and the Nuragic pottery found in Lipari. (Giardino 1995, 40-41) He remarks "*non è stato ancora possibile elaborare una sequenza cronologica complessiva delle varie classi di materiali, sia a causa della lacunosità nell'edizione dei reperti, lacunosità che impedisce di realizzare uno studio tipologico globale, che anche per via delle peculiarità stilistiche dei manufatti ceramici e bronzei sardi, che spesso non permettono precisi agganci con altre culture protostoriche*" (Giardino 1995, 42). Maybe all these elements together resulted in a bullish chronology for some phases of the Nuragic period. "*Fulvia Lo Schiavo, nei suoi studi prevalentemente rivolti all'esame dei bronzi sardi, ha più volte indicato come i contatti con altre aree culturali, e segnatamente con il mondo cipriota-levantino, obbligassero ad una visione rialzista*" (Giardino 1995, 42). The ferment on the chronological problem began in the 90s.

With the purpose of finding a solution for the large void on a reliable chronology of the Nuragic age, the "Sardinian Stratigraphy and Mediterranean Chronology International Colloquium" was held at the Tuft University in Massachusetts. The need to interface the Nuragic chronology with the Aegean one, especially after the confirmation of the presence of Nuragic pottery in Kommos (Crete), comparable with the "grigio ardesia" pottery found in Nuraghe Antigori (Watrous 1992), became essential. The various problems of interpretation and conflicts between the relative chronologies still prevent from appreciating a chronological synchronism, but the contact between the Aegean and Sardinia lays down new and positive basis for research; as Manning wrote: "The conference at Tufts brought the welcome challenge to do the reverse, and for Aegean archaeology to look west" (Manning 1998, 298). The conference showed that "Sardinia is tightly linked to the pattern of Bronze Age long-distance trade in the Mediterranean" (Vagnetti, 1998, 285). Lucia Vagnetti remarked the basic points achieved by the research on the basis of a distribution map displayed for the proceedings of Colloquium by Licia Re (Re 1998, 287-290). Imports from

mainland Greece, Crete and Cyprus are certain: the peak of the imports, mostly pottery, can be assigned to LH IIIB, while evidence for LH IIIC is very limited and the large majority of painted pottery is not imported. The evidence of Pithoi imported from Cyprus and Crete can be related to the cargo of the *Ulu Burun* and *Point Iria* shipwrecks (Vagnetti 1998). Finally, the distribution's map illustrated that a new evidence emerged: the Mycenaean pottery or Mycenaean-type pottery were found on sites that later became major Phoenician centers and "this may add further fuel to the discussion of the role of Sardinia in the crucial transition between the Bronze Age and Iron Age, when long-distance trade fades and colonization is imminent" (Re 1998,299).

Another occasion for reasearchers to exchange their personal perspectives on the connections occurring in the Aegean, central and western-Mediterranean areas, was provided by the Italian Simposium of Aegean Studies in honour of L. Bernabò Brea and G. Pugliese Carratelli titled "Epi Ponton Plazomenai". During this conference new information was presented. Although most of the articles were focused on issues purely pertaining to the Aegean and southern Italy, an important aspect emerged related to the so called "pseudo-mynian pottery" and "barbarian ware" (better called "hand burnished ware" or "Handmade burnished - HMB")[37] and its potential relations with the "gray pottery" found in southern Italy, particularly at the site of Broglio di Trebisacce[38]. Clarissa Belardelli and Mario Bettelli studied the spatial distribution of gray pottery and HMB in *Raum* 127 at the *Unterburg* in Tiryns. After the classification, they identified in Tiryns four *gray pottery* classes, that are the same as the gray pottery at Broglio (Belardelli 1999, 453). Referring to the classes of "gray pottery" at Tiryns, Belardelli also wrote: "*É da segnalare, inoltre, la presenza di una fabbrica nuova, riconoscibile per l'ingubbiatura spessa di colore 'grigio ardesia' che sfuma al rossastro e dall'argilla molto compatta di colore rossastro o rosato. A tale fabbrica sono da riferire tre forme aperte, fra cui un frammento di ciotola carenata e un fondo distinto*" (Belardelli 1999, 453; fig. 1.15, 452; fig.2.31, 2.32, 2.33, 2.44, 454) There is no proof that the denomination "grigio ardesia" is connected to the "grigio ardesia" Nuragic pottery identified by Ferrarese Ceruti in Antigori and classified by R. Relli (Relli, but Marco Bettelli in his PhD thesis made the comparision explicit and wrote: "*La particolarità della realizzazione in ceramica pseudo minia non deve meravigliare; infatti in Sardegna è presente una categoria ceramica, la cosiddetta 'grigia ardesia', che in alcuni casi possiede caratteri tecnologici simili come le superfici ben lucidate. Se i confronti proposti si rivelassero pertinenti, sarebbe questo il primo caso di un'imitazione di ceramica di tipo Nuragico presente nella Grecia Continentale*" (Bettelli 2002, 129; fig. 56, 127).

[37] *"[…] non tornita, con le superfici spesso lucidate, completamente differente dalla tradizionale produzione micenea per forme, decorazioni e naturalmente tecnologia*" (Bettelli 1999, 461)

[38] "*Una classe di produzione specializzata eseguita al tornio, che ora sappiamo essere locale e fino ad allora rinvenuti in alcuni siti dell'Italia meridionale in associazione con materiale egeo riferibile per la maggior parte al TE IIIB e C*" (Belardelli 1999, 451).

During this period, the study of typological classification and of published Nuragic pottery by F. Campus and Valentina Leonelli is released (Campus - Leonelli 2000). The 1998 Conference in Lido di Camaiore "*Criteri di nomenclatura e di terminologia inerente alla definizione delle forme vascolari del Neolitico/Eneolitico e del Bronzo/Ferro*" tried to bring order in the Babel of names for pottery's shapes in the prehistoric and protohistoric peninsular and insular Italy.

Obviously Nuragic archaeology could not be exempted from this work, although "*lo stato attuale degli studi sulla materia in Sardegna è penalizzato dal numero ancora troppo limitato di contesti di scavo pubblicati nella loro completezza*" (Cocchi Genick 1998, 497). As the process of approaching the Nuragic culture of the Bronze Age to the subdivision used in the Italian peninsula had already started (Contu 1987, 13; Peroni 1996), in the same way, Nuragic pottery production had to be organized according to the guidelines adopted in mainland Italy. The pottery's classification caused the Nuragic culture to have a relative chronology splitted into the Bronze Age and not anymore subdivided in Nuragic phases, although Contu wrote "*la suddivisione in Bronzo Medio e recente viene riportata solo allo scopo di poter avere un certo riferimento all'ambito extrainsulare*" (Contu 1987, 13).

The Nuragic age was gradually synchronized with the division of the Bronze Age adopted in the peninsula[39], which is the conventional system that corresponds approximately to the Middle and Late Bronze Age of the Italian peninsula with the LH. In this regard, Mycenaen findings shed some light on Sardinian proto-hystoric culture, Nuragic pottery in Kommos, in Lipari (Contu 1980; Ferrarese Ceruti 1987; Cavalier - Depalmas 2008, 281-300) and in Cannatello in Sicily (Levi 2000, 234).

Through the reorganization of knowledge, the scholars involved in the Congress in Lido di Camaiore "*L'Età del Bronzo Recente in Italia*" attempted to give a picture of Nuragic Sardinia during the Late Bronze. It is very interesting to note the methodology used for that work. The starting point was the LHIIIB: the chronological framework within which the Nuragic pottery fragments were found at the port of Kómmos (Crete). Second, the identification of sites where some material of the same type as that found in Kómmos had been discovered. Finally, the identification of all the sites where the materials identical to those in Kómmos were in combination with other materials of different characterization. (Lo Schiavo et al. 2000, 357).

The article on the pottery of the Late Bronze Age by G.Ugas, C. Lugliè and S. Sebis plays a very important role. After a summary of the recent studies on chronology[40], almost with a deterministic

[39] *Bronzo Antico* (BA) =Ancient Bronze Age, *Bronzo Medio* (BM)= Middle Bronze Age, *Bronzo Recente* (BR)=Late Bronze Age and *Bronzo Finale* (BF)=Final Bronze Age.

[40] The Colloquium at Tufts University and the observations on the calibration of radiocarbon data presented by Wiener, Manning, Betancourt etc. are the main reference for the chronology of the Nuragic Age.

certainty, the authors confirm what Ugas already presented during the colloquium at Tufts: "*In Sardegna il BR si sviluppa tra la fine del XIV e la metà del XII sec. 1330-1150 a.C.), in piena sincronia con il Subappenninico, Thapsos II e Pantalica I, l'Ausonio I, il Miceneo IIIB e il Tardo Minoico IIIB. Nell'ambito del BR sardo si distinguono due distinte facies archeologiche denominate Muru Mannu e Antigori*" (Ugas - Lugliè - Sebis 2000, 399; Ugas 1998,251-272)).

These two facies, recognized through pottery, derive their name from two sites where Mycenaean pottery imports were found. If the main indicator of the Muru Mannu facies is the black ceramic, glazed on all sides, usually in open forms, the chief indicator of the Antigori facies is the "*Grigio Ardesia" pottery "argentea, ingubbiata, lucida, di ottima qualità, realizzata con il tornio lento come si evince dalle sue tracce lasciate soprattutto sulle superfici interne delle anforette ad anse ellittiche*" (Ugas Lugliè Sebis 2000, 402). Should researchers accept and opt for a indentification of three pottery facies[41] during the Sardinian Late Bronze Age, then, the considerations on the "grigio ardesia" pottery regarding the derivation from the 'pseudo mynian ware' (Ugas - Lugliè - Sebis 2000, 402) and the derivation of the yellow slip neck amphoras from the yellow Mynian pottery (Ugas Lugliè- Sebis 2000, 402) might seem careless.

Despite the scarcity of the published contexts and some naïvety with "diffusionismus" background (Ugas -Lugliè- Sebis 2000, 402-404), the article began to focus on the framework of the LBA Nuragic pottery, and tried to create the chronological comparison that would allow more interaction between the Nuragic archeology and the contemporary Mediterranean archeology.

As the author wrote in the previous pages, scientific questions to explain "the nature" of the presence of Mycenaean products in Italy were raised.

Lucia Vagnetti, in her 1999 article, after having republished the distribution maps of the Mycenaean material in the central Mediterranean basin, with a chronological mapping, used the Broglio di Trebisacce case study "to define the functional value of the Mycenaean pottery found in central Mediterranean and the relationship between imported and locally imitated vessels, and to reconstruct at least some aspects of the *chaine opératoire* that is connected to its production and use, should be based on the study of reasonably well-known archaeological contexts" (Vagnetti 1999, 142). She asked herself: "What was the meaning and function of the three classes of specialized pottery at Broglio and other sites in the region? What was their relationship with the local potting tradition? Who were the potters involved in their production? […] What about the gray wheel-made ware? Is this pottery aimed at satisfying the local habit of dark-surfaced vessels, or is it a cheap substitute for silverware? And from the craftsmen's point of view is it the achievement of

[41] To the two mentioned chronological facies (Muru Mannu and Antigori) a third facies "ceramica a pettine evoluta" joins. This third facies, recognized by S. Sebis had limited contexts to have a good typological picture (Sebis 2000, 405)

local potters who learned new technologies from visiting Aegean potters?" (Vagnetti 1999, 148-149). The same questions could be addressed in relation to the findings in Sardinia and would be a starting point from which it is right to begin the research.

In 1999 a conference about the wreck of Point Iria added new elements to the traffic in the Mediterranean during the second millennium. Together with the wrecks of Uluburun and Cape Gelidonya, the wreck at Point Iria creates a framework with complete information on cargos in the Mediterranean Sea during the II millennium B. C.

The pottery preserved in the cargo was studied in stylistic terms by Yannos Lolos and Day P. attempted to give the resulted analysis from thin section under the polarising microscope (Day 1999, 60). He presented four analyzed groups of pottery. He found that "the pithoi of Point Iria are similar in composition to the examples from Nuraghe Antigori in Sardinia and Kómmos in Southern Crete" (Day 1999, 62). Increasingly, the Mycenaean presence on the island looks like a "training session" to the next step of the XII century and the metal production *boom* of that characterizes the island, and have the attention of most scholars.

The archaeological literature of the last years does not offer historical solution about the Mycenaean presence in Sardinia. Despite reference to it is oftenn made during international meetings , in which the material found and any new acquisition have been published (Lo Schiavo 2003), the issue that characterizes nuragic archaeology is clear. "This is hard and time consuming work, much affected by the continuing scarcity of information available on the extraordinary archaeological heritage of Nuragic Sardinia. An aspect that should always be kept in mind is that research develops, not in correspondence with the archaeological excavations, but with the publication - generally only preliminary and very rarely exhaustive of the discoveries" (Lo Schiavo 2003, 15).

Attempts to chronological comparison[42] is not sufficient yet to provide answers and it is true that "the role of Mycenaean pottery in international exchange during the Late Bronze Age is not properly understood" (Van Wijngaarden 2003, 1) and "the significance of these ceramic items in an international economy that was probably based on the circulation of metals is by no means clear" (Van Wijngaarden 2003, 7).

Likewise, there seems to be no comprehensive and proper answer as to the presence of Cypriot elements in Sardinia, although the attention for both metallurgic production and scientific literature is higher. The latest publications on the analysis of copper in the ox-hide ingots found in Sardinia confirm that they were produced using Cypriot copper, not Sardinian copper (Lo Schiavo 2005) and

[42] Based on pottery evidence (Mycenaean pottery in Sardinia and Nuragic Pottery in Italy and Crete) three phases are identified by Fulvia Lo Schiavo in her article of 2003. "*1. LH IIIA2-LHIIIB, Italian end MBA3-RBA (ca 13thcentury BC). Kommos (Crete) and Cannatello (Agrigento, Sicily); 2. LH IIIC, Ausonio I-II, Italian FBA1-2 (ca.middle 11th – middle 10th century BC) Lipari Acropolis; 3. Italian FBA3-EIA1 (from ca 10th century BC onwards). Nuragic askoid jugs"*. These three phases are currently discussed by archaeologists, particularly for the FBA and EIA.

bring the very idea up for discussion again, namely that Sardinia could have been the main producer metals in the western Mediterranean Basin, between the fourteenth and twelfth centuries BC. The link between Nuragic Sardinia and Cyprus indeed relates to metallurgical activities[43], but researchers do not seem to agree on how the Cypriot Nuragic civilizations first got in contact with each other: “the presence of people coming from Cyprus and settling in Sardinia is missing”(Lo Schiavo 2005, 315; Bernardini 2010, 41).

The recent discovery of two Nuragic vases at the Pyla Kokkinokremos site (Karagheorgis forthcoming) will provide with new information on Mediterranean exchanges between Sardinia and Cyprus.

Over the past 10 years, with respect to the period between the twelfth and the ninth century BC, a specific subject has drawn much attention in the scientific literature on Sardinia's protohistory. The idea of an association between the "sea peoples" and the Tyrrhenian area has been more and more accepted, therefore considering the Sherdens, the Shekeleshes, the Turshas and the protohistoric groups from Sardinia and Sicily as a single civilization.

In 2000, Lucia Vagnetti wrote an article that was expected to serve as a response to the "High Barbary" chapter of Sandars' book (Sandars 1978, 81-103). Through a synopsis of the Bronze Age sequences in the Italian peninsula, Sardinia and Sicily, the analysis of geographical and cultural differences and interactions between the East and the West Mediterranean Sea, especially Cyprus, provides useful data with these identifications (Vagnetti 2000, 305). Although relations were kept between the sixteenth and the thirteenth century, despite the collapse of the Aegean palatial structures, there is no evidence of a ‘colonization’ of the Aegean groups in the western Mediterranean Sea, but the Bronze Age in the Western Mediterranean Sea (from XII BC on) is anything but a time of crisis. Despite the huge number of publications on the subject, despite the case for or against, there seems to be no solution: “archaeological evidence is but one piece in a puzzle that must be worked on equally by philologists, historians, and other specialists” (Vagnetti 2000, 319). The debate on the identification of the peoples of the sea is currently open and, in turn, has shifted the focus on that timeline that marks the contemporary literature on Nuragic Sardinia, i.e. the end of the Bronze Age and the early Iron Age, the resulting chronological attribution of the bronze figurine production, the influence of bronze production in Cyprus, the cultural interaction, and finally the encounter with the Phoenician people and the fully-fledged colonization.

In 2001, Paolo Bernardini highlighted a concept he had previously described in detail, that is, in the struggle between the East and the West, during the precolonization and colonization period, the East

[43] See, in addition to the findings of ox-hide ingots also all silversmith tools, the votive tripod etc. (Lo Schiavo 2005, 305-315)

prevails over the West. (Bernardini 2001, 28). He makes a good point: "*che sono proprio i modi dello sviluppo interno, locale, delle comunità indigene che influenzano, condizionano e provocano le forme dell'incontro con i naviganti dell'Oriente; non esiste in atri termini, una Sardegna micenea, una Sardegna cipriota o filistea o fenicia, ma una Sardegna nuragica che si sviluppa e si trasforma anche attraverso il rapporto con i Micenei, i Ciprioti, i Filistei e i Fenici*".

Similarly, Fulvia Lo Schiavo: "there is no gap in the cultural development of Nuragic Sardinia from the MBA to the EBA and LBA, nor detectable changes, but a "grown trend" (Lo Schiavo 2001, 134, 142-5; Lo Schiavo 2003, 28).

But even if there is a historical explanation for the Mycenaean presence in Sardinia, several contributions have recently helped acquire new data, which provide a better understanding of its evolution. Namely, the records of the Conference held in Senorbi, in December 2000, published in 2005 and 2008, the "I Nuragici, i Fenici e gli altri" conference in 2007 and finally the Scientific Meeting of the Italian Institure of Prehistory, held in Sardinia in December 2009. From an article by Paolo Bernardini, published in the Records of the Senorbì Conference, it is possible to construe the main questions concerning Sardinia and the Mycenaean (or Aegean) world. Talking about Sardinia in a cultural perspective is the primary purpose of this essay.

Bernardini draws a schematic picture on the historical process that involves Sardinia between the sixteenth and sixth centuries BC, describing it according to the analysis of relevant scientific literature, almost like a two-act drama, that may be entitled "The others' island" (Bernardini, 2005, 10). The first part of the drama consists of the greatest blooming of Nuragic architecture, where the first contacts with the Aegean world may be observed and that witnesses the beginning of its influence on the Cypriot bronze figurine production; while the second act occurs during the final centuries of the Bronze Age, that "*ripropongono letture, che condizionate da un lato dalla visione di un grande impero miceneo che progressivamente assorbe e vivifica la sua periferia occidentale, dall'altro dal concetto del commercio fenicio come sostanziale preparazione alla successiva fondazione di colonie, restituiscono l'immagine di una Sardegna precolonizzata, i cui debiti verso la Grecia micenea e la Fenicia oscurano il reale dato storico dello sviluppo interno di una civiltà che assume una propria specifica e precisa identità culturale*" (Bernardini 2005, 11; Bernardini 2010, 32).

And although, over the years, many have regarded Sardinia as an Aegean province during the last and final stages of the Bronze Age, the time feels ripe to try a more pragmatic and cautious approach, based on available data, in order to clarify the process.

17 sites have been listed so far, where Mycenaean ceramics and material have been found in Sardinia (Usai - Lo Schiavo 2009, 11-13, Soro, 2011), and although there are still some key issues

over the cultural impact of these contacts, although the questions are still open, a new awareness seems to have been reached: "*quali che siano state le motivazioni prime che hanno determinato l'inizio della navigazione verso ovest, la ricerca dei metalli ha costituito solo una parte di esso e certo non ha esaurito l'interesse delle popolazioni egee e vicino orientali*" (Usai -Lo Schiavo 2009, 10). And maybe, attention should be paid to those perspectives that show the "continued and penetrating attendance, oriented towards the exchange of goods and technologies, primarily of sepcialized pottery and agricultural produce, and the manufacturing and processing of products" (Usai – Lo Schiavo 2009, 10).

2011 will be remembered as the time when, after twenty years of research, the work on the archaeological excavations of Nuraghe Antigori was finally published. In April 2011, a booklet was presented, as a pre-print publication of a book that will include the unpublished proposals regarding Nuraghe Antigori, written by students from the Maria Luisa Ferrarese Ceruti school, and a series of new interventions, which should provide a more comprehensive picture of what is currently known about this Nuragic monument, an important symbol for both the Mycenaean and Sardinian peoples.

2 EXPERIMENTAL LAND EVALUATION

The literature reviewed has displayed some initial attempts to adopt a territorial and geographic approach, in particular, in the evaluation of archaeological sites in Southern Italy, where Mycenaean and Aegean materials have been discovered.

Several studies focused on the reorganization of collected data through the creation of territorial models showing the spread of Aegean products (Smith 1987, Bietti Sestrieri 1989) and distribution maps which provide a chronological-territorial visualization of Mycenaean pottery in the Western Mediterranean Sea (Lo Schiavo - Vagnetti 1993, Vagnetti 1999, Re 1998).

At the same time, however, no sustained interest has been shown in the topographic analysis of the sites under study, with the exception of those on the coast, which might have been used as harbours. This aspect has in fact prompted in-depth territorial analyses of the sites in which Mycenaean and Aegean materials have been found in Sardinia.

A new methodological proposal for archaeological-territorial investigation is espoused in the following pages, aiming to promote a better understanding of accessibility and reachability of the sites in Sardinia, in which Mycenaean pottery has been found. The following pages deal mainly with the implementation of a landscape evaluation technique, carried out on the basis of the natural sciences, to understand the accessibility of the sites, and the resulting trial of the reconstruction of the road network, so as to find new indications to better understand the distribution of Mycenaean material.

The study of the accessibility and reachability of sites is a new starting point and promotes the understanding of the intercultural dynamics and processes between the Eastern and Western Mediterranean Sea during the II Millennium B.C., a complex movement in which Sardinia played an important role.

The choice to approach a territorial archaeological study of the above-mentioned sites, starting from an experimental methodology, has deliberately set aside the biases of the scientific circles on “the Mycenaeans and Sardinia”, which in turn have often resulted in a sterile debate due to the upholding of rigid positions, which today lack innovation and drive for new research-based developments[44].

[44] The chapter on the history of the studies and the discoveries aims to provide a comprehensive view of the scientific stances which have emerged since the early 1980's.

- **Aims and objectives**

The studies of Mycenaean material in Sardinia have traditionally aimed to understand trade, the nature of the exchanges, the itineraries adopted in the Mediterranean area in the II Millennium BC, and as a final question, what population or group of populations transported the Mycenaean material (Lo Schiavo - D'Oriano 1989; Bernardini 1991; Bernardini 1994, 29-67; Ferrarese Ceruti et al. 1987, 7-37) and the Nuragic one, especially after the finding of Nuragic pottery at Kómmos (Creta).

The following chapters will clarify and examine in great depth issues relating to Mycenaean and Cypriot maritime practice (Wedde 2000; Höckmann 1968; Höckmann 1987; Casson 1971; Knapp 1998), also in relation to Sardinia. What seems a more arduous task, also due to the lack of relevant documents[45], is the description of the same practices in relation to the Nuragic people[46], on the basis of bronze artefacts portraying small boats and ships[47] or on the basis of the widespread idea that the mineral wealth of the island beckoned peoples throughout the Mediterranean Sea and on that of the discovery of Nuragic material in other sites along the coast.

This work will start from the premise that, given the certainty of the presence of Mycenaean material in Sardinia, and given their having been able to arrive there exclusively via the sea, the study should aim at evaluating the reachability via land of the sites in which the Mycenaean material has been found.

In other words, given the *n* sites in which the Mycenaean material has been found:

1) what is their relationship with the surrounding territory and above all with the sea?

2) since not all the sites have direct contact with the sea, how did they relate to each other from a territorial analysis perspective?

3) may the distribution of the material be a consequence also of the position of the sites in the territory?

The fact that the archaeological evidence is clearly visible in the interior of the island has prompted the curiosity to understand whether, to what extent and how the island territory was influential in the distribution of the Mycenaean material and whether a road-based network for the distribution of this material may be hypothesised.

- **Justification for the research project**

Before proceeding to analyse some of the procedures to be adopted, it is important to evaluate whether the available data allow the carrying out of the research project.

[45] As regards the mythological figures linked to Sardinia, which inevitably concern the general problem of the classical sources for the island, see the considerations in section 1.1.

[46] As early as in 1937 the term “talassocrazia nuragica” was used (Patroni 1937, 17; 257; 343; 457)

[47] With regards to this, a catalogue has recently been published containing the main examples of bronze boat models: Le Navicelle Nuragiche by A. Depalmas (2006).

First of all, interestingly the number of sites in which Mycenaean material has been found most certainly does not facilitate archaeological research; and the same applies to the number of finds per site[48]. Unfortunately, archaeological research must make do with the scarcity of material evidence, and even more often with the scarcity of contexts.

It would certainly be arduous to consider carrying out, for example, a statistical study of the site; yet the uniqueness of the finds and their archaeological value, that testify to their transport and exchange in the Mediterranean area during the II Millennium BC, are the basis from which the input must depart, even for a research project. From a methodological point of view, this may appear less *traditional*, compared to those carried out to date. The presence of Mycenaean material in the island is beyond discussion and its quality notwithstanding, it deserves detailed examination[49].

It is worthwhile to start a territorial archaeological research project on this subject, as the exchanges, above all from the XII century onwards, may have likely been influenced by the mineral resources which Sardinia is rich in, while, to date, no archaeological confirmation of this has been provided.

In any case, the study must focus less on the find itself, and more on what surrounds it, in an analytic and multidisciplinary fashion, aiming at providing a scientifically sound description of the sites within their landscape, and not a mere and simple intuitive observation. The study of today's landscape does not provide us with a mirror-view of the Sardinia landscape during the Bronze Age and the studies concerning environmental changes in relation to cultural adaptation are few in number[50]. It may be maintained that the current landscape in relation to the Holocene landscape between the Middle and Late Bronze Ages has not undergone substantial changes, with the exception of some specific contexts, which will be discussed in a later paragraph.

The territorial elements are those which will influence more, and it is precisely the examination of these elements that will serve as the core of this analysis. For this reason all the historical-archaeological studies based on architectonic structures or on the materials found, aiming at establishing the organisation, the hierarchy, their greater or lesser importance, will not be taken into consideration; rather, with regards to the experimental investigation in the following pages, they will play a minor role and will be integrated only after the analysis of the results of the first investigation.

[48] The case of Nuraghe Antigori is, with this regard, different due to the large quantity of material recovered during the archaeological excavations

[49] It may be assumed that more Mycenaean material may have been found and perhaps not recognised as such, or that further material may come to light in the near future.

[50] http://www.ricercaitaliana.it/prin/unita_op-2005048755_005.htm

- **The choice of sites**

The main problems when carrying out this research project arose from the choice of the sites on which the analysis was to be performed.

To date, the majority of the pottery elements and the finds at Mitza Pùrdia (Decimoputzu) and San Cosimo (Gonnosfanadiga) may be regarded as certain Mycenaean imports. The ox-hide ingots belong to a far more complex debate that concerns the role of the Cyprus island and the use and circulation of copper, in particular, in the light of the recent archaeo-metallurgical analyses conducted on Sardinian ingots, which confirm almost unanimously their Cypriot provenance (Lo Schiavo 2005, 311; 333-342). Although Mycenaean pottery has been found in several sights together with ox-hide ingots (as in the case of Nuraghe Nastasi in Tertenia-Nuoro[51] and the site Monte Zara Monastir-Cagliari[52]), since these are not presented with reliable stratigraphic evidence that may allow a proper understanding of the recovery data, grouping these sites in which ox-hide ingots have been found with those in which pottery material has been found, for this type of experimental study, would mean levelling the Aegean importations to Sardinia both chronologically and typologically. The project will hence include those sites which are well-positioned on the map, and in which the certain presence of Mycenaean material, be it imported or imitation (Vagnetti 1998, 286), has been recorded.

We will examine, for the sake of convenience connected to the homogeneity of material production, only those sites in which the presence of pottery material has been attested.

Since all the work will be carried out with the aid of a G.I.S.[53] platform, greater importance will be given to sites in which the pottery material was recovered during archaeological excavations, as it is easier to locate.

It will be more difficult to analyse the zones in which the material comes from sporadic finds or surveys, in which the discovery was not supported by carto-geographic (IGM, CTR)[54] or device based (G.P.S.)[55] reference.

Following the data that emerge from this first study, we will attempt to evaluate the Aegean importations in a larger framework, building possible bases for future analysis of the distribution of

[51] During the excavations in 1968, two fragments of ox-hide ingot as well as a fragment of painted LH IIIC ware were found in the same layer in Tower B (Lo Schiavo 2005, p. 324; Contu 1968; Basoli 1980, 434, fig. 2; Re 1998, 288, no. 12).

[52] G. Ugas reports: "*Nelle strutture 34S e 25 sono stati rinvenuti alcuni frammenti di piombo e pezzi di rame, riferibili a oxhide ingots" e nelle vicinanze, seppur non in connessione stratigrafica furono ritrovati "5 pezzi di ceramica argolica del Miceneo III B*" (Ugas 2001, 79; Lo Schiavo 2005, 326; Re 1998, 288, n.10).

[53] G.I.S. stands for Geographical Information System.

[54] IGM maps are in a 1:25000 scale and are produced by the Istituto Geografico Militare (Military Geographical Institute - the state body responsible for map-making). CTR stands for Carta Tecnica Regionale (Techical Regional Maps). These are at a scale of 1:10,000, and are obtained by way of sectorialisation of orthophotomaps at the same scale.

[55] With regards to this a scale of reliability has been created for the geo-referentiality of each site.

Aegean material in the island, dedicating the correct amount of attention to all the other forms of archaeological information that have clarified the chronological basis both of the layers of discovery and the material itself.

On the basis of the bibliographical information, 14 sites will be taken into consideration for the subsequent analysis: these are illustrated in the distribution map.

The information relating to each site was entered in a database, which was correlated with a G.I.S. system. This allowed us to produce a file for each containing a summary of the typology of site and the Mycenaean materials found therein (Appendix 1.)

11 of the 13 sites taken into consideration are Nuragic (*Antigori, Sa Domo 'e s'orku, (A)Nastasi, Su Nuraxi, Nuraghe Arrubiu, Corti Beccia, Monti Zara, Duos Nuraghes, Is Baccas*[56], Is Lais, Orosei), whereas 3 probably come from a Phoenician-Punic context (Nora, *Tharros*, S. Antioco)[57].

- **Research methodology**

The analysis of the accessibility of the sites taken into consideration will be carried out, as previously written, in a multi-disciplinary fashion, through:

A) Land Evaluation and the creation of Land Units.

The creation of land units is the result of geo-archaeological and territorial analysis that aims, in this phase of the project, to classify the landscape in terms of accessibility.

Although already familiar in the archaeological field, the implementation of land evaluation techniques is nevertheless a rather recent phenomenon.

However, the experimentation of this research project lies in the implementation of land evaluation methods to the accessibility of the previously mentioned archaeological sites: this is an unprecedented approach in Sardinia-related studies.

B) The creation of a cost model for accessibility (Cost Surface Analysis - CSA) and that of a consequent distribution route (Least Cost Path - LCP).

Cost surface analysis is one of the spatial analysis research methods that involves, by creating a mathematical model, the calculation of the costs of travel in a digital landscape, using the GIS functions[58]. The cartographic product that results is a least cost path, which marks the points in which the cost of travel is lowest.

[56] The finding of a Mycenaean fragment occurred "*sulle pendici meridionali del Nuraghe Is Baccas*"; it was hence decided to use the same Nuraghe as a reference point for the analysis.

[57] The context of recovery at the Macellum and the Forum of Nora, as well as in the excavations of the Cronicario at Sant'Antioco, are of no help in understanding the relationship between the Mycenaean fragments and the recovery context. This however, is not sufficient to eliminate the sites from the territorial analysis.

[58] "Cost surface analysis uses cost accumulation algorithms to calculate the cumulative cost of travelling over a digital cost landscape" (Van Leusen 2002, 61).

In this work, the model will be based on the classification of accessibility, by way of numeric values, and will aim, using this model, to hypothesise a possible path of distribution from the sites, along the coast to some inland sites.

2.1 The creation of land units

Land unit creation and the study of land evaluation did not stem from the archaeological field. Before addressing the issue of their application in the archaeological disciplines and in particular in the following work, it is therefore advisable and fitting to mention in general terms their origins and applications and understand how it has been possible to mediate and experiment with this type of territorial study in the field of archaeology.

In the work “Pedologia”, the term *Land* is defined as: “un’area delineabile della superficie terrestre, che comprende tutti gli attributi della biosfera immediatamente sopra o sotto la superficie, con inclusione del clima, dei suoli, della forma del terreno, dell’idrologia superficiale, dei sedimenti superficiali, delle comunità vegetali ed animali, della struttura dell’occupazione antropica, e dei risultati fisici delle attività umane attuali e passate” (Giordano 1999,).

The use of the terms *Land unit* and *Land System* were adopted for the evaluation and understanding of territorial use (*potential land evaluation*).

This procedure had already been applied in the early 1970's (Beek-Bennema 1972; Brinkman – Smith 1973; Beek 1975, 87-106), yet the concept of evaluation of land was widely defined by the UN Food and Agriculture Organization (FAO) as “the assessment of land performance, whenever used for specific purposes. It involves the execution and interpretation of basic surveys of climate, soils, vegetation and other aspects of land in terms of the requirements of alternative forms of land use” (FAO 1976).

Therefore, evaluating land, or better, physical landscapes, entails trying to estimate their potential for different uses, in an attempt to understand, given a certain type of land, what is the most suitable use for it and vice versa. In other words, given a well-defined practice, which are the lands which are most suitable for it (Giordano 1999, 31).

It is natural that, given such premises, other variables arise which would then be part of that evaluation, such as a time variable and a spatial use of the lands: in other words, how long may one talk about most suitable use and which space of reference is to be taken into consideration?

In fact, that rapidity of change with time following natural and/or anthropic transformations are factors which simply cannot be excluded from a land evaluation analysis, similarly, one must not ignore where the lands to be examined are located. Quoting FAO again: “change in the use of land and in some cases change in the land itself” (FAO 1976, 1).

The Land Units or Systems hence constitute territorial contexts endowed with distinct, peculiar and homogeneous aspects of formation and evolution. They allow the identification of the uniqueness of a landscape and of the characteristic elements, which in future may allow the improvement and management of territorial planning.

2.1.1 The methodological approach to the creation of Land Units

Following a very precise scale, FAO outlined the most suitable methodological approach to embrace for the creation of land units.

This procedure has above all the aim of harmonizing land evaluation canons linked to territorial planning, the evaluation of lands in current economic terms and the creation of projects for development and surveying inherent to the fields of study of FAO. The programme of this organisation, while lying outside the field of territorial investigation linked with archaeology, may also be, in general methodological terms, a valid tool in the archaeological field.

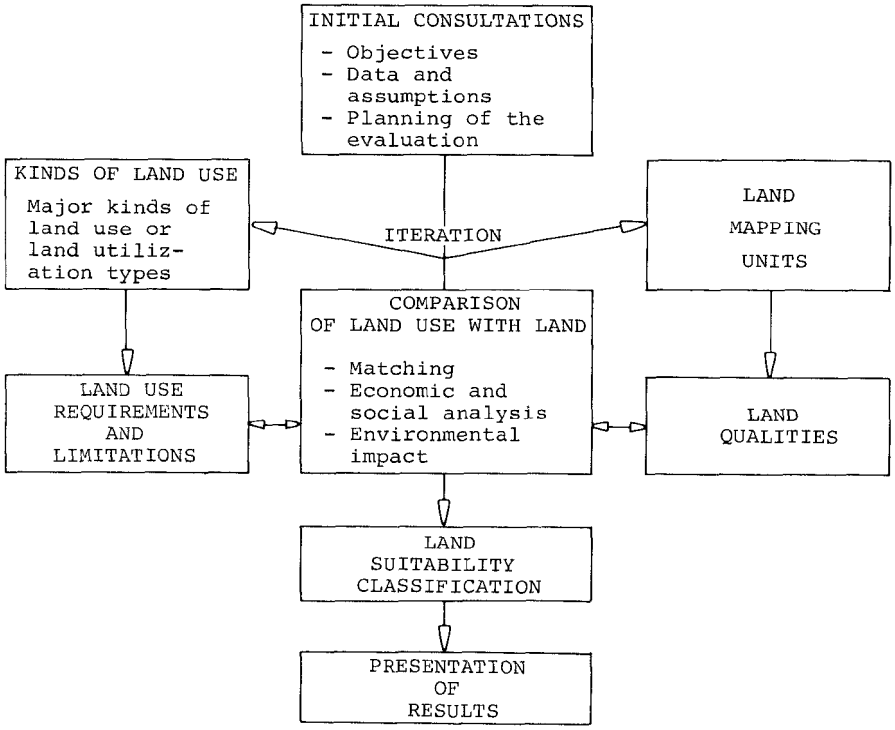

Figure 1. Schematic representation of the activity of Land evaluation (FAO 1976, fig.3, p.4)

A) Initial consultations concerning the objectives of evaluation, the data and the assumptions which Land Evaluation must be based on.

The first step in the creation of Land Units is indicated as being the identification of the aims one intends to reach, so as to be able to better evaluate the strategy to be adopted when trying to reach them: “In all cases, land evaluation commences with initial consultations, concerned with the

objectives of the evaluation, assumptions and constraints, and the methods to be followed", (FAO 1976).

Data collection is a consequence of the objectives to be taken into consideration: the choice of useful maps, the type of analysis, and the considerations to be made before proposing the evaluation, allow the creation of specific and detailed Land Units.

The extension of the area to be taken into consideration is instead often motivated by the Body of Institution that commissions the work or proposes a study of the territory or must be chosen on the basis of the uses which presumably determine that type of area or which may potentially determine its use (location, accessibility, climate etc.). Before deciding to address the matter of surveys, be they extensive or intensive, one must avail of all the information at hand (topographic maps, soil maps, pedologic maps etc.) in order to be able to decide how to carry out a possible survey with the aim of acquiring missing information or that only partially available.

The use of a parallel method, or a method in two stages is determined by the level of intensity to be applied to the Land Evaluation: a two-stage method involves linking the first stage with qualitative Land Evaluation, followed by an approach concerning economic and social analysis, while a parallel method involves qualitative analysis being carried out at the same time as that which is economic and social (FAO 1976, 7).

After the acquisition of data and the decision to proceed with Land Evaluation, it is necessary to describe the quality of the lands, on the basis of the information possessed, and how these are used. On the basis of their description and potential one may outline the main requisite of that land and draw spatial borders for it.

B) Description of the Land Unit map

The identification of the Land Units is followed by the creation of a cartographic representation in which the Units are outlined and characterised. The scale at which the maps is to be drawn depends on numerous factors: for example the greater or lesser detail of the map depends on the way in which the data have been obtained, the available maps that have been consulted and the aim to be reached.

C) Comparison between the use of the land and the land itself

Comparison between the Land Qualities (LQs) and Land Uses (LURs) becomes necessary in order to understand how these two types of information are mutually coherent; in other words, the comparison between that which exists and the real qualitative potential of the land. This stage is the departure point for a deeper evaluation of Land Suitability together with socio-economic evaluation. The FAO indicates three different diagnostic procedures (FAO 1976, 45-48). In the context of

territorial planning this is, together with socio-economic analysis and evaluation of the suitability of the land, the stage from which to proceed to the identification of the places requiring intervention.

D) Social and economic analysis.

The analysis of the social and economic framework is important both for providing a global picture concerning the Land Units, and to help understanding of the extent to which land use is influenced by economic and social factors and how these relate to the real suitability of the land. In a qualitative context, the social and economic aspects are useful above all for the real and general comprehension of the use and potential of the lands taken into consideration. According to a quantitative evaluation, the socio-economic aspect is one which is essential: development projects are examples of this (FAO 1976, 50).

E) Classification of (qualitative or quantitative) land suitability

The evaluation of the capacities of land is indicated as being Land Suitability Evaluation. This may be either qualitative or quantitative. Qualitative evaluation does not have precise estimates of costs and the income relating to the suitability of the land. It is hence based above all on the productive potential of the land. Quantitative evaluation is instead expressed in numerical terms. It is motivated by economic and therefore numerical criteria, which, on the basis of the use of lands and their suitability, aims to calculate costs and income (FAO 1976, 28; Van Joolen 2003, 20).

2.1.2 Land Units in archaeology

The application of the use of Land Units for archaeological purposes was widely discussed in a workshop at a conference in Groëningen, Netherlands, in 2000. The title of the workshop was Potential Land Evaluation in Archaeology (Attema 2002, 185-202). On this occasion an attempt was made to evaluate what the potential impact of the ancient soils on archaeological sites could be and their reciprocal influence (Volpe - Arnoldus-Huyzendveld 2004, 4). The
Groëningen conference outlined the parameters for the use of Land Evaluation in archaeology.
Since Land Evaluation was developed above all for purposes linked to the comprehension of the agricultural potential of lands, it is logical that its application in the field of archaeology is linked to the understanding and determining of the agricultural uses of specific territories of archaeological interest: in other words, the evaluation what the ancient agricultural landscape must have been like.
The result that emerges from the Groëningen workshop refers to "[…] to the investigation of the probable degree of agrarian suitability of a field in the past" (Attema 2002, 185, 6.1) and anticipates problems that are to be encountered in dealing with this new methodological approach to archaeological research.

The methodological approach discussed in the previous paragraph may indeed be, as has been noted, used for archaeological purposes, but it inevitably clashes with the time variable, and with the awareness that the archaeological landscape that appears before our eyes may not correspond to that which must have been the landscape in the period to be taken into consideration together with the archaeological data to which the Land Units are to be correlated (Landscape development). This involves the need to take into consideration the issue of what the technological potentialities of the reference period were, and finally what the perception and real instrumental and social meaning of land suitability could have been in antiquity (Attema 2002, 188, 6.3.3).

Land Evaluation in archaeology is a pathway of logical investigation, yet it is highly innovative and although its methods have yet to be refined, it is a flexible system and can be applied for a large number of purposes.

The Land Unit in archaeology is hence the results of Land Evaluation and may be defined as the synthesis of those aspects of the territory and the landscape linked to the situation of an archaeological site and the territory which surrounds it, which have conditioned its life and conversely have been conditioned themselves by the selfsame site.

The creation of Land Units therefore allows us to compare an archaeological site with that which must have been its landscape with the aim of understanding what reciprocal influence landscape and site may have had on each other. In this way a site-landscape system is created.

For this reason it is possible, not only to evaluate the suitability of a territory for agricultural use, but also its suitability for grazing, for forestry and all other uses which condition the life and death of an archaeological site, and which influence and potentially determine the trade and the movements of the populations that live there.

Since at the basis of the whole research project, the first step to be taken is that of establishing the objectives to be reached, it is also fundamental in the creation of the following map of Land Units to know in advance what information one would like to obtain.

2.2 Innovation and the purposes of Land Units in this work

The creation of the map of Land Units in this work has the aim of evaluating the accessibility of the archaeological sites taken into consideration, and their consequent reachability from the sea, as well as their defensive capabilities; these are fundamental aspects for the comprehension of the distribution of imported material (Mycenaean pottery) in relation to the indigenous substrata.

The innovation in this work consists of the creation of maps and Land Unit files, which represent the negotiability of the territory surrounding the archaeological site and the resulting accessibility of the latter.

This experimentation has indeed forced us to limit the number of sites taken into consideration, to subsequently facilitate interpretation of the data of the analysis, however, it aims to be usable with larger portions of territory, with the aim of evaluating, with the same territorial model, other similar archaeological situations.

It would be interesting, for example, to analyse the settlement situation of a larger number of Nuraghes, in a far larger territorial district, following investigation models based not only on speculative observation, but also in a more in-depth territorial study, of which the following work aims to constitute one of the possible modalities of investigation.

Analysing an archaeological territory following a rigorous classification of its geological, morphological, lithological and pedological prerogatives, with the aim of obtaining information on the nature of the sire, is of far different scientific significance than an evaluation carried out with the mere observation of the site and the surrounding landscape.

Attempting to classify, according to a geomorphologic framework, the territorial situation of an archaeological site on the basis of its accessibility, and that of the surrounding territory, may aid our understanding of the value of the site within its territory, and its resulting defensive capabilities and/or reachability.

In this study the potential success of such an operation depends on the cartographic material and other data available, in particular on the scales and the contents of the various maps.

-Preliminary evaluation

At the outset we decided to create a scale of evaluation of the accessibility of the Land Units with reference to the territory (Sardinia) and the period (Late Bronze Age) in relation to the majority of the sites examined.

When creating a scale of accessibility, we started from an evaluation of what the potential means of travel in the territory could have been.

On the basis of the archaeo-zoological data available at present, the use of the horse and donkey, while quite sporadic, started to occur in Sardinia in the Early Iron Age (Wilkens 2003, 185-187), while, “nell’età del Bronzo si evidenzia l’importanza dei bovini come animali da lavoro. Le percentuali aumentano e i dati sulla mortalità indicano la presenza di numerosi soggetti anziani. Oltre che per i lavori agricoli, è probabile l’utilizzo nell’edilizia e nei trasporti pesanti” (Wilkens 2003, 185).

This suggests that, on the basis of the information at our disposal today, travel in that time took place on foot or with the use of large animals (bovines, for example) and with draught animals that certainly did not allow high velocities to be reached (the horse was absent).

On this basis, one may create an accessibility scale, that follows the scheme elaborated by the FAO in 1978 and in 1983 and is used for determining land suitability.

This scheme proposes an order S (suitable) and N (not suitable) and a class that indicates the degree of a given suitability of a land (1, 2, 3 etc.) (Giordano 1999, 323-326)

The scale created is the following:

Class of Accessibility	Definition
S1	Easily accessible/negotiable on foot, for animals and for draught animals
S2	Possible to access/negotiate with little difficulty on foot, with animals and with draught animals
S3	Moderately accessible/negotiable on foot, difficult to access for animals and for draught animals.
S4	Difficult to access/negotiate on foot or for animals, very difficult for draught animals.
S5	Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals.
N	Inaccessible/impossible to negotiate with ordinary means

Table 1. Classes of accessibility.

2.2.1 Cartographic choices relating to the creation of Land Units and cartographic data to be interpolated so as to build flexible Land Units.

The maps used in this work are above all determined by the objectives to be reached, however, they are also the only available and usable maps for Sardinia[59].

However, on possessing the maps, one is able to produce the Land Units needed for the understanding of the landscape.

The maps used are the following:

- I.G.M. maps at a scale of 1:25,000
- CTR (Carta tecnica regionale – technical regional maps) at a scale of 1:10,000.
- Orthophotomaps at a scale 1:10,000.

[59]An ideal cartographic situation would be that of maps, which could be accessed on a GIS platform, which are the result of geo-archaeological studies of the Middle and Late Bronze Age of the Island or the sites taken into consideration.

- The maps of the Servizio Geologico Italiano (Italian Geological Service) are available in raster format, at a scale of 1:100,000, later geo-referenced[60], on a GIS platform. Their survey scale is 1:25,000.
- Slope maps, extracted from DEM (*Digital Elevation Model*), as a percentage value, with each pixel representing 20x20 m.
- A pedological map at a scale of 1:250,000 in vector format.
- A map of soil use at a scale of 1:250,000 in vector format.
- A map of the catchment network in vector format.

The IGM, CTR and Orthophotomaps were used for the geo-referencing of the sites. A scale of reliability concerning the geo-referencing of the sites was created and inserted in the database. It is distributed in this way:

Value	Reliability of Geo-referencing
5	Instrument based geo-referencing (G.P.S; total station) inserted in a GIS platform.
4	Geo-referencing for monuments indicated on I.G.M. or C.T.R.
3	Geo-referencing for toponyms on I.G.M., C.T.R. or locality.
2	Geo-referencing for territory (commune, province).
1	Not identifiable

Table 2. Reliability of geo-references.

The geological map should allow us to produce maps of the Land Unit at the same scale, though these are unlikely to be in greater detail.

The slope maps, based on the DEM (with each pixel representing 20 x 20 m), are undoubtedly more detailed and wider-ranging than the geological data.

At this point, one may well doubt how reliable (and hence real) the detail obtained by the superimposition of the geological map[61] on an extremely detailed map such as the slope one may actually be.

In order to avoid extreme detail which is only apparent, we decided to subdivide each geological unit into sub-units, defined on the basis of one or more classes of dominant slope.

[60]Geo-referencing of the raster maps was carried out using ArcMap 9.1 (Software ESRI) and Geographic Transformer (Geomarble Software).

[61] "Gli svantaggi di questa carta consistono principalmente nell'elevato denominatore della scala e nella classificazione delle formazioni geologiche per grandi gruppi, resa inevitabile d'altra parte dalla stessa scala adottata" (Cambi Terrenato 2004, 51).

For this reason the slope maps have been subdivided into classes based on gradient, commonly used in Italy for the study of the physical landscape:

Slope class	Slope values %	Slope definition	Landscape definition
1	**0 – 2 %**	Level ground	Level ground
2	**2 – 10 %**	Lightly sloping	Lightly undulating
3	**10 – 20 %**	Sloped	Undulating
4	**20 – 35 %**	Moderately steep	Hilly
5	**35 – 50 %**	Steep	Steep
6	**50 – 70 %**	Very steep	Very steep
7	**> 70 %**	Extremely steep	Extremely steep

Table 3. Slope classes.

Therefore on the basis of the accessibility scales previously proposed in Table 1, flanking suitability for accessibility/negotiability to each slope class, the result is that each will have its own degree of negotiability, divided into the following:

Slope class	Slope values%	Slope definition	Landscape definition	Evaluation of accessibility taking into consideration only slope and the risk of getting bogged down
1	**0 – 2 %**	Level ground	Level ground	**S2**
2	**2 – 10 %**	Lightly sloping	Lightly undulating	**S1**
3	**10 – 20 %**	Sloped	Undulating	**S2**
4	**20 – 35 %**	Moderately steep	Hill	**S3**
5	**35 – 50 %**	Steep	Steep	**S4**
6	**50 – 70 %**	Very steep	Very steep	**S5**
7	**> 70 %**	Extremely steep	Extremely steep	**N**

Table 4. Slope classes with evaluation of their accessibility[62]

[62] It can be seen from the table that slope and accessibility are inversely proportional parameters: with an increase in slope, negotiability diminishes. However, we must not neglect the fact that a slope from 0 % to 2 % may present a considerable risk of getting bogged down, both in unfavourable climatic conditions and for the fact that this typology is generally associated with geo-pedologic formations that make travel slightly more difficult. These associations have been made on the basis of personal experience during archaeological and geo-archaeological surveys as well as hiking expeditions.

Finally, the pedologic map, which is available only in the general 1:250,000 scale, was used to further justify the grouping of the slope classes within each geological unit.

The Land Units that are created are result of the union of the map data in our possession.

The main characteristic of the classification that will be created is that of allowing optimum evaluation of the integration of data.

For example, a steep slope associated with basalt formations is to be evaluated differently, in terms of accessibility, from a steep slope with granite formations.

Hence, each Land Unit does not have an absolute value. Instead it must be contextualised with the site and the territorial district being taken into consideration.

This will allow the application of the same methodology of integration of cartographic data in the future, when more data concerning the ancient landscape of Sardinia will be available.

Land Units will hence be created for the sites being examined and their surrounding territory; a result of the integration of the cartographic data at our disposal, each having a precise accessibility class (S1, S2, S3, S4, S5, N).

These classifications alone will allow us to evaluate how and to what extent the sites taken into consideration have and do not have aspects of accessibility and resulting defensive capabilities in common.

For the sites along the coast, their relationship with the sea will be analysed; for the sites further inland, that with the surrounding territory.

2.3 The creation of a cost analysis model for site accessibility

With the aim of imagining how the distribution of pottery from the coast to the internal areas could have taken place, we decided to experiment with a cost analysis model that, based on the Land Evaluation carried out, could create a potential road network.

It is important to underline that this type of analysis intends neither to create absolute values, nor to provide deterministic answers concerning the road network along which the Mycenaean material could have travelled. It is instead an experiment, which is capable of prompting further research on a territorial basis, which may explain better if, and what, distribution strategies were used.

The departure point for our project lies in a question which we would like to answer (Macchi 2001b), (in this case the creation of a potential road network) and this is an unavoidable step in starting off any research project: in this present both for land evaluation and for the creation of a cost model.

In fact, even though on a numerical basis, the model remains merely a model, or better, one of many, which may display a possible distribution network of Mycenaean material in the island.

2.3.1 Cost surface analysis (CSA)

Cost surface analysis is a generic way to define a function of GIS software, which can assign a numeric value to the negotiability of each cell (pixel) in a file in raster format.

This methodology has become part of the more well known Site Catchment Analysis, introduced to the field of archaeology in the 1970's by Vita Finzi and Higgs (Van Leusen 2002, 64).

Cost Surface Analysis in archaeology calculates the cost spent by an individual in moving from one point to another (Forte 2002, 107), or better "it qualifies the simple Euclidean distances between the sites, illustrating the effects of topography and terrain on movement in a landscape" (Ejstrud 2005, 135).

On this basis we may create simulations of the road network between one site and another.

It recent years its applications have been numerous and varied, and above all prolific, thanks to the use of GIS platforms. Its use allows experimentation with this type of analysis in this work. Given a point of departure and of arrival, the GIS allows simulation of the most economic route through the cells (pixels) that weigh less, hence with a low expense of energy.

In order to create it, it is essential to start off with the realisation of a digital model of the ground, DEM or DTM[63], in *raster*[64] or *grid*[65] format.

The time factor plays an important role in this type of analysis as well; hence it would be desirable to create a digital model of the land that could represent the situation of the area taken into consideration in antiquity, evaluating the morphological and pedogenetic changes that have occurred with time.

To this we must add all the factors useful for the creation of a cost model, these are also in the raster format, and in a similar way a numeric value will be attributed to each. The factors to be inserted, and their evaluation, must be chosen and analysed, on the basis of their real relevance to the model to be created. These must also be screened on the basis of time.

It is always necessary to scientifically justify the use of the factors to be adopted, so as to avoid falling into the trap of using anachronistic variables or those that are often useless with regards to the initial question that was asked and for which the model may represent one of the potential answers.

The interaction of the DTM (or DTMs) with the factors will create a digital platform of the territory, in which each cell (pixel) will have a weighting/numeric value for accessibility.

[63] DEM stands for *Digital Elevation Model*; DTM for *Digital terrain model*

[64] It is important to underline the difference between a raster image and a raster model. The former is a file composed of cells (pixels), in which the cells contain only a symbolic representation of the colours, while a raster model contains numeric information, that can be visualised, for example, on a GIS platform, by way of colour variation.

[65] Grid files are files composed of cells (*pixels*) that contain information.

The creation of a cost model entails attributing numeric values, which must also be justified, to each pixel of the raster models used.

2.3.2 The validity and interpretation of a cost model in archaeology

After the initial experiences of Hodder and Orton (1976) with spatial analysis in the 1970's, a series of difficulties arose concerning the application of this methodology, as, while feasible in many cases even without the use of a calculator, the quantity of time required constituted an obstacle to its application in the more humanistic disciplines, such as archaeology.

Such procedures often entail a high number of mathematical operations. The tiresome nature of such operations has certainly been reduced by the arrival of calculators, and the widespread use of GIS software technologies has without doubt increased the use of the methodology (Macchi 2001).

Its introduction to the archaeological field, arose from the noble attempt to eliminate the degree of subjectivity in cartographic interpretation in distribution maps, but quite rightly: “una definizione così generica finisce per generare più confusione e rendere ulteriormente complessa e difficile la valutazione che la comunità di ricercatori potrà fare di questi metodi” (Macchi 2001, 9).

For this reason it is necessary that an explanation be given concerning what levels of knowledge quantitative geography and its derived application is based on with regards to the archaeological sciences.

A first level of knowledge is constituted by the data, i.e. the raw notions arriving from empirical exploration. In archaeology for example, the data are all those notions that arrive from an excavation, or a survey, or from historical sources. Their reliability depends on an infinite number of factors that the research must always bear in mind. On a GIS platform, the given knowledge is constituted by a database or by a layer. In this work, the data are the sites the analysis is based on and the maps used. The next level is composed of information, which is obtained from the interpolation and processing of the data. Information cannot exist in the absence of data. For example, a piece of information is composed of the accessibility class assigned to a particular slope in the ground, or the height above sea level given to a group of coordinates. The quality of the information is closely linked to how the data have been obtained and must be interpreted and evaluated. Finally, models are the evaluation that has been carried out in the interaction between the levels of information (Macchi 2001, 9; Cianciarulo-Gherdevich 2005, 83).

A cost model is hence a mathematical evaluation carried out on levels of information, or variables, which have been mutually interactive, with the aim of measuring the capacity of movement of an individual in a determined space.

The mistake that is most often made, and the criticism which is most often made of the application of mathematical models to archaeology, is that one thinks of creating a model, which, being based on numerical evaluation, is almost the result of an automatic process and hence the real representation of reality. The creation of a mathematical model is not a factory for absolute answers or dogmatic truisms, but an increase in new levels of information, that precisely, due to their being numerical evaluations, are refutable and interpretable.

In the creation, but above all in the evaluation, of a cost model applied to archaeology, one must not forget that the movement is not linked solely and exclusively to territorial aspects, but also to social behaviour that is extremely difficult to quantify.

For this reason we cannot screen the potentiality of human movement only on the basis of physical data concerning the territory.

Since "il paesaggio è anche un modello di potere" (Forte 2001, 111), it follows that human movement in a given territory is conditioned by political, territorial and religious factors, amongst others.

Therefore, it is essential to have detailed knowledge of all those anthropological aspects that do not always have a correspondence with the maps and that are to be taken into consideration when evaluating any potential realisation of road networks obtained via a cost model (Llobera 2000).

2.3.3 The use and application of a cost model in this work

The cost model that will be applied for the evaluation of the potential accessibility between the sites taken into consideration will be the result of an evaluation conducted on a Land Evaluation, the methodological outline for which has been provided in the previous chapter.

At the basis of its creation there are therefore only territorial factors, yet since the aim of the project is a declaration of what could have been the road network based on factors relating to the landscape, only with the successive progression of this research will there be the addition of potential anthropological and social factors, which may have conditioned a particular network rather than another.

In fact, we see the existence of both topographic cost and qualitative landscape cost (Forte 2001, 111) as being confirmed, both being influential on the road network.

Even though we are dealing with a period in which historical documents are practically absent, and for which we can have no written information regarding the road networks, it would be nevertheless superficial to imagine this being linked solely to totally "natural" factors.

That which is being proposed, is hence a cost model carried out on evaluations of the accessibility the ancient landscape within the limits allowed by the few existing studies.

From its realisation we will evaluate the potential success of the operation, which has amongst its aims an estimate of the landscape parameters for the distribution of Mycenaean material.

2.4 General considerations concerning the ancient landscape of Sardinia from the Middle to the Late Bronze Age

The following section addresses the necessity to understand whether and how the analyses of this research project, even though carried out using contemporary maps, may nevertheless be a satisfactory reflection of the Late Bronze Age landscape in Sardinia.

We must not forget that time is one of the main variables in Land Evaluation, and that natural and/or human actions are constantly present in the observation and evaluation of the archaeological landscape.

We have had to justify how it was necessary to estimate the analysis carried out in this research project, in relation to the ancient landscape of the Late Bronze Age, the period of reference both for the Mycenaean pottery fragments and for the majority of the archaeological sites taken into consideration.

It would be purely naive to imagine that the landscape that we are presented with today could be the same as that of the archaeological period taken into consideration; and even more naïve to give high value to any analysis of the territory without considering how the ancient landscape could have been different.

With reference to Sardinia, no sufficiently detailed studies of the ancient landscape in relation to human settlement have been conducted (Ginesu- Marogna- Sias 2000, 391), with the exception of specific cases[66], coverage in connection with the sites in this work is extremely limited.

Even though the situation of the studies conducted up to now appears to be at the pioneer stage, and hence still insufficient, it can be maintained that the methodology that has been decided on, regarding the accessibility and reachability of sites, uses data which, with respect to the landscape of the Middle and Late Bronze Ages, has not undergone substantial change.

Nevertheless, since we intended to evaluate the accessibility of every single site and the reachability of the sites along the coast in relation to the sea, it was in any case necessary to analyse in greater depth those aspects that, potentially having changed during the Holocene, could anyway have undergone those changes that may influence a careful reading of the landscape.

Therefore, the queries that we decided to address had the aim of facilitating understanding of:

[66]An example of this is the city of Nora, which since it includes several structures from the Roman period that are partially submerged, leads to the hypothesis that the coastline was further out in the Roman period and has made it necessary that other studies be carried out to understand the ancient landscape (http:\\www.nora.it; Leone-Ulzega-Lecca 1980; Melis 2000).

- changes in relief with consequent changes in slope;
- changes in the coastline;
- climate changes that could have caused greater or less volume of rivers.

2.4.1 Relief and average slopes[67]

One of the principal reference variables used in this work concerning the creation of Land Units is slope.

Hence, the question arises of how much the average slopes of Sardinia during the last phase of the Quaternary[68] could have been modified so far as to change the landscape.

As is well-known, the geological history of Sardinia is amongst the oldest in Europe, and in the Holocene its relief was similar to that of today, as its formation had long since settled[69].

Furthermore, the mountains of Sardinia, even while not reaching 2000m above sea level, did not undergo any type of orogenetic pressure subsequent to their formation. However, they were affected by the slow and constant activities of deposition and accumulation to which the island is exposed, as a result of the strong flow of surface water, winds and anthropic activity.

Some of the sites display characteristics that, from the paleo-landscape point of view, are peculiarities that are to be exposed individually.

For example, the steep hill which hosts Nuraghe *Antigori*, formed of granite, certainly did not undergo modifications in slope, with the exception of those conditioned by constant erosion. This could have influenced a change in the slope of its sides, yet we do not avail of sufficient information to conduct an evaluation of this. Therefore we may consider the site as presenting the same parameters of accessibility from its birth.

All the sites taken into consideration are at a maximum altitude of 500 m above sea level: this is the case, for example, of Nuraghe *Arrubiu*, situated in one of the so-called "giare"[70].

These are the result of a lava flow of a pre-Holocenic effusive-basaltic type. These lava flows invaded the lower areas of the land and covered the sandstone sediments that had formed previously. With the passing of time, agents carried out erosive activity that acted with greater

[67] In Italian *clivometria* is the term used for the measurement of the average slope of the ground with respect to the horizon.

[68] The quaternary is the last geological era, divided into the Pleistocene (1.8 Million Mya - c. 11,000 BP) and Holocene (11,000 B.P. to today).

[69] The metamorphic schists of the Gennargentu were formed in the Silurian (435-395 Mya) and Devonian (395-345 Mya), giving rise to large and thick deposits of limestone sediments that re-emerged giving birth to the spectacular formation of the “tacchi” and “toneri” of Barbagia (NU), Sarcidano (NU) and Ogliastra (NU). In the Cretaceous (136-65 Mya) the limestones of Supramonte in Oliena (NU), the Gulf of Orosei(NU) and those of the Nurra – Capo Caccia (SS) were formed.

[70] The etymology of this term is: stony place.

speed on the pre-existing sediments, composed of Marl-Sandstone rock. As a result, these terraces covered by basalt ended up at a higher level in comparison to the surrounding landscape.

The same type of anthropisation of the Giare in the Nuragic Age[71], for example, appears to demonstrate that settlement had taken place in the Holocene.

It is, however, to be taken into consideration that, on the basis of the latest studies (Ginesu – Marogna – Sias 2000) conducted on the small basalt plains of North Sardinia that (Logudoro - Meilogu), "già in epoche storiche il paesaggio che caratterizzava queste zone era profondamente diverso. La erosione differenziale ha asportato nel corso degli ultimi 4/500 mila anni quantità impressionanti di basamento calcolato nell'ordine di qualche mm per anno. Le stesse pianure, generate per sbarramento del corso d'acqua tributario da parte delle colate basaltiche, furono, per lungo tempo dominate da ambienti malsani e paludosi, mentre via via la morfologia collinare degli spartiacque si modificava ampliando le aree pianeggianti" (Ginesu – Marogna – Sias 2000, 395).

For this reason, in reference to a zone such as that on which the Nuraghe Arrubiu is to be found, and also Duos Nuraghes, it can be maintained that the basaltic plateaux with a slope between 0-2% (level), are to be considered as presenting the risk of getting bogged down, and hence with an accessibility class of S2, already in the era of construction of the very same monuments.

For the other sites that are found on basalt formations, such as *Is Baccas* or *Sa Domo 'e s'Orku*, one could probably make the same consideration as those made up to now concerning the basalt formations, but even in this case, there is an insufficient number of *ad hoc* studies to allow us to give credit to more detailed hypotheses. This is because these sites are not found on the plateaux of the previous one, but are rather on basalt structures that are morphologically different.

Since we intended to evaluate slope change during the Holocene, we have provided examples from highland sites; yet there are also sites situated on level ground such as that of *Corti Beccia*.

The site is at the limits of the plain of *Campidano* (Cagliari – Oristano), one of the most recent geological formations of the island. The plain, which originated in the Pleistocene, is a hollow that was filled by alluvial detritus carried by the rivers that flowed through it to the sea. This detritus covered the sandstone and conglomerates, which were the result of wind deposits (also in the Pleistocene).

Its recent data notwithstanding, in the period of interest to this work, the landscape was already widely fossilised.

The presence of that which is called the "marsh of *Sabazzus*"[72], is attested by both the historical sources and the map analysis: "[uno] stagno di occupava tutta la formazione Olocenica, costituita da

[71]The haut plateau on which Nuraghe Arrubiu is to be found has no less than 45 Nuraghes on its border.

"alluvioni ciottolose e aree con livelli argillo-sabbiosi di facies palustre, lacustre o salmastra"[73], delimited to the SW and W by the Sulcis Iglesiente mountains and to the E by the mountains behind the Commune of Sanluri.

The presence of the Nuragic site at the edge of a recent alluvial landscape leads us to hypothesise two changes in the territory:

- possible intensification and development of the hydrographical network in the same area.
- the presence of a freshwater lake due to the distance of the reclaimed zone from the sea.

The slope of the whole zone around the site varies from 0 to 2%, hence most of it presents the hypothetical traveller with a risk of being bogged down, even though the sandy-gravelly nature of the sub-layer mitigates the risk.

Furthermore, the site is at an altitude of 86 m a.s.l., c. 1800 m from the area of the old marsh, which was at 62 m above sea level. Therefore the site of *Corti Beccia* was 24 m higher than the marsh, and therefore, as a result of the slope, in a position in which the risk of getting bogged down would have been considerably lower.

Also in this case, however, there is a dearth in the literature regarding in-depth studies that could allow us to understand what the situation would have been like all around the site in the period taken into consideration. As a result, evaluating whether getting bogged down was a risk in the Nuragic period, and the possible presence of marshy patches, are questions we may never be able to answer.

The same applies to the site of Monte Zara: in fact, even though situated on an older geological formation, it is facing the plain of Campidano, somewhat similar to a bastion on the territorial *limes* marked by the plain.

The geological map (*Monti Zara*) indicates a plain generated by floods. Nevertheless, we may hypothesise, thanks to attentive observation of the contour lines, that the site faces what was probably a colluvium, *conoide* or a terrace, a fact which is not marked on sheet n. 226 of the Geological Map of the National Geological Service.

All the hypotheses made seem to correspond with the map data, which leads us to always maintain that the slope values used in the research project, even though they are the result of contemporary cartography, may be applied also to the Middle and Late Bronze Ages. Having said this, given the lack of detailed investigation, we are wary of proposing absolute models.

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[72]The drying up of the ancient marsh "*Sabazzus*" (as it was called by Fara) in Sanluri was started in 1827 by a major of the Regie Armate, and Inspector of the Genio Civile of the Kingdom of Sardinia called G. A. Carbonazzi. This work, after various setbacks, was completed only with the so-called Opera di Bonifica dei Combattenti that started in 1919 and lasted for 50 years.

[73]Note for F. 224-225 on the Geological Map of the National Geological Institute.

Therefore, we await research data and more precise information on the ancient landscape of the sites taken into consideration, so as to be able to verify whether the application of the binomial (slope-geology), used for the creation of the Land Units, may provide more effective results.

2.4.2 Variation of the coastline

This research project must inevitably take into consideration the coastline aspect, above all because one of the many analyses regards the understanding of the relationship between the sites along the coast with the sea[74].

Also concerning this issue, the studies in Sardinia are limited to single areas, which are not always connected with the sites examined in the present work[75].

However, there are studies that are currently being carried out that will certainly add new and important information (Ginesu-Marogna-Sias 2003, 393).

Seven of the sites[76] dealt with in this work have a direct relationship with the sea.

There are several reasons that may cause variation in the coastline: one is linked to "variazioni eustatiche[77] del livello marino".

The sea level has not always been the same. To the contrary, it has often fallen, bringing to light several square kilometres of surface, which it then covered again when rising.

The speed with which these variations take place is directly relevant both to the dynamics of sedimentation and to the resulting stratigraphic sequences. There are many theories and hypotheses regarding this, but this variation has two main causes: the variation in the total volume of water in the seas, or a variation in the capacity of marine basins and therefore a variation in their shape.

We know that the changes in the sea-level around the Italian coast in the last 10,000 years are "the sum of eustatic, gladio-hydro-isostatic, and tectonic factors" (Lambeck *et al.* 2003, 1567).

The situation of the coasts seems to have remained stable during the Quaternary in Sardinia, as in other parts of Italy, however, during the Holocene a single rise in sea level has been identified. This did not take place in a linear manner, but in series of drops and phases of rapid rises (Bellotti 2000, 777-792). Hence the sea-level rose during the Holocene, but since this rise did not take place in a constant manner, it is necessary to understand how this trend affected Sardinia and the parts of the coastline examined in this project during the period taken into consideration. As regards the

[74]It has been necessary to examine this problem also due to the fact that in the case of the city of Nora, it is possible to see Roman structures under the water.

[75] At the end of the 1980's, Prof. Paskoff of Lieges University, attempted to cartographically monitor the coastline of the last 2000 years in the Western Mediterranean. While his work provided some important information for archaeological sites, it was limited to an investigation of the beaches of the N and NW of the island. Other studies that have been conducted concern NE Sardinia (De Muro- Orrù 1998).

[76]In theory, there are eight of these, but the impossibility to know the real place in which the fragments were found in Orosei, allows us to carry out an analysis in relation only to the area, and not to a precise site.

[77]From the Austrian geologist Suess in 1906.

evaluation of the rise in sea-level in Sardinia, it is taken for granted that tectonic factors were of no influence, and hence that there was relative stability during the most recent glacial cycles and that the coastline was typically 7-10.5 m to the East, c. 4m to the North-East and about 5 m to the South[78]. The most recent analyses in the island were conducted on the basis of carbonatic deposits, which were conserved in *beach-rock*[79], limited to a spatial context that does not however regard the sites in our project[80].

19—*Orosei (Cala Liberotto)*

Ages (cal yr BP)	Age error (± yr)	Altitude (m)	Altitude error (± m)		Marker	Ref.
9938	58	−33	1.0	5.0	Beachrock	24

20—*North Sardinia*

Ages (cal yr BP)	Age error (± yr)	Altitude (m)	Altitude error (± m)		Marker	Ref.
180	50	0	1.0	5.0	Beachrock	24
830	83	−0.3	1.0	5.0	Beachrock	
1780	70	−1	1.0	5.0	Beachrock	
2169	107	−2	1.0	5.0	Beachrock	
2256	107	−3	1.0	5.0	Beachrock	
1963	75	−3,5	1.0	5.0	Beachrock	
2263	109	−4	1.0	5.0	Beachrock	
5126	163	−7	1.0	5.0	Beachrock	
6774	106	−15	1.0	5.0	Beachrock	
8356	74	−17	1.0	5.0	Beachrock	
9705	179	−29	1.0	5.0	Beachrock	

21—*Caccia Cape*

Ages (Archaeological attribution; yr BP)	Age error (± yr)	Altitude (m)	Altitude error (± m)		Marker	Ref.
7000	200	−8.5	3.0	10.0	Submerged Neolithical Burial	25

Figure 2. Summary of the evidence for the changes in the meeting points between sea and land (Lambeck et al. 2003, table 1., 1573).

On the basis of these studies it has hence been calculated that the rise in sea-level in Sardinia during the Holocene was around 3,5-10m (Lambeck *et al.*, 2003, 1579).

However, in order to be able to reconstruct the ancient coastline, we must evaluate many other influential parameters, and we cannot base our assumptions solely and exclusively on eustatic variations. Variations in coastline depend also on the slope and form of the coastal strip and the adjacent seabed. Variation in the coastline may also take place with a stable sea-level, but with a tectonic drop or rise in the land[81], or it may be due to a variation in the load of river detritus, and

[78] "where the MIS 5.5 shoreline is typically found at 7–10.5 m in the east and at about 4m in the northwest and at about 5m in the south (Cala Mosca) where the Tyrrhenian (MIS 5.5) section was established by Gignoux (1913)", (Lambeck *et al.* 2003, p. 1575)

[79] "Beach rock is constituted from clastic shoreline deposits cemented by calcitic-magnesitic or aragonitic–carbonates in or near the intertidal zone, often at the interface of the freshwater–marine phreatic flow" (Lambeck *et al.* 2003, p. 1570)

[80] Orosei merits separate discussion. In fact, since we do not know the exact point in which the Mycenaean material was found and having an area too large to allow the convergence of territorial analysis, for now it would be superficial to propose a hypothesis on the ancient landscape of the area. The dearth in data forces us to postpone the analysis of this zone, despite the fact that it is interesting and particular for archaeological analysis in relation to the favourable territorial situation of anthropization.

[81] This hypothesis should not be relevant to Sardinia, as the tectonic stability of the island is taken for granted.

hence the material carried by the marine currents along the coast and towards the seabed (Arnoldus Huyzdenveld 2005,14-30).

To this must be added all the erosion factors that have forced the public administration bodies in recent years to undertake notable measures to protect the coastline. Also in this case, the problem cannot be resolved with simplistic general evaluations. To the contrary, case to case analysis is necessary. The map below shows how erosive factors in European coasts, and also those of Sardinia, are neither uniform nor suggestive of general parameters.

Therefore, for the seven sites analysed in this project, it may be said that, assuming a lower sea-level in comparison to the 150 cm of the Roman Period, the coastline was farther out also during the Bronze Age. However, not enough information is available for us to be able to demonstrate a similar situation in all the coasts of the island.

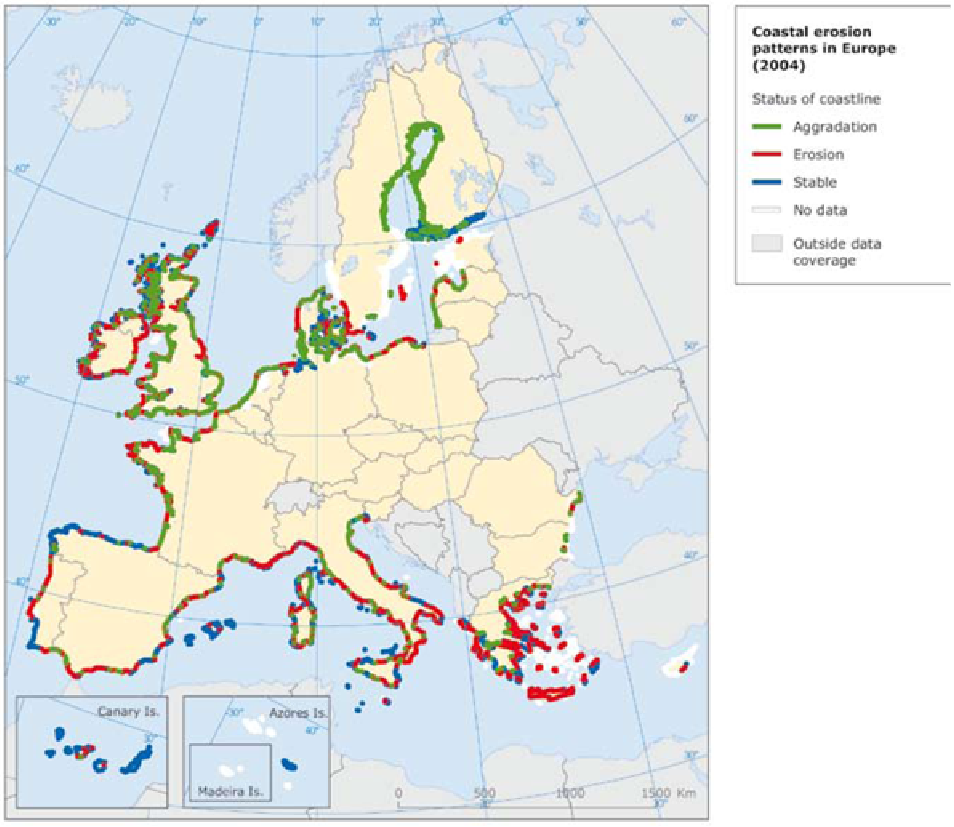

Figure 3 From EEA, 2005, based on Eurosion, 2004 (The changing faces of Europe's coastal areas, EEA, No 6/ 2006)

The situation of Nora, for example, is indicative as a result of the submerged Roman and Punic structures[82]. Examination of the aerial photographs taken of the Nora area display submerged structures that are particularly important and lead us to suppose on the basis of "a l'étude de la

[82]The finding of fragments of Mycenaean pottery at the Macellum and Forum inevitably leads to evaluations of how the landscape could have been between the Middle and Late Bronze Ages.

position et de la nature des structures submergées fait supposer une remontée du niveau de la mer d'environ 0,50 m". Therefore the rise in the sea-level of c. 0.5 m indicates that the coastline in the Roman Period was farther out[83]. It could be hypothesised that during the Bronze Age it could have been even farther out than in the Roman Period, but given the lack of studies and research, it is quite difficult to establish whether and in which way other activities (e.g. subsidence, erosion etc.) could have influenced the retreat of the coastline. The abandonment of the city was one of the causes for which erosive action was able to take place freely, so much so that the structures were submerged. The whole district of the Costa del Sud that goes from Sarroch to Pula, was also affected by several factors that have interacted with the coastline, and above all in recent years, provoked constant erosion. On the basis of the few data at our disposal, it may be hypothesised that the sea-level was indeed lower and that the coastline in the Bronze Age was farther out, but this cannot be applied to the whole Island. In order to have a more productive analysis of the landscape of sites near the sea, ad hoc studies would be necessary for each.

Another interesting situation for the understanding of the ancient landscape is the Island of Sant'Antioco. Today the island is connected to the major island by a bridge and a road, but it is probable that this was so also in the past. This is testified to not only by the visible remains of a Roman road, but also by more evident territorial aspects.

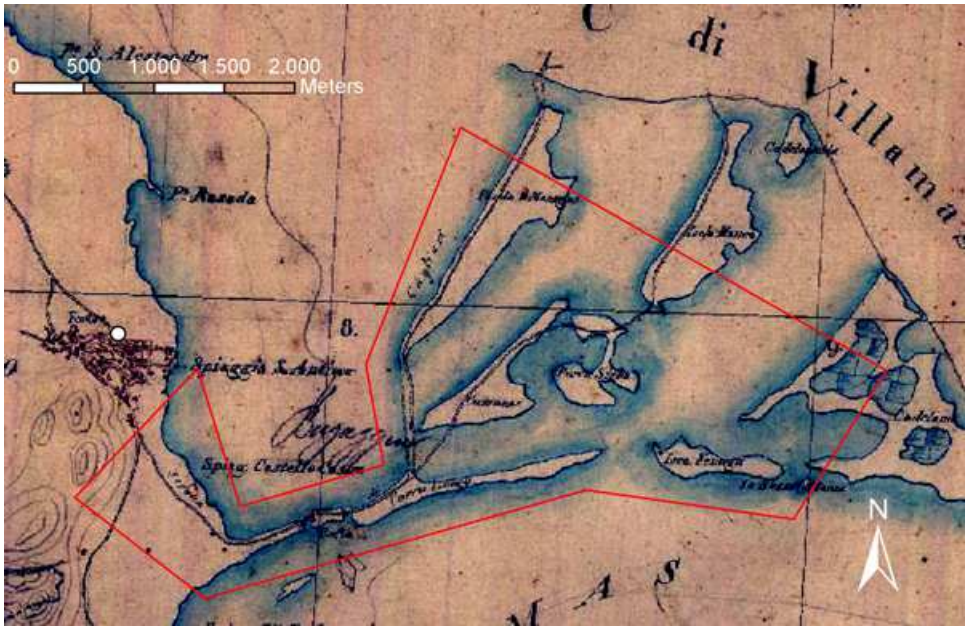

Figure 4 Sant'Antioco and the mainland in Cartografia Catasto del Real Corpo edited by De' Candia at a scale of 1:30,000 dating to 1844[84].

[83]This has led to a series of studies on what the Port of Nora could have been like and on how the part of the peninsula on which the city now lies could have been used as a dock. (Melis 2000, 127-135).

[84]The De Candia map illustrates the different morphology of the isthmus in 1800. In the last century work on the isthmus was intensified, leading to its completion.

Being unable to reconstruct the ancient landscape of the area, as a result of the presence of marshes and transformation due to anthropic activity, suffice it to mention the fact that the curves in the sea - bed in the Golfo di Palmas, slope off at -5 m onwards, hence at a level which is too low for us to hypothesise that the island was completely separated from the mainland. The detritus from the Rio Palmas, which flows into the bay of the same name, must certainly have been influential. Furthermore, if we assume that the sea-level was lower, the depositing action of the river would have taken place with greater ease, and the Isthmus was almost certainly negotiable. With regards to this, it is probable that the rise in sea-level in the Punic and Roman Period , prompted an anthropic intervention to make the isthmus more negotiable[85] (Tronchetti 1989. An accurate investigation of the ancient landscape of the area could discover the various phases of rise in sea-level, and compared with the archaeological data, could even provide elements of use in establishing the period of completion of the isthmus.

A last case to take into examination is surely that of the Phoenician-Punic city of Tharros, located on the Sinis Peninsula, close to the promontory of Capo S. Marco.

We attempted to carry out general evaluations of the landscape aspect of the whole area.

The entire peninsula was occupied already in the Protohistoric Era: this is testified to, both by Nuraghe Baboe Cabitza at the tip of the headland, and the village that developed on the hill of Muru Mannu, from which the Mycenaean fragment emerged and over which there are now the remains of the Phoenician tophet. The whole zone has recently undergone erosion and landslides that have also compromised the archaeological remains (Fanti 2000). This certainly influenced the morphology of the coastal landscape of the peninsula that, little by little, undergoes the modification of its coasts.

This site has problematic issues similar to those of Sant'Antioco and Nora.

The peninsula on which the site of Tharros is found is on the Eastern side of the Gulf of Oristano, into which the Tirso River flows. Its particular and favourable geographic position has increased the number of studies into the identification of the docking areas of the city.

In 1969, based on the analysis of aerial photographs, Schmiedt identified the remains of several docks on the eastern side of the peninsula, that had been submerged as a result of the retreat of the coastline; Zucca agrees by expressing the opinion that the remains of the port lie under the waters of the Mar Morto (Gulf of Oristano), and Fioravanti identifies the location as being at the base of the eastern slope of Muru Mannu . For this reason, “sono state avanzate, tutte le ipotesi riguardanti l’arretramento della linea di costa, determinate da una generale subsidenza della penisola, e da un

[85] There i san open discussion about the isthmus during punic and roman period (Tronchetti 1989, 5). New discoverises testify the different morphology of the area (Guirguis 2011, 96-97)

sollevamento assoluto del livello marino in epoca storica, che avrebbe portato ad un innalzamento relativo delle acque di qualche metro" (Fanti 2000, 92).

It is important, however, to view all hypotheses with extreme caution, as we do not have sufficient data to confirm significant and absolute variation.

"A sostegno dell'arretramento della linea costiera, sono riportate in letteratura osservazioni sulla presenza di un orizzonte nuragico in abrasione a Funtana Meiga […]". It is maintained that in the Nuragic period in this place there was a large sandy terrace of some tens or hundreds of metres long on which human activity took place.

Also in this case it is quite difficult to be able to objectively evaluate the analysis conducted. In fact, there do not seem to be any investigations or studies aiming to understand the evolution of this landscape during the Holocene. Rather, it seems that data are used solely and exclusively to prove hypotheses concerning the location of the presumed port of the city. Furthermore, the landslide and erosive action, that may have been taking place also in the last century, are suggestive of only a slight change in the landscape of the Sinis peninsula.

2.4.3 Climatic variation

Another question to be asked is that concerning our comprehension of whether and how much the climate may have changed from the Bronze Age, and how much this variation could have conditioned the landscape, in so much as it could have been different to that of today.

It is certainly unrealistic to imagine that we could have a single and general answer that could provide absolute terms of reference: in fact, the planet is exposed, and has been particularly so in the last 100 years to notable climatic variation, generated by a number of causes, that make it extremely difficult to develop a linear model of reference. Desiring to answer a similar question would mean focussing the whole project on this point, and it being an issue of great interest to the whole scientific community, as a result of the climate upheaval that the whole planet has undergone in recent years, we have aimed to extract a summary of the information to be found in the literature, which may be of use in the study of the landscape of the Island.

Also in this case, specific and detailed studies with reference to Sardinia are amiss. Therefore we can solely make reference to general studies that regard the Mediterranean basin in the period taken into consideration.

Understanding and evaluating climatic change entails having a means of interpreting the whole landscape: in fact, climatic variation is the cause and consequence of a whole series of factors that, continuously evolving, transform and interact with the landscape.

Hence, human existence is profoundly conditioned by this, and climatic variation and the mechanisms that it causes have often been of profound influence on human evolution. The gap in written documents for the period taken into consideration may be filled only by palaeo-anthropological and geological data.

A certain amount of information is available concerning the climatic conditions between the Middle and Late Bronze Ages for the regions of the Eastern Mediterranean. All concord that the zone was characterised by a hot dry climatic phase (Issar 2003, 1-29).

For example, this appears to have provoked several famines brought about by long periods of drought, which probably caused the downfall of several great civilisations including that of the Hittites and perhaps even that of Mycenae (Ricci Lucchi, 246-247).

The reconstruction of the ancient environment in the pre/protohistorical period, in the Italian peninsula, which underwent different geo-morphological events with respect to Sardinia, is quite difficult, due to the human activities (agriculture, shepherding, urban development etc.) which took place successively. However, on the basis of pollen analysis: "[in] 3700 BP there is a temporary reduction of tree abundance at all site in central Italy, that on the basis also of a marked change in the hydrologic regime of lakes, is interpreted as a dry event; around 2500 BP there is clear evidence of cultivations, however without any dramatic change in the density and distribution of woodland" (Magri 1997, 517).

Also in this case, even though a period has been observed from 4000-3000 BP in which the climate was drier and more arid (Mayewsky 2004, 251), it is fundamental that all data be evaluated with great caution.

It often happens in archaeology that one makes the naïve mistake of attempting to explain a given human event, for which the material data gives no answers, as a direct consequence of a particular climatic situation.

As a result of the lack of data, in this project it appears difficult to establish whether the presumed dryness and aridness of the climate could have caused landscape changes, which, for example, could regard to the hydrological network.

It may only be supposed, on the basis of the climatic data cited, that the current hydrological regime, with that of the torrents being the main class for the majority of Sardinian rivers, has remained unchanged. Consequentially, after sudden heavy rain, typical of places with arid climates, the rivers could have overflowed violently.

In conclusion, it may be stated that we do not have sufficient data to establish the presence of extraordinary changes in the coastal and inland landscape to prohibit us from using the maps currently available to evaluate the territory for the objectives of this project.

We can do no more than await more precise results from studies currently being carried out , that will allow the application of the methodology of this project to more reliable data concerning the ancient landscape.

In fact, only detailed and multidisciplinary studies can provide useful scientific information in order for us to be able to obtain results from the application of the methodology adopted in this work that are as reliable as possible.

2.5 Land Units: an example of cartographic interaction

Land units have been created for each of the sites taken into consideration

The first step in their creation is that of isolating a territorial space around the site in which cartographic interaction is to be analysed. The choice was made to create a quadrant with an area of 9 km2 (3x3 km) around each site in such a way that, for the sites along the coast, the portion of territory investigated could include the site and territorial district of the same as far as the coast. In this way accessibility to the sea could be understood. For the inland sites the same 9 km2 quadrant was used, this time aiming to cover all the geo-morphological features which could potentially condition accessibility. The interaction of the slope maps obtained by DEM, the 1:100,000 geological maps, the soil maps, the relief maps, the pedological maps and those of the hydrological network allowed us to obtain a global view of the landscape in which the sites are located and that of the surrounding landscape.

The classification of the different combinations of map data, carried out in an analytic manner within each quadrant permits the creation of Land Units in relation to accessibility. As the main cartographic interactions take place by way of the merging of the 1:100,000 (but surveyed at 1:25,000) geological map and the 1:20,000 DEM, we can reasonably reproduce maps of Land Units at a scale of 1:25,000. Once the cartographic elaboration has been carried out, a result of particular Land Evaluation, we may classify each Land Unit on the basis of the scale of accessibility/negotiability previously created.

The final step is that of evaluating the accessibility situation for each site, on the basis of the Land Units created.

ID 1 Nuraghe Antigori

Commune: Sarroch

Province: Cagliari

Topographic references: I.G.M. 566.3; CTR 566.090

(X 1500492,11935; Y 4327382,08041).

Reliability of geo-referencing of site: 4

1:100,000 Geological map sheet: F. 235

Site description: The Nuragic complex of Antigori is composed of a fortification in which rectangular walls, five circular towers and granite rocks alternate to completely surround the summit of the hill of the same name, which dominates the 20 km of beach from Cagliari to Punta Zavorra.

Figure 5 Nuraghe Antigori seen from the North

The whole complex is situated on a plateau that is 80 m long in a SW-NE direction and 50 m in a SE-NW direction. It is 102 m above sea-level. The geological structure of the hill of the same name is composed of granites (γ)[86], and has slopes that range from 35% to 70%, pertaining to classes 5-7.

[86]In the notes on the 1:100,000 F. 235 map of the Italian Geological Service one reads: "Granito biotitico di colore roseo per lo più a struttura porfirica; granito a due miche (Marina di Sinzias; M. Turnu); Granito bianco talora a grossi feldspati (Capo Ferrato e altrove); roccia intrusiva endogena". In the 1:200,000 Geological Map of Sardinia edited by the Regional committee for the coordination of the geological and geothematic cartography of Sardinia (Prof. L. Carmignani), one reads of the presence of equigranular leucogranites.

To the NW the steep hill of Antigori is separated from Mone Luas, at an altitude of 171 m above sea level, which is composed of the same granite formations, by way of a small river valley, occupied by screes (ad)[87], of a moderate slope, ranging from 10% to 20%. Monte Luas does not have slopes that are as steep as that of the hill of Antigori. Its slopes reach slope levels always lower than 70%

In an easterly direction, towards the coastline, the hill of Antigori has a steep slope, greater than 70%, continuing until it meets a large area of continental fluvial deposits (q)[88] with a slope between 2 and 10 %. Close to the coast, these deposits are replaced by sandy dunes (as2)[89] with slopes less than 2%.

Also to the south, under the steep cliffs of the southern slope of the hill, the same river deposits are present. These occupy all the pre-coastal sector. Under the southern cliff flows the river Riu di Baccalina, a torrent of larger dimensions than that north of the hill. To the south there are small basalt outcrops (α)[90], emerging on the fluvial deposits.

The area to the west of the Nuragic complex is occupied by a chain of hills belonging to the same geological formation as Antigori. These slope off towards the coast, leaving Monte Luas and Antigori as the last rises in the land before the coastline.

Within the 9 km^2 drawn around Antigori, two pedological units can be recognised.

a) Epileptic Cambisols (LEP CM) with a maximum depth of 30 cm[91].

Epileptic (Lep) with hard continuous rock 25 to 50 cm from the surface of the soil.

Cambisols (CM): soils that have a cambic horizon, a mollic horizon that lies on a horizontal sub-surface with saturation in alkaline (NH_4OAc lM) inferior to 50% in some parts within 100 cm from the solid surface; or an andic, vertic or vitric horizon that starts between 25 and 100 cm, or a plynthic, petroplynthic or salic horizon that starts between 50 and 100 cm, in the absence of sandy loam textures or larger above these horizons.

b) Haplic Luvisols (HA LV) with a maximum depth of 150 cm[92].

Haplic (HA) has an expression typical of certain characters (typical in the sense that there is no further or significant characterisation).

[87]Quaternary screes from "Note della Carta geologica F. 235".

[88] Continental river deposits, often sandy/with pebbles and occasionally terraced from the Quaternary, from "Note della Carta geologica F. 235". But also: "Conglomerati, sabbie argille compattate in terrazzi e conoidi alluvionali", in the 1:20,0000 Geological Map of Sardinia edited by the Regional committee for the coordination of the geological and geothematic cartography of Sardinia (Prof. L. Carmignani).

[89]Marine sands on the beaches and seafront, coastal zones and inlets (Quaternary), from "Note della Carta geologica F. 235".

[90]Basalts of the trachidoleritic type, dark grey or blackish, fine-grained, with interaertale poryphic structure (extremely compact rock composing the tip of Perda Niedda and the promontory of Bruncu Sa Figu, with a typical basalt structure with column-shaped or parallelogram-shaped cracks from "Note della Carta geologica F. 235".

[91]Costantini Dazzi 1999

[92]Costantini Dazzi 1999

Luvisols (LV): soils that have an argic horizon, with a capacity for cation exchange (con NH_4OAc lM) equal to or greater than 24 $cml_c\ Kg^{-1}$ of clay, the upper limit of which starts either within 100cm of the soil surface, or within 200cm if lying beneath horizons that, for their thickness, are composed of sand loam or sand coarse textures.

All of the part composed of granite formations, and of basalts has leptosols on the surface[93], while the continental river deposits, marine sands and detritus are connected with luvisols[94].

From the merging of the geological map (F. 234), with the slope and pedological map we were able to divide the landscape around the site of Antigori into the following Land Units with the aim of determining the accessibility of the parts of the territory by way of a subdivision into classes.

Land units	**Geology**	**Landscape description**	**Practical Evaluation of accessibility**
01S	**as2**	slightly uneven terrain (slope: 20-35 %) sand dunes	*Possible to access/negotiate with slight difficulty on foot, with animals and with draught animals* (**S2**)[95]
01Q	**q**	slightly sloping and sloping terrain (slope 2-20%), Pleistocene coastal terraces	*Possible to access/negotiate with slight difficulty on foot, with animals and with draught animals* (**S2**)[96]
01D	**dt**	screes, moderately steep (slope: 20-35%)	*Moderately accessible/negotiable on foot and for animals, difficult to access for draught animals.* (**S3**)
01B	**α**	moderately steep, basalt hills (slope 20-35%)	*Moderately accessible/negotiable on foot and for animals, difficult to access for draught animals.(***S3***)*
01Gp	**γ**	slightly sloping and sloping terrain, granite (slope: 2-20%)[97]	*Possible to access/negotiate with slight difficulty on foot, with animals and with draught animals* (**S2**)
01Gc	**γ**	Moderately steep slopes and steep slopes, granite(slope: 20-50%)[98]	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals.***(S4)**
01Gr	**γ**	Very/extremely steep slopes, granite (slope: 50- >70%)	*Inaccessible with ordinary means (**N**)*

[93]Leptosols are soils conditioned by the topography and physiography of the territory: this term denotes superficial soils on massive rocks (Cremaschi 2000, p.62).

[94]Luvisols are soils that are "alterazione alterata, lisciviaggio e debole acidità"(Cremaschi 2000, p.62)

[95]This is a result of the quality of the sandy ground that makes passage difficult, its slight slope notwithstanding.

[96]Greater weightings have been given to uneven slopes than to those that are slightly uneven: for this reason, accessibility class S2 rather than S1 is given.

[97]In this case, the stony nature of the terrain and the apparent irregularity of the surface, as well as the probable presence of thorny vegetation, led us to push the evaluation towards the worse class.

[98]See note 8.

ID 2 Nuraghe Sa Domo ‘e S’orku

Commune: Sarroch

Province: Cagliari

Topographic references: I.G.M. 566.3 CTR 566.090

(X 1502068,39419; Y 4323645,75011)

1:100,000 Geological map sheet: F. 234-235

Reliability class: 4

Site description: The Nuraghe consists of two towers separated by a central courtyard with a plan of the so-called “a tancato” type. The tower with an *a tholos* closure is the older of the two. The construction is of the polyhedral type with blocks bound together with cement and mud. The second tower and the internal courtyard (with a trapezoidal plan) are to be attributed to a moment subsequent to the building of the first tower.

Figure 6. Nuraghe Sa domo ‘e s’orku *seen from the North.*

The site is on the northern extremity of a plateau that is 300m long in a North-South direction, and 72 m wide in an East-West direction. The altitude of the site is 103 m a.s.l.

The hill on which the site is found is the natural decline towards the coast of a “mountainous”[99] basalt formation, the same material with which the two Nuragic towers were built.

The sea is little more that 1 km from the site in a NE direction.

[99]The highest peak of the group, Monte Arrubiu, reaches 262 m.s.l.

To the north, the hill overlooks a flat landscape of sand dunes (as2) that continues to the coast to the East of the site, as far as Punta Zavorra. The slope ranging from 2 to 10% diminishes towards the North, close to the contemporary Porto Foxi, forming a vast area of sand dunes, where the slope is between 0 and 2%. This is the area in which the industrial complex of Sarroch lies.

It is quite probable that the territorial layout of this part of the coast was changed by the arrival of the industrial plant. The slope of the territory, along the strips of coastal dunes and the optimum slope, in relation to accessibility, of the continental river deposits (q), that extend from the North, in a West-East fashion, in relation to the Nuraghe, make the zone a natural choice for the establishment of a port.

On the screes (a) to the Northwest lies the modern village of Sarroch.

The hill of Sa domo'e s'orku is delimited to the North by the river Riu du Leonaxi and to the south by Riu Sanna. The latter separates it from another basalt hill on which there are the remains of another Nuraghe (Nuraghe Motti).

The southern side of the hill of which Sa domo 'e s'orku is erected has been modified by the mining activity of a basalt quarry.

The slope to the south has certainly been altered by the presence of this quarry and this is visible even from observation of the relief curves.

Within the delimited area, two different pedological typologies can be recognised.

The whole basalt formation is covered by soils of the following type:

Leptic cambisols (LE CM)[100] with a maximum depth of 40 cm.

The Leptic horizon is characteristic in that it has continuous hard rock at 25 to 100cm from the soil surface.

The dune formations and continental river deposits are characterised by pedological units.

Haplic Luvisols (HA LV)[101] with a maximum depth of 150 cm.

From the integration of the geological map (F. 234), with the slope and pedological map we were able to divide the landscape around the site of *Sa Domo 'e s'orku*, into the following Land Units.

Land units	**Geology**	**Description of landscape**	**Practical evaluation of accessibility**
02S1	**as2**	Level terrain, sand dunes (slopes 0- 2%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* (**S2**)[102]
02S2	**as2**	Slightly uneven terrain, sand dunes (slopes 2-10 %).	*Easily accessible/negotiable on foot, for animals and for draught animals*

[100]For the definition of Cambisols, see the U.P. file for Nuraghe Antigori.
[101]For the definition of HA LV soils see the L.U. file for Nuraghe Antigori.
[102]As a result of the risk of getting bogged down given by the quality of the land and the very low slope.

			(**S1**).
02Q	**q**	Slightly uneven terrain on continental river deposits	*Easily accessible/negotiable on foot, for animals and for draught animals* (**S1**)[103].
02Bp1	**α**	Slightly uneven terrain, basalt (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals* (**S1**).
02Bp2	**α**	Slightly terrain, basalt [104] (slopes 10-20%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* (**S2**)
02Bc1	**α**	Moderately steep slopes, basalt (slopes 20-35%).	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* (**S3**).
02Bc2	**α**	Steep slopes, basalt (slopes 35- 50%)	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals.* (**S4**)
02 Br	**α**	Very steep slopes, basalt, (slopes > 50%).	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals* (**S5**).

Both the Nuraghes examined are mutually visible. This was verified during a survey in August 2006. Their position in the territory allows visualisation (in conditions of good visibility) not only of the coast, but also of the territory between the two sites, where the modern industrial zone of Sarroch lies.

[103]As a result of the texture of the land and the very good slope for accessibility.
[104]Slightly uneven terrain is the prevailing type.

Figure 7. Nuraghe Antigori seen from the Nuraghe Sa domo 'e s'orku

Figure 8. Sa Domo e s'orku and Nuraghe Motti seen from Antigori.

ID 3 Nuraghe Nastasi

Commune: Tertenia

Province: Nuoro

Topographic references: IGM 541.II; CTR 541.120

(X 1554623, 50507; Y 4390812, 27843)

1:100,000 Geological map sheet: F. 219-F. 227

Reliability class: 4

Site description: The Nuraghe is composed of a main tower, probably the oldest surrounded by four other small towers, of a later date, separated from the main tower by way of a central corridor. From the orthophotomap the ante-mural structure that surrounds the archaeological complex is visible.

The Nuraghe Nastasi is at an altitude of 38 m a.s.l. at the top of a small hill 60 x 50 m, c.70 m SW of the river *Riu Forcedda 'e Lioni- Perde 'e sa Figu.*

Figure 9. Nuraghe Nastasi: court and east tower

The site is on a porphyric vein (Eπ)[105], that emerges from a granite formation (γ+ Eμ)[106], that is present in most of the surrounding landscape[107].

Nuraghe Nastasi is little more than 1 km from the coast and faces sand dunes, where today there is the hamlet of Melisenda.

[105]Porphyric subvolcanic rock: yellow or brick-red mostly acidic.

[106] The note of the Italian Geological Service map F. 219 at a scale of 1:100,000 reads: "**γ** Granititi bianche a grana normale e granititi rosse a grana grossa", while a note on F.227 indicates "**Eμ** leucomonzonite quarzifera a grana grossa". Leucomonzonite is also a granite formation.

[107] "I porfidi generalmente sporgono dalle rocce incassanti, anche dai graniti. Tipico è il caso dei grossi filoni porfirici di Punta Barisoni e del N.ghe omonimo", notes for the Italian Geological Service map F. 227, p. 39.

Sheets 219-227 of the geological map indicate an area of recent floods with dunes, littoral sand and screes (a2), along the portion of coastline which the Nuraghe overlooks. The slope range is 0-2%.
To the north granites and sandstones close off this area. To the NE a sandstone formation (S2ar) reaches the seas with slopes that reach 50% (N of *S. Giovanni di Sarrala*). To the S it is closed off by the same sandstone formation with gentler slopes (10-35%) as far as the modern hamlet of *Barisoni*.
The part of the coastline occupied by the sands and alluvial material is delimited to the West by the granite formation indicated as γ – Eμ, which is occupied by hills which reach a height of 400m.s.l. with slopes that exceed 50% in the highest points and that tend to decrease towards the coast.
The granite formation is covered by soils of the *Halpic Luvisols* (HA LV) type, with a maximum depth of 40 cm, while the other formations are covered by *Leptic cambisols* (LEP CM), with a depth of 130 cm[108].
In the cartographic elaboration of the Land Unit, we decided to include the porphyric formations together with the geological unit in which they emerge.
In fact, in terms of accessibility, their role is not substantially different from that of the granites and sandstones. In any case, they are marked in the classification of the Land Units: both because Nuraghe Nastasi itself lies on a porphyric flow, and because in all the area they are a rather common phenomenon and are not to be ignored. The Nuraghe itself was probably built with porphyry[109].
The sandstone areas have been subdivided into four distinct Land Units. In fact the landscape within the portion of territory examined with S2ar appears to be more varied than that of the granite formations.
Within the granite formations there are a few sub-plain areas with a slope between 0-2%, which we have decided to join with the areas with a slope of between 2 and 10%. These are wider in the areas of sandstone formations.
On a logical basis, the site is found on a 03Pp Land Unit. However, as noted above, in the cartographic representation, no differentiation will be made in the Land Units of the porphyrics.

Land units	**Geology**	**Description of landscape**	**Practical evaluation of accessibility**
03S1	a2	Level terrain, sand dunes, 0-2% slopes	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* **S2**
03S2	**a2**	Slightly uneven terrain, sand	*Easily accessible/negotiable on foot,*

[108] For the definitions of *soil taxonomy* see the file for Nuraghe Antigori.
[109]Partial bibliographic information is available for this, however, there does not seem to have been a study on the building material of the structures.

		dunes, 2-10% slopes Slightly uneven terrain, sand dunes, 2-10% slopes	*for animals and for draught animals* **S1**
03Gp	**γ+Eμ**	Slightly uneven terrain, granite, 2-10% slopes	*Easily accessible/negotiable on foot, for animals and for draught animals* **S1**
03Gc	**γ+Eμ**	Moderately uneven hillsides, granite, 20-50% slopes	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals.* **S4**
03Gr	**γ+Eμ**	Steep and very steep hillsides, granite, 50->70% slopes	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals* **S5**
03Ap1	**S2ar**	Even terrain, sandstone, 0-2% slopes	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* **S2**
03Ap2	**S2ar**	Even and slightly uneven terrain, sandstone, 2-10% slopes	*Easily accessible/negotiable on foot, for animals and for draught animals* **S1**
03Ac	**S2ar**	Moderately uneven hillsides, sandstone, 20-50% slopes	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals.* **S4**
03Ar	**S2ar**	Steep and very steep sides, granite, 50->70% slopes	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals* **S5** *and in limited points* **N** *Inaccessible/impossible to negotiate with ordinary means*
03Pp	**π2**	Even and slightly uneven terrain on a porphyric rock outcrop with 2-20% slopes	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals* **S5**
03Pc	**π2**	Moderately uneven hillsides on a porphyric rock outcrop with 20-50% slopes	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* **S3**
03Pr	**π2**	Steep and very steep hillsides on porphyric rock, 50-70% slopes	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals* **S5**

ID 4 Nuraghe Arrubiu

Commune: Orroli

Province: Nuoro

Topographic references: IGM 540.II;

(X 1525560,46126; Y 4390308,31208)

1:100,000 Geological map sheet: F. 218

Reliability class: 4

Site description: The site is in the Sarcidano area close to the haut plateau of Pranu 'e mùru. It is the only five-tower Nuragic monument known in Sardinia to date. It is composed of a central tower, around which there are five towers connected with massive walls that create a pentagonal internal courtyard. Around the monument there is an defence structure with seven towers and three courtyards. On the south there is another structure with four or five towers. Again on the southern side there are huts of circular and rectangular plan, dating to different periods.

Figure 10. Nuraghe Arrubiu, aerial view

Nuraghe Arrubiu is at an altitude of 509 m a.s.l, on a basalt haut plateau (**β**)[110], a feature better known in Sardinia with the term *giara*[111], and known by the name of the haut plateau *Pranu 'e mùru.*

The *giara* is in fact like a haut plateau, closed off on the eastern side, from N to S by a steep descent of sandstone (**S1Ar**)[112] and porphyroid gneiss (**Dgn**)[113]. The Flumendosa river flows through this.

The river is blocked by a dam, which since the 1960's has given rise to the artificial lake of Flumendosa. This is 13 km long and no deeper than 300 m.

All the zone to the NE of the area under investigation is occupied by the artificial lake. Hence in the potential reconstruction of the ancient landscape, one must imagine that the declivity had a rather different appearance.

In fact, immediately after the dam, the Flumendosa flows between a narrow gap in steep porphyric formations, and we must imagine similar sandstone formations where on IGM map 540.II, the place names of *Soglianesu* and *Is Tittionis* are found.

It is of interest to examine the features and characteristics of the *giara* in greater depth, above all in light of the fact that this is a zone in which there is still today an abundant concentration of archaeological traces of the Nuragic presence: "nell'area dell'altipiano di *Pranu 'e mùru* sorgono 45 nuraghi, dei quali 31 sulla sommità dell'altipiano e 14 a mezza costa"[114].

A first point to note is that the Nuraghe occupies an area of c. 3000 m^2, on a 2-10% slope. The altitude above sea level as recorded in the DTM is slightly higher than the average altitude for the whole *giara*. This means that the site, while situated on a haut plateau, is not in territory which, as a result of a low slope, could give rise to an increased risk of getting bogged down.

In the identification of the Land Units, the presence of an artificial lake, caused by the dam, has created several problems, above all due to the importance of the Flumendosa river. It is relevant to note, that up to the last century, as A. La Marmora observes: "Il Flumendosa, l'antico Saeprus, è il fiume più terribile della Sardegna, ogni anno si contano delle vittime […] la media delle persone che in un anno si annegavano, attraversando questo fiume ed i torrenti della Barbagia, montava al

[110] "basalto olivinico-augitico delle –Giare- ("basalto degli altopiani")", from Notes of F.218, of the Geological map of the Italian Geological Service.

[111] See Chap. IV. The term "Giare" refers to the types of haut plateaux such as Sarcidano and Marmilla, created by the inversion of the relief of basalt flows (extremely fluid lava eruptions of the Pliocene) within marl valleys. The high fluidity of the lavas determines the perfectly horizontal level of the surfaces. For this reason today the haut plateaux are perfectly level.

[112] "Arenarie, quarziti filladi, arenarie scistose, argilloscisti più o meno filladici", from Notes for F.218-226.

[113]"Gneiss porfiroidi, scisti sericitici porfiroidi, da vulcanismo lavico e piroclastico, prevalentemente sottomarino e precedente al diastrofismo ercinico", from Notes for F. 218-226, of the Geological map of the Italian Geological Service.

[114]Lo Schiavo-Sanges, 1994, p. 18.

numero di 20.[…]Di fatto quando sborda, questo fiume lascia un limo fertilissimo che ha dato il nome di Nilo della Sardegna".

Since anthropic activity has modified the landscape considerably, it has been necessary to take into consideration also this information in order to understand better the accessibility of the zone around Nuraghe Arrubiu in proto-historic times.

The nature of the *giara* gives rise to the fact that the sites located upon it have great control of the surrounding territory, as they are protected by the deep depression caused by the Flumendosa and by sharp declivities of marl, dolomitic limestone, porphyrs and sandstone, with slopes exceeding even 70%.

The basalt haut plateau in the centre of which lies the Nuraghe, is closed to the SW by the so-called "Taccu Piccinnu". The word "taccu" refers to those forms on the landscape which are heel-shaped, composed principally of dolmitic limestones and marls. These features can be seen almost all over the island, but are particularly common in the Sarcidano area.

The particular situation of the physical landscape of this site has prompted extreme care in the creation of the Land Units, with a higher number than those in the other sites.

Land units	**Geology**	**Landscape description**	**Practical evaluation of accessibility**
04Bp1	β	Even terrain, Basalt (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals **(S2)**.*[115]
04Bp2	β	Even and slightly uneven terrain, Basalt (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals **(S1).***
04Bc1	β	Moderately uneven hillsides, Basalt (slopes 20-35%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals **(S2).***
04Bc2	β	Moderately steep hillsides, Basalt (slopes 20-35%)	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals. **(S4).***
04Br	β	Steep and very steep hillsides, Basalt (slopes 50-≥70%)	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals and in limited points inaccessible/impossible to negotiate with ordinary means **(S5-N)***
04Ap	S1Ar	Even and slightly uneven terrain, sandstone, (slopes 2-20%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals **(S2).***
04Ac	S1Ar	Moderately uneven terrain, sandstone, (slopes 20-50%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. **(S3).***
04Ar	S1Ar	Steep and very steep	*Almost inaccessible/impossible to*

[115]Due to the risk of getting bogged down.

		hillside, sandstone, (slopes 50-≥70%)	*negotiate on foot or for animals, inaccessible for draught animals and in limited points inaccessible/impossible to negotiate with ordinary means* ***(S5-N)***
04Dp	S1Ar	Even and slightly uneven terrain, dolmitic limestone, (slopes 2 -20%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1).***
04Dc	Gc	Moderately uneven terrain, dolmitic limestone, (slopes 20-50%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* ***(S3).***
04Dr	Gc	Steep and very steep hillside, dolmitic limestone (slopes 50-≥70%)	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals* ***(S5).***
04Pp	Dgn	Even terrain, porphyry, (slopes 2-20%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1).***
04Pc	Dgn	Moderately steep slopes, porphyry, (slopes 20-35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* ***(S3)***
04Pr	Dgn	Steep and very steep hillside, porphyry (slopes 50-≥70%).	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals and in limited points inaccessible/impossible to negotiate with ordinary means* ***(S5-N)***
04Mp	Pe-Ts	Even terrain, marl, (slopes 2-20%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***
04Mc	Pe-Ts	Slightly uneven terrain, marl, (slopes 20-35%).	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* ***(S3)***
04Qp	Q3	Even terrain, recent flood-lands (slopes 2-20%).	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***
04Qc	Q3	Slightly uneven terrain, recent flood-lands, (slopes 20-35%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***.

No fewer than three soil types can be found in the area around Nuraghe Arrubiu.

All the basalt *giara*, the dolmitic limestone and the porphyries that occupy the slopes to the south of the *giara* have soils of the *Leptic eutric cambisol* (LEP EU CM) type with a maximum depth of 40 cm, while the dolmitic limestone and marl to the west of the *giara* are covered by soils of the *Eutric cambisol* (EU CM) type with a depth of 50 cm.

ID 5 Nuraghe Su Nuraxi

Commune: Barumini

Province: Oristano

Topographic references: I.G.M 539.I CTR 539.080

(X 1499234,42484; Y 439512,31705)

1:100,000 Geological map sheet: F. 218

Reliability class: 4

Site description: Su Nuraxi is the most well-known and most widely studied Nuragic complex in Sardinia. The Nuraghe has four towers, with an ante-mural structure with seven perimeter towers and a village with mono- and bi-cell huts. The site is in the Marmilla area, in the central part of the Sarcidano. It was excavated in the 1940's by G. Lilliu, and today is a UNESCO world heritage monument.

Figure 11 The Nuraghe Su Nuraxi in Barumini (Lilliu 1999,85)

The well-known "Nuragic Throne" of Barumini is at an altitude of 241 m a.s.l. on a formation of sandstone and marl (Ma)[116], that constitutes a slight relief, with slopes from 20-35%. This provides a good view of the surrounding territory.

The marls on which the site is found are valleys which in the Pliocene were occupied by basaltic lava that gave rise to the so-called *giare*.

Immediately to the N of the site, in fact, there is one of the largest *giare* in the island: la giara di Gesturi. All the territory around the site, including that which is not included in the area examined for the creation of the Land Units is dotted with a large number of settlements, which testify to how the territory was used for settlement from the prehistoric era to the Medieval.

The small hill on which the site is built allows good visibility of the territory immediately to the south, east and west. All the area to the NE is composed of clay formations and clayey sands (Mags)[117], which with hills of 20-50% slopes close the site on this side.

To the west the less sloping ground (0-20%) is occupied alternatively by flood lands (q)[118] and black lands (qn)[119]: here the rivers *Riu Fanari* and *Riu de S'Acqua Sassa* flow in a parallel fashion.

To the south, the marls and flood lands, with 2-20% slopes create a plain-like landscape which the site overlooks.

From east to south the river Riu de Su Linarbu flows through recent flood land. It is channelled close to the current village of Barumini.

The sandstone marls (Ma), clays and clayey sands (Mags) are covered by soils of the VR CM type and have a depth of 80 cm.

The black lands (q) and recent flood lands (qn) are, instead, covered by deeper soils (150 cm) of the PE VR type.

On the basis of the features listed, the following Land Units have been distinguished with their respective accessibility values.

Land units	**Geology**	**Landscape description**	**Practical evaluation of accessibility**
05Ap1	Ma	Even terrain, marl and sandstone (slopes 0-2%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals **(S2)***
05Ap2	Ma	Even and slightly uneven	*Easily accessible/negotiable on foot, for*

[116] "Arenarie, arenarie calcaree, arenarie marnose, marne arenacee, brecciole. Sia verso la base sia in seno al complesso, che non è mai piegato, si rinvengono anche lenti di conglomerati più o meno minuti. Sono abbondanti i litotamni, i briozoi, i corallim gli ostreide, i turritelidi, i clipeastridi, i pectinidi, etc., Miocene", from Notes for F.218 of the Geological map of the Italian Geological Service.

[117] "Argille e sabbie argillose, Miocene Medio", from Notes for F.218 of the Geological map of the Italian Geological Service.

[118] "Alluvioni terrazzate, Olocene", from Notes for F. 218 of the Geological map of the Italian Geological Service.

[119] "Terre nere (Olocene)", from Notes for F. 218 of the Geological map of the Italian Geological Service.

		terrain, marl and sandstone (slopes 2-10%).	*animals and for draught animals* ***(S1)***
05Ac1	Ma	Slightly uneven terrain, marl and sandstone (slopes 20-35%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
05Ac2	Ma	Moderately uneven slopes, marl and sandstone (slopes 20-35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* ***(S3)***
05Ar	Ma	Steep hillsides, marl and sandstone (slopes 35-50%)	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals.* ***(S4)***
05Sp1	Mags	Flat terrain, sand and clay (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
05Sp2	Mags	Flat and slightly uneven terrain, sand and clay (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***
05Sc1	Mags	Slightly uneven hillsides, sand and clay (slopes 10-20%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
05Sc2	Mags	Moderately uneven and uneven hillsides, sand and clay (slopes 20-35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* ***(S3)***
05Sr	Mags	Moderately steep and steep slopes, sand and clay, (slopes 35-50%)	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals.* ***(S4)***
05Qp1	q	Flat terrain from recent floods (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
05Qp2	q	Flat terrain from recent floods (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***
05Tp1	qn	Flat terrain, black lands (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
05Tp2	qn	Flat terrain, black lands (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***

ID 6 Nuraghe Duos Nuraghes

Commune: Birori

Province: Nuoro

Topographic references: I.G.M 498.III CTR 498.140

(X: 1483710,55893; Y : 4452334,30427)

Reliability class: 4

1:100,000 Geological map sheet:

Site description: The site of Duos Nuraghes gets its name from two *tholos* Nuragic towers that were built in different times: Tower A and Tower B, around which a village was built, are of the classic two-floor *tholos* type.

Figure 12. Nuraghe Duos Nuraghes. Tower A from SE (Moravetti 1998, 412)

The site of Duos Nuraghes, in the commune of Borore, is situated just a few metres from the village, at an altitude of 402 m a.s.l on the large basalt plain-like formation (βp1)[120] that is at the foot of the Marghine chain.

The whole territory (Marghine) on which the site is to be found is well-known for its wealth of archaeological sites, and there is also a considerable number of Nuraghes (Moravetti 1998).

The site does not seem to occupy a position of particular relief; neither is it in a position of particular defensibility, in comparison to the sites examined up to now.

Nevertheless, it is the northernmost site in the island in which Mycenaean pottery fragments have been found.

[120]"Basalti alcalini grigi con intercalati trachibasalti e basalti debolmente alcalini, talvolta marcatamente porfirici per cristalli di olivina", from Notes for F. 205-206, of the Geological map of the Italian Geological Service.

The landscape around the site does not have any particular distinguishing features.

In fact, only two Land Units have been identified. These were obtained on the basis of the differing slope of the basalt haut plateau.

Land units	**Geological formation**	**Landscape description**	**Evaluation of accessibility**
06Bp1	β	Flat terrain, basalt (*slopes* 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
06Bp2	β	Flat terrain, basalt (*slopes* 2-10%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***

The whole basalt formation is occupied by soils of the Leptic Distric cambisols (LE DY CM) type, with a thickness of 40 cm.

ID 7 Nuraghe Is Baccas

Commune: Sarroch

Province: Cagliari

Topographic references: IGM. 566.III CTR 566.130

(X 1501940,09476; Y 4321661,63771)

1:100,000 Geological map sheet: F234-235

Reliability class: 3

Two Mycenaean fragments were found during an exploration survey –Progetto Nora- in 1992-1996. The fragments were found "dalla prima indagine sulle pendici meridionali terrazzate del Nuraghe *Is Baccas"*[121].

Figure 13 The little hill of Nuraghe Is Baccas from south est

Therefore, the Nuraghe was used as a reference point for the creation of the Land Units. It is in fact not improbable that the fragment came from the same Nuraghe. It is to be underlined that Nuraghe *Is Baccas* is between Nuraghe *Sa Domo 'e s'orku* and the Punic-Roman city of Nora, hence it is close also to Nuraghe *Antigori*. Even though the fragments were not found in the site itself, but in the vicinity, its position is fundamental in the choice of site for the evaluation of its accessibility. Unfortunately the lack of systematic archaeological excavation and exploration of the site does not permit us to have information as to its structure, characteristics and materials.

The nuraghe is on the southern slope of the mountains that overlook the modern village of Sarroch from the south.

While *sa Domo'e s'orku* is on the slope to the north of the basalt relief looking towards the gulf of Cagliari, *Is Baccas* is on the southern slope overlooking the part of the coast that goes from *Torre*

[121] Botto Rendeli 1996, p.

del Diavolo to *P.ta Furcadizzo* and that arrives as far as the peninsula of *Coltellazzo* where the Punic-Roman city of Nora is to be found.

The site is at an altitude of 81 m a.s.l. on a small basalt promontory (α)[122] separated to the north by the higher reliefs of *Gutturu Mannu* and *S'arku e s'ailis* by a small valley. In an easterly direction the site is little more than 1300 m from the sea. Around the site of Is Baccas there are basalt hilly formations, with slopes from 2-50% that slope down towards the sea, leaving space for the continental eluvial deposit plains (a^1)[123] and recent Quaternary flood lands (a^2)[124] with slopes between 0 and 2 %. The basalt formations are occupied by soils of the *Leptic cambisols* (LE CM) type, with a maximum depth of 40 cm, while the continental eluvial deposits and recent flood lands feature soils of the *Haplic luvisols* HA LV, with a maximum depth of 150 cm.

Of the 9 km^2 examined around the site of *Is Baccas*, the following Land Units were created:

Land units	**Geology**	**Landscape description**	**Evaluation of accessibility**
07Bp	α	Flat and slightly uneven terrain, basalt (*slopes* 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***
07Bc1	α	Moderately uneven terrain, basalt (*slopes* 10 and 20%**)**	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
07Bc2	α	Moderately uneven hillside, basalt (slopes 20 and 35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* ***(S3)***
07Bc3	α	Moderately steep hillside, basalt (*slopes* 35-50%)	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals.* ***(S4)***
07Br	α	Very steep hillside, basalt (*slopes* 50-70%)	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals.* ***(S5)***
07Ap1	a^2	Terrain, recent flood lands (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
07Ap2	a^2	Flat and slightly uneven terrain, recent flood lands (*slopes* 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***
07Dp1	a^1	Flat terrain, continental eluvial deposits (*slopes* 0 -2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***

[122] See note 5.

[123] "Depositi eluviali, espandimenti detritici di sfacelo di rocce granitiche", from Notes for F.234-235 of the Geological map of the Italian Geological Service.

[124]"Alluvioni recenti, valli, depositi fluvio-lacustri degli stagni di Farai, Piscina Rei, S. Giusta, etc.", from Notes for F. 234-235 of the Geological map of the Italian Geological Service.

07Dp2	a[1]	Flat and slightly uneven terrain, continental eluvial deposits (*slopes* 2-10 %)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***

ID 8 Monte Zara

Commune: Monastir

Province: Cagliari

Topographic references: IGM 557.4; CTR 557.010

(X 1504351, 87197; Y 4358968,01309)

1:100,000 Geological map sheet: F.226

Reliability class: 2

Site description: The site is in the south of Sardinia, on the Campidano plain. It was found during work for the enlargement of the state road 131 that connects Sassari and Cagliari. It is an agglomerated Nuragic settlement, in the zone to the west of Monte Zara. The structure excavated include several huts, that can be dated via the materials from the Middle Bronze and Recent Bronze Ages, and due to some Punic burials dating up to the start of the Iron Age. The Mycenaean material comes from Structure 34S (Ugas 1992, 210) .

Figure 14. Excavation at the site of Monte Zara (Photo by Dr. E.Atzeni)

The site of Monti Zara, to the contrary of the other sites discussed up to now, has not conserved the monumental aspect of the Nuragic towers, which are visible also in the orthomaps. This made its exacting positioning on the map somewhat difficult. The excavation reports did not allow complete understanding of its whole size. The fact that these data were missing hampered the attempt to understand the relationship of the site with the territory on the basis of its accessibility.

This notwithstanding, the fact that Mycenaean material emerged from the excavation, highlighting the fact that there was stable settlement in the Nuragic era, is to be considered an important finding.

The site is at an altitude ranging from 100 to 110 m a.s.l., on a formation of trachytes and andesites (Mt)[125], which form Monte Zara and slope off towards the modern town of Monastir (CA).

Monte Zara, together with Monte Crabas and Su Cuccumenu, forms a system of trachytes and andesites (Mt) on the eastern slope, and marls and carnelians (PETs)[126] on the western and north western slopes.

The western slope is separated from another relief, Monte Aqutzu, composed of composite basalt (MicG)[127], by a small river (Gora di M.te Aqutzu) a tributary of Rio Flumineddu: a river that flows parallel to Riu Mannu, which flows along the northern limit of the modern town of Monastir.

All the plain area that is not occupied by the hill that surrounds the mountain system to the north and west, is occupied by recent flood lands, according to the notes for F. 226 of the Italian Geological Service. In the Geological Map of Sardinia at a scale of 1:200,000, edited by the Regional committee for the coordination of geographic and geothematic cartography of Sardinia (Prof. L. Carmignani), one reads that the zone is occupied by "Ghiaie, sabbie, limi e argille sabbiose dei depositi alluvionali, colluviali, eolici e litorali, travertini dell'Olocene (1)", and by "conglomerati, sabbie, argille più o meno compattate, in terrazzi e conoidi alluvionali (Alluvioni antiche) del Pliocene(?) –Pleistocene (2a)".

As regards an evaluation of the accessibility of a territory, the presence of recent or ancient flood plains could create differences. In this case we are dealing with the presence of plain zones, which with slopes from 0-2% may well present conditions in which one may get bogged down. To add to this, the pedological map indicates, in the plain areas, soils of the CC LV type with a maximum depth of 120 cm, while in the areas occupied by the trachytes and andesites there are soils of the LE CM type with a maximum depth of 40cm. In those of the marls and conglomerates, soils are of the CA CM type with a maximum depth of 60 cm.

On this basis the following Land Units have been identified for the mountainous zones:

08TRc1 Moderately uneven terrain on trachytes and andesites with 10-20% slopes and accessibility class S2.

08TRc2 Hilly terrain on trachytes and andesites with 20-35% slopes and accessibility class S3.

08TRc3 Moderately steep terrain on trachytes and andesites with 35-50% slopes and accessibility class S4.

[125] "Trachiti e andesiti" from Notes for F226 of the Geological map of the Italian Geological Service.

[126] "Marne e carniole, facies lacustri e palustri; argille refrattarie palustri (Riu Muscadroxiu); *Rotliegende* e sovrastanti arenarie rosse", from Notes for F226 of the Geological map of the Italian Geological Service.

[127]" Conglomerato basale e sovrastanti marne più o meno arenacee, più o meno argillose, in alternanza con banchi di calcare." from Notes for F226 of the Geological map of the Italian Geological Service.

Of note in the locality of the modern town of Monastir is also the presence of trachytic tufa, that from the point of view of accessibility/negotiability may be grouped with the distinct formations of trachyte and andesite, but for the sake of thoroughness have been divided in the following way:

Land units	Geology	Landscape description	Evaluation of landscape
08TFp		Slightly uneven terrain, trachytic tufa (slopes 2-10%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
08TFc1		Uneven terrain, trachytic tufa (slopes 10-20%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
08TFc2		Hilly terrain, trachytic tufa (slopes 20-35%).	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*
08Mp		Slightly uneven terrain, marls and carnelians (slopes 2-10%).	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
08Mc1		Uneven hillside, marls and carnelians (slopes 10-20%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
08Mc2		Hillside terrain, marls and carnelians (slopes 20-35%).	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*
08Mc3		Very steep terrain, marls and carnelians (slopes 35-50%).	*Difficult to access/negotiate on foot or for animals, very difficult for draught animals. (S4)*
08CGp1		Even landscape, basal conglomerates (slopes 0-2%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
08CGp2		Even landscape, basal conglomerates (slopes 2-10%).	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
08CGc1		Uneven hillside, basal conglomerates (slopes 10-20%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
08CGc2		Moderately steep hillside, basal conglomerates (slopes 20-35%).	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*
08CGr		Very steep hillside, basal conglomerates (slopes 50-70%).	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals. (S5)*
08Qp1		Even terrain, recent flood lands (slopes 0-2%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*

08Qp2	Slightly uneven terrain, recent flood lands (slopes 2-10%).	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
08Qc1	Slightly uneven terrain, recent flood lands (slopes 10-20%).	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
08Qc2	Hilly terrain, recent flood lands (slope 20-35%).	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*

ID 9 Corti Beccia

Commune: Sanluri

Province: Cagliari

Topographic references: IGM 547.1; CTR 547070;547030

(X 1488613,24242; Y: 4377006,57746)

1:100,000 Geological map sheet: F.224-225

Reliability class: 2

Site description: A pottery fragment was found in the Nuragic settlement that was discovered "nella località di Corti Beccia, durante i lavori per l'irrigazione effettuati nel 1979"[128]. The settlement is composed of a nuraghe which is "semplice e di pianta indeterminabile"[129] known also by the name "Su Mori 'e sa Cotti". The irrigation work mentioned above ruined the remains of the nuraghe itself, which already in the 1980's "non più emergente in superficie, ridotto a tre filari di blocchi in conglomerato d'arenaria"[130]. The material evidence dates the site to the Late Bronze Age and 4th c. BC[131].

Also in this case we are dealing with a Nuragic site, and as for Monti Zara, it has been difficult to map the site. Neither the IGM map nor the more detailed CTR map mark the Nuraghe and clearly the remains of the settlement are not mentioned. The toponomastics and 1:10,000 orthomaps have been of assistance in its identification.

The site is on the plain of Campidano between the communes of Sanluri and San Gavino Monreale. According to sheets 224-225 of the map of the National Geological Service, the 9 km^2 are occupied by Pleistocene alluvial deposits (q2)[132].

In the Geological Map of Sardinia at a scale of 1:200,000, edited by the Regional committee for the coordination of geographic and geothematic cartography of Sardinia (Prof. L. Carmignani), one reads that the zone is occupied by "Ghiaie, sabbie, limi e argille sabbiose dei depositi alluvionali, colluviali, eolici e litorali, travertini dell'Olocene (1)" and "Conglomerati, arenarie e argille di sistema alluvionale prevalentemente derivanti dal rimaneggiamento di sedimenti miocenici (Campidano) (3b)". The presence of the sandstones is important above all because reports on the Nuraghe inform us that, as written above, the only remains of the monument are composed of a few blocks of the same material.

[128] Ugas 1982, p. 39

[129] Lilliu 1948, p.417

[130] Ugas 1982, p. 39.

[131] Ibidem.

[132] "Depositi alluvionali e palustri con conglomerati, sabbie ed argille; superfici di erosione talora coperte da depositi pluvio-detritici e da luoghi interessati dalle piccole incisioni del ciclo alluvionale olocenico", from Notes for F.224-225 of the Geological map of the Italian Geological Service.

From the point of view of accessibility of the territory taken into consideration, there are no differences in the use of the information from either of the geological maps, as the terrain is essentially uniform.

Hence, for the creation of the Land Units, reference is made to the information from sheets 224-225 of the map of the National Geological Service.

Land units	**Geology**	**Landscape description**	**Evaluation of accessibility**
Qp1	q2	Even terrain, flood deposits (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
Qp2	Q2	Slightly uneven terrain, flood deposits (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*

The whole zone is occupied by soils with a maximum depth of 180 cm.

ID 10 Nora

Commune: Santa Margherita di Pula

Province: Cagliari

Topographic references: IGM 573.1 CTR .

(X: 1501337,26318 Y : 4315013,02476)

Reliability of geo-referencing: 4

Geological Map Sheet 1:100,000: F.239-240

Site description: The Punic-Roman city of Nora occupies the peninsula called Coltellazzo, which overlooks the Gulf to the West of Cagliari. The Mycenaean fragments found there comes from the Roman *macellum*, and the others come from the Roman *forum*. Human presence on the promontory has been attested in the Nuragic era, nevertheless, in any case, here we are dealing with a few pottery fragments and re-used remains of Nuragic blocks, found in the so-called “Tanit's temple”. There are remains of a nuraghe on the same hillock of *Sa Guardia Mongiasa*, immediately inland of the city, now covered by structures belonging to the Navy.

Figure 15. Ruines of Nora (Aerial photo by Gianni Alvito, Terravista)

The city of Nora is on a promontory known as the Pula Headland, on a strip of land separated from the inland by an isthmus that does not exceed 80 m in width. After narrowing, the promontory widens considerably extending to two points: one to the south, *Punta de su Coloru*, and one to the east *Punta del Coltellazzo*, facing the island of the same name.

The promontory of Nora is hence similar to a triangle with the base facing the sea and the vertex towards the narrow strip of the isthmus.

Altitude is: 3 m a.s.l., where the modern fish pool of Nora is to be found; 5 m a.s.l. at the Temple of Tanit; and 32 m a.s.l. at *Punta de su Colòru* and Punta del Coltellazzo.

The landscape of the peninsula of Coltellazzo is quite particular, above all because the current situation, as mentioned in Chap. IV, is not representative of the ancient landscape.

For this territorial district, the following Land Units have been distinguished.

Land units	**Geology**	**Landscape description**	**Evaluation of accessibility**
10Ap	(a)[133]	Even terrain, recent flood lands (*slopes* 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
10Dp	(q)[134]	Even terrain, continental fluvial deposits (*slopes* 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
10Tp	qt[135],	Even terrain, travertine (*slope*s 0- 2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
10Sp	as[2136]	Even terrain, marine sands (*slopes* 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
10Bp	α [137]	Even terrain, basalt and andesite (*slopes* 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals* ***(S1)***
10Bc1	α	Slightly uneven terrain, basalt and andesite (*slopes* 10-20%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals* ***(S2)***
10Bc2	α	Uneven terrain, basalt and andesite (*slopes* 20-35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals.* ***(S3)***

[133] "Alluvioni recenti, valli, depositi fluvio-lacustri degli stagni di Farai, Piscina Rei, S: Giusta, etc.", from Notes for F.239-240 of the Geological map of the Italian Geological Service.

[134]"Depositi continentali. Panchina arenacea e sabbie stratificate spesso cementate, e talora ferrettizate in superficie. Terrazzi ciottolosi ad elementi vari", from Notes for F.239-240 of the Geological map of the Italian Geological Service.

[135] "Travertini. Panchine travertinose litoranee a *Strombus* (facies marina del Quaternario antico)", rom Notes for F.239-240 of the Geological map of the Italian Geological Service.

[136] "Sabbie marine e dune costiere", from Notes for F.239-240 of the Geological map of the Italian Geological Service.

[137] "Andesiti granulari di color grigio rossastro, nerastro e basalti a grana fina vitrofirici, a colore grigio e nerastro. Per la maggior parte in formazioni piroclastiche più o meno stratificate,a grossi elementi: tufi a granaglie o terrosi, giallastri. (Trachiti anfibolica e fonolitiche di Lamarmora)", from Notes for F.239-240 of the Geological map of the Italian Geological Service.

ID 11 Tharros/Muru Mannu

Commune: Cabras

Province: Oristano

Topographic references: IGM 528.3 CTR

(X: 1452189,19589; Y: 4414218,35923)

Reliability of geo-referencing: 3

1:100,000 Geological map sheet: F. 216-217

Site description: The fragments are from the hill of *Muru Mannu*, in the Sinis peninsula. This is the site of the Phoenician *tophet* above the remains of the ancient Nuragic settlement.

The Nuragic village is located on the northernmost part of the Sinis peninsula.

The whole peninsula is little more than 3 km long in a N-SW direction, and together with the facing Capo Frasca forms the inlet of the Gulf of Oristano.

Muru Mannu is the place name of one of the three higher areas (Torre di S.Giovanni and Capo S. Marco) that are to be found along the peninsula. These are connected by a narrow isthmus.

The hill, which to the east overlooks the *Mar Morto* (Gulf of Oristano), is at 36 m a.s.l.

Figure 16. Tharros, the hill of Muru Mannu and the Sinis peninsula (Photo by Gianni Alvito-Terravista)

The whole peninsula has a very varied and particular geological situation in which there are basalts (βc)[138], in outcrops close to the three higher parts of the peninsula (*Muru Mannu, Torre di S. Giovanni, Capo S. Marco*), sandstones (Qm)[139] in outcrops close to the city, groups of marls and sandstones (Qd)[140] that occupy the last strip of the peninsula before Capo S. Marco and Holocene sands (s)[141] and flood lands (a) [142] in the northern part of the peninsula where it is linked to the mainland.

It is interesting to note that the island of Mal di Ventre, facing the peninsula from the west is composed of granite, which does not appear in Sinis. Some geologists maintain that it lies at greater depth, below the other, more recent rocks.

All the problems of the ancient landscape of the peninsula of Sinis have been dealt with previously. It is difficult to evaluate whether the peninsula was completely attached to the mainland in the Middle and Late Bronze Ages. In fact, one may wonder whether the sands in the north could be the result of an accumulation over the years, due to the erosion of the underlying sandstone, and also to the deposit from the Tirso river, the mouth of which is to the east of the peninsula. Unfortunately, we do not have sufficient evidence to make evaluations with regard to this, and in the classification of the landscape, this is considered to have been already fossilised in the period taken into consideration.

For the analysis of a zone that is so problematic, we must in any case evaluate also the considerations made in the chapter on the ancient landscape. Therefore the Land Units created for this zone, are a sort of "work in progress", lacking in fundamental evidence.

The table below reports the classification to facilitate the comprehension of the accessibility of the zone.

Land units	**Geology**	**Landscape description**	**Evaluation of accessibility**
11Ap	A	Even terrain, recent flood lands (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
11ARc	Qm	Slightly uneven terrain, sandstone (slopes 20-35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*
11Bp	Bc	Even and slightly uneven	*Easily accessible/negotiable on foot, for*

[138] "Basalti in colate compatti o bollosi, talora in coni o intumescenze nelle "giare" from Notes for F.216-217 of the Geological map of the Italian Geological Service.

[139] "Arenarie conglomenrati e sabbie con fauna marina tirreniana" (Pleistocene), from Notes for F.216-217 of the Geological map of the Italian Geological Service.

[140] "sabbie e calcari più o meno cementate, in massima parte wurmiane", from Notes for F.216-217 of the Geological map of the Italian Geological Service.

[141] "Sabbie attuali e recenti delle spiagge passanti a dune litoranee", from Notes for F.216-217 of the Geological map of the Italian Geological Service.

[142] "Alluvioni ciottoloso-sabbiose o argillose e depositi limo-argillosi palustri attuali e recenti", from Notes for F.216-217 of the Geological map of the Italian Geological Service.

		terrain, basalt (slopes 2-10%)	*animals and for draught animals (S1)*
11Bc	Bc	Moderately uneven terrain, basalt (slopes 35-50%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*
11Br	Bc	Steep and very steep terrain, basalt (slopes 50-≥70%)	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals. (S5)*
11Cgr	Pl	Steep terrain, conglomerates (slopes 50-70%)	*Almost inaccessible/impossible to negotiate on foot or for animals, inaccessible for draught animals. (S5)*
11Dp1	S	Even terrain, sand dunes (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
11Dp2	S	Even and slightly uneven terrain, sand dunes (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
11Dc	S	Moderately uneven terrain, sand dunes (slopes 20-35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*
11Mp	M3	Even terrain, marl (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
11Mc	M3	Moderately uneven terrain, marl (slopes 20-35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*
11Sp1	Qd	Even terrain, recent sands (slopes 0-2%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
11Sp2	Qd	Even and slightly uneven terrain, recent sands (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
11Sc	Qd	Uneven terrain, recent sands (slopes 10-20%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*

ID 12 Sant'Antioco (ancient *Sulky*)

Commune: Sant'Antioco

Province: Cagliari

Topographic references: IGM 573.I-II-III-IV; CTR 564.100

(X: 1452821,26555; Y; 4324745,1694)

Reliability of geo-referencing: 4

1:100,000 Geological map sheet: F. 232-232b

Site description: The pottery fragments were found in the area of the so-called "Cronicario" of Sant'Antioco (Bartoloni, 2006; Pompianu Soro 2013). Considering the potential Mycenaean provenance, it has been necessary to take into consideration the site of ancient *Sulky*[143].

Here were found the remains of the archaic settlement, discovered in 1983 thanks to restructuring work on the town's nursing home. This is currently being excavated by the University of Sassari and the National Institute for Ancient Mediterranean Civilisations of the C.N.R. (Director: Prof. Piero Bartoloni).

Figure 17. Sant'Antioco in IGM sheet 573.III-573.II

The ancient town of *Sulky* was located in the area of the modern town of Sant'Antioco, in the NE of the island of the same name in the Sulcis area. It was a Phoenician center, occupied later by the

[143]On the attribution of the provenance of the materials and their characteristics, the reader is referred to the presentation made by Prof. Bartoloni at the 22nd Africa Romana conference.

Punics, and in the Roman Period, it became the town of *Sulci*. The traces of its multiple occupations are a clear sign of its extraordinary geographical and territorial position[144].

Such a district deserves more in-depth treatment as a result of its geographical position: in fact, the locality overlooks what may be defined as a natural port, and the study of the ancient landscape could be definitive for a better understanding of the evolution of the site, that, even before the Iron Age, played a significant role in this territorial space.

The pottery fragments were found on a formation of effusive rock, indicated in Sheet 232-232b of the Geological map of the Italian Geological Service as "lipariti vitrofiniche" (**τ**) and in the 1:200,000 Geological map edited by Prof. L Carmignani one reads "rioliti, riodaciti, daciti e subordinatamente comenditi, in espandimenti ignimbritici, cupole di ristagno e rare colate, a cui si associano prodotti freato-magmatici ("fall" e "surge"); talora livelli epiclastici intercalati".

In the evaluation of accessibility, differences between the two effusive rocks are not found.

It is of importance to note that the ancient settlement and the archaeological structures are on the oldest geological formation and in a situation of enhanced defensibility.

The rest of the landscape is occupied by Holocene Aeolic sands (**s**)[145].

The formations of effusive rock are covered by soils of the LE HA CM type, with a depth of 35 cm, while the sand deposits are covered by soils of the FV CM with a depth of 80 cm.

The resulting Land Units are the following:

Land units	**Geology**	**Landscape description**	**Evaluation of accessibility**
12Sp1	as2	Even terrain, Aeolian sands (slopes 0-2%)	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
12Sp2	as2	Even and moderately uneven terrain, Aeolian sands (slopes 2-10%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
12Lp	τ + τ2	Even and moderately uneven terrain, effusive rock (slopes 2-10%)	*Easily accessible/negotiable on foot, for animals and for draught animals (S1)*
12Lc1	τ + τ2	Slightly uneven terrain, effusive rock (slopes 10-20%)	*Possible to access/negotiate with little difficulty on foot, with animals and with draught animals (S2)*
12Lc2	τ + τ2	Uneven terrain, effusive rock (slopes 20-35%)	*Moderately accessible/negotiable on foot or with animals, difficult to access for draught animals. (S3)*

[144] Some observations concerning the landscape situation during the Middle and Late Bronze Ages are made in Chap IV.

[145] "Dune e sabbie di origine eolica" (Holocene) from Notes for F. 232-232b of the Geological map of the Italian Geological Service.

ID 13 The Orosei zone

The fragments of Mycenaean pottery considered to originate from the zone of Orosei (Nuoro) have an archaeological history that do not allow their true location of finding to be identified[146].

In a recent conversation with Dr. F. Lo Schiavo, who at the time was Soprintendente Archeologica for the provinces of Sassari and Nuoro, it emerged that the zone, as a result of the complicated affair and the frequent clandestine excavations which took place at that time, had been widely surveyed, but no extra information that could have narrowed down the area of the finding of the fragments was obtained.

The large number of archaeological sites in the area and the dearth of information on the finding do not allow us to narrow down the area even to a potential zone.

The Gulf of Orosei and the zone of potential finding embrace a vast area. The commune of Orosei alone has an area of 90885,104 km^2 and contains a huge concentration of Nuraghes, tombs and remains of villages that can be dated to the Middle and Late Bronze Ages.

At the current state of knowledge we could evaluate the landscape of all the area around the Cedrino river, for example, without arriving at significant results and this would be at cross purposes with the very objectives of the research project.

We can only accept the fact that the presumed place of finding of the fragments is to be found in the indicated zone. However, it seems superfluous for now to attempt to carry out analyses and evaluations with such a small amount of information at hand.

[146] Lo Schiavo- Vagnetti 1980, p. 371-393

2.5.1 Cartographic Elaboration of Land Units

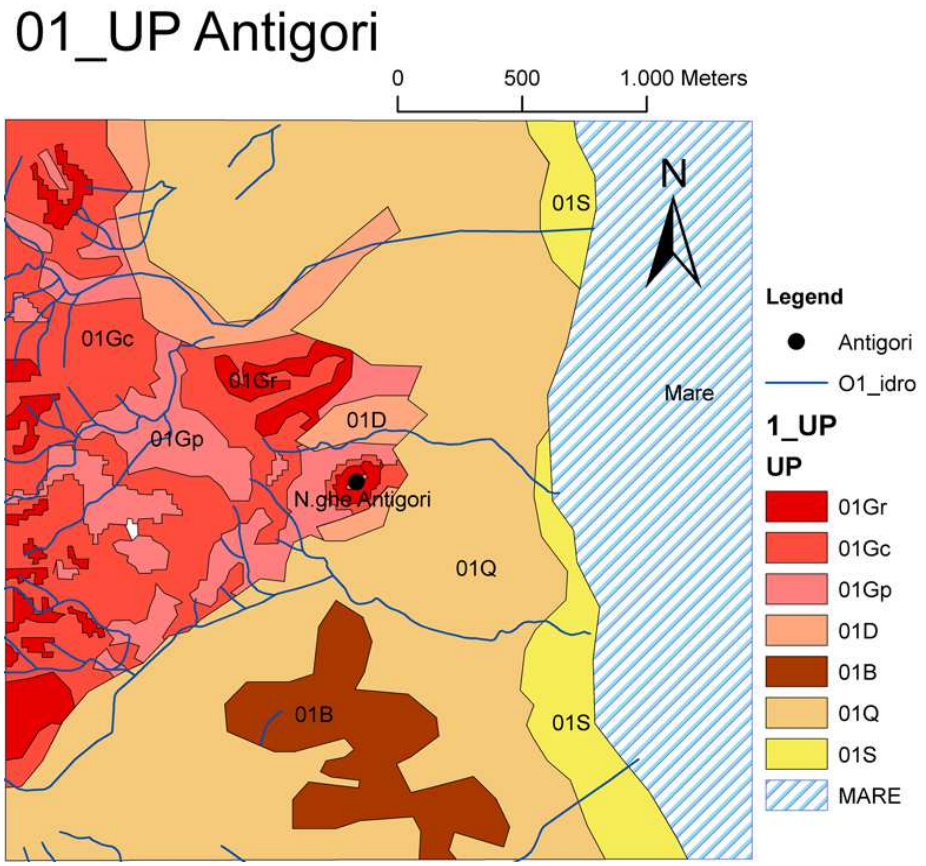

Figure 18. Map of UU.PP.Nuraghe Antigori

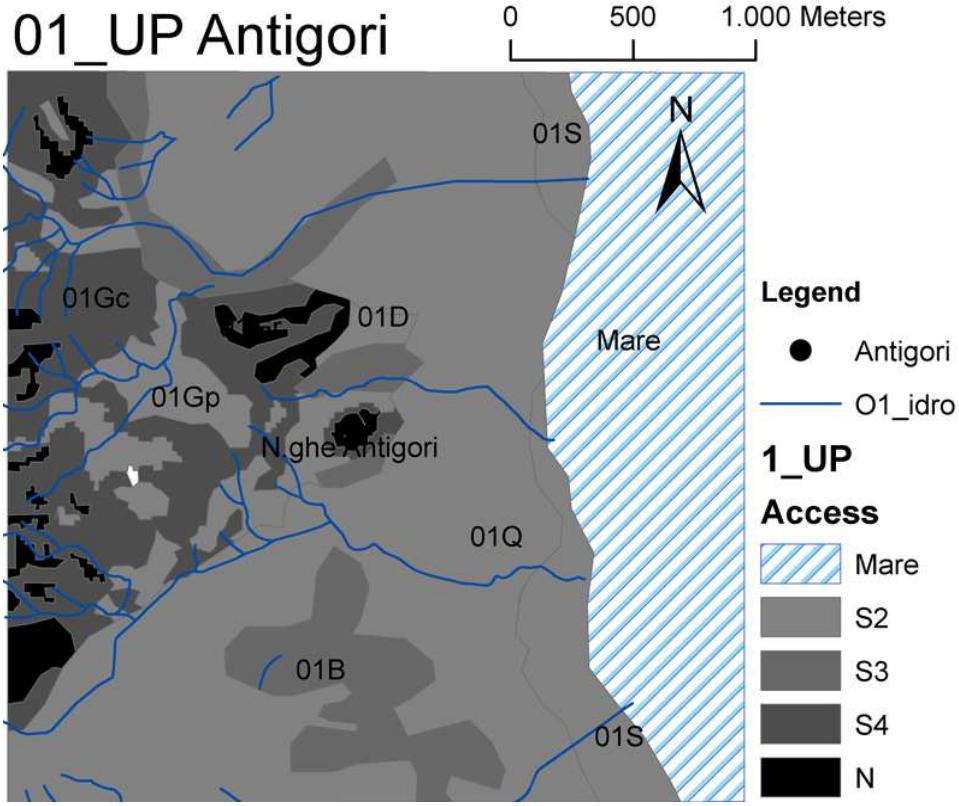

Figure 19. Map of accessibility to the site of Nuraghe Antigori

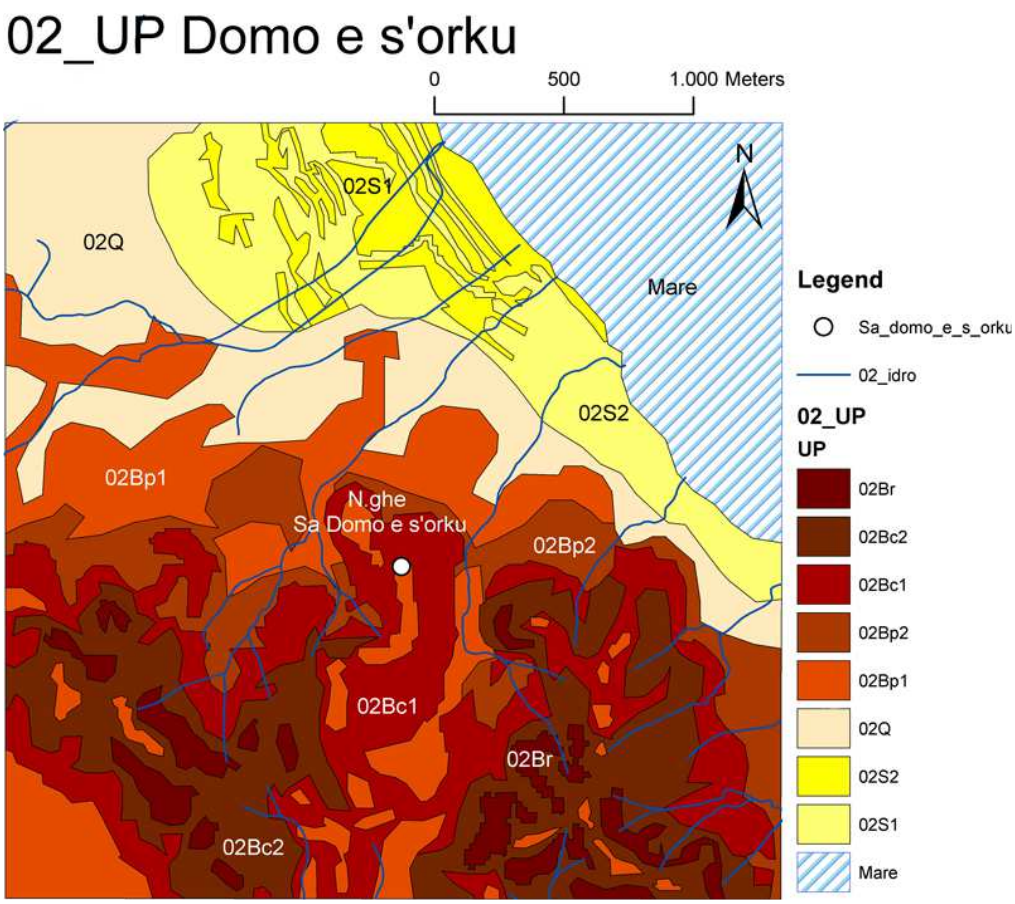

Figure 20. Map of UU.PP. Nuraghe Sa domo 'e s'orku

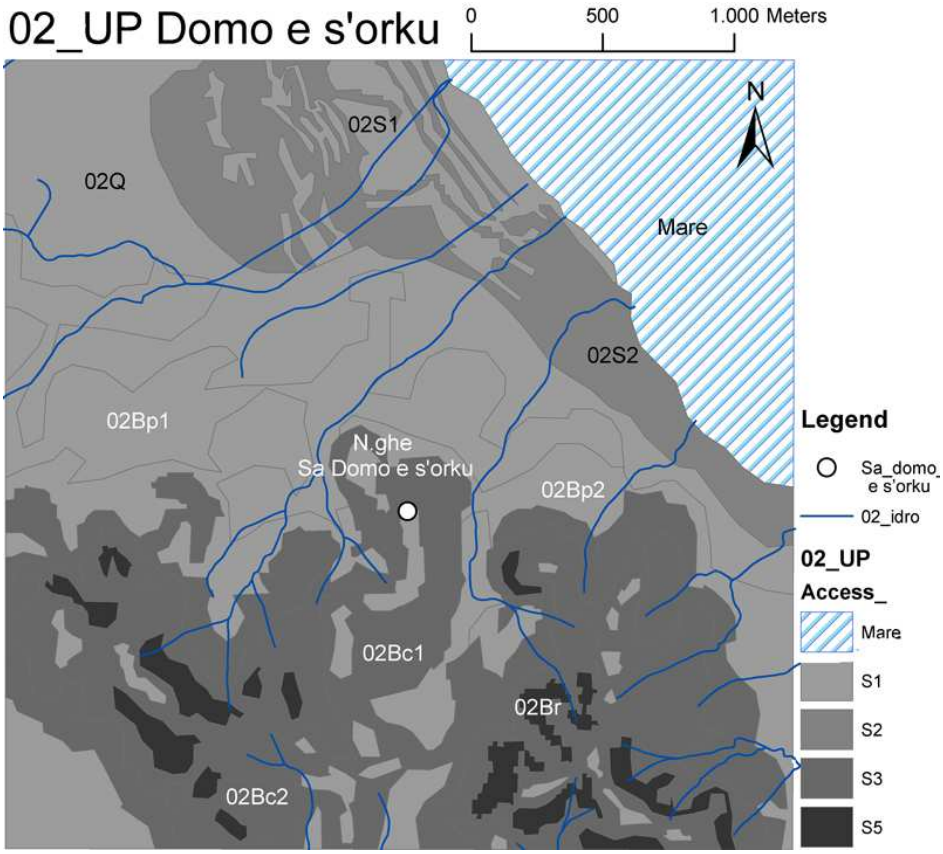

Figure 21. Map of accessibility to the site of Nuraghe Sa domo 'e s'orku

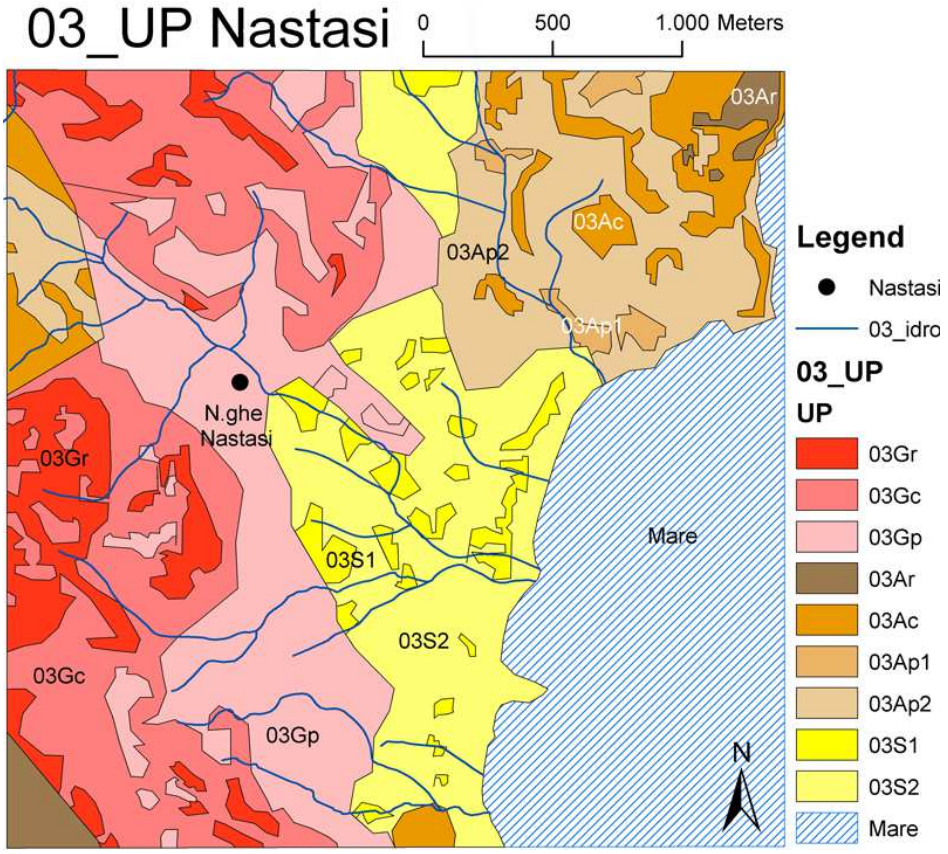

Figure 22. Map of UU.PP. Nuraghe Nastasi

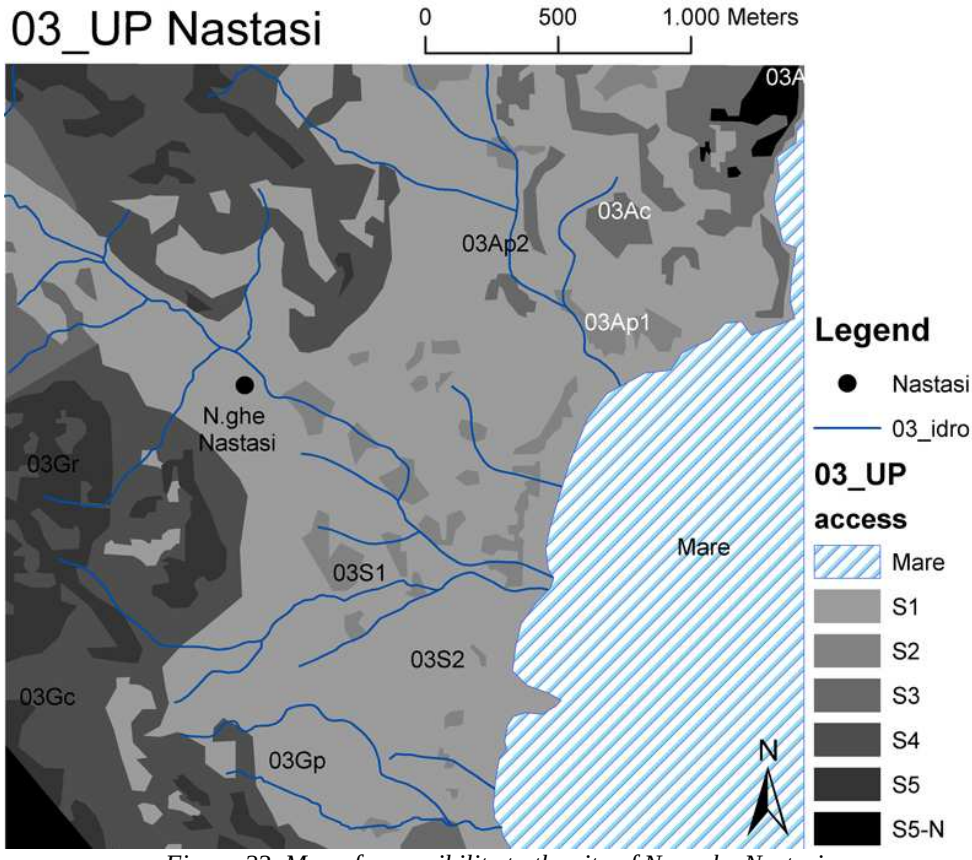

Figure 23. Map of accessibility to the site of Nuraghe Nastasi

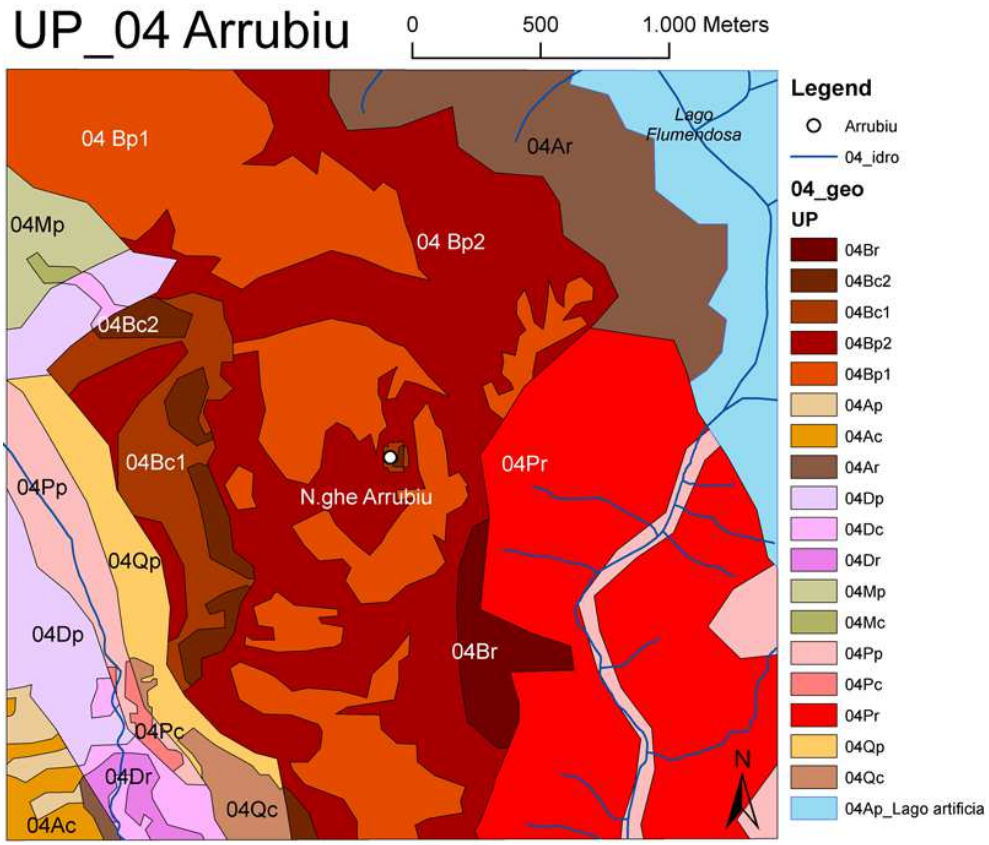

Figure 24. Map of UU.PP. Nuraghe Arrubiu

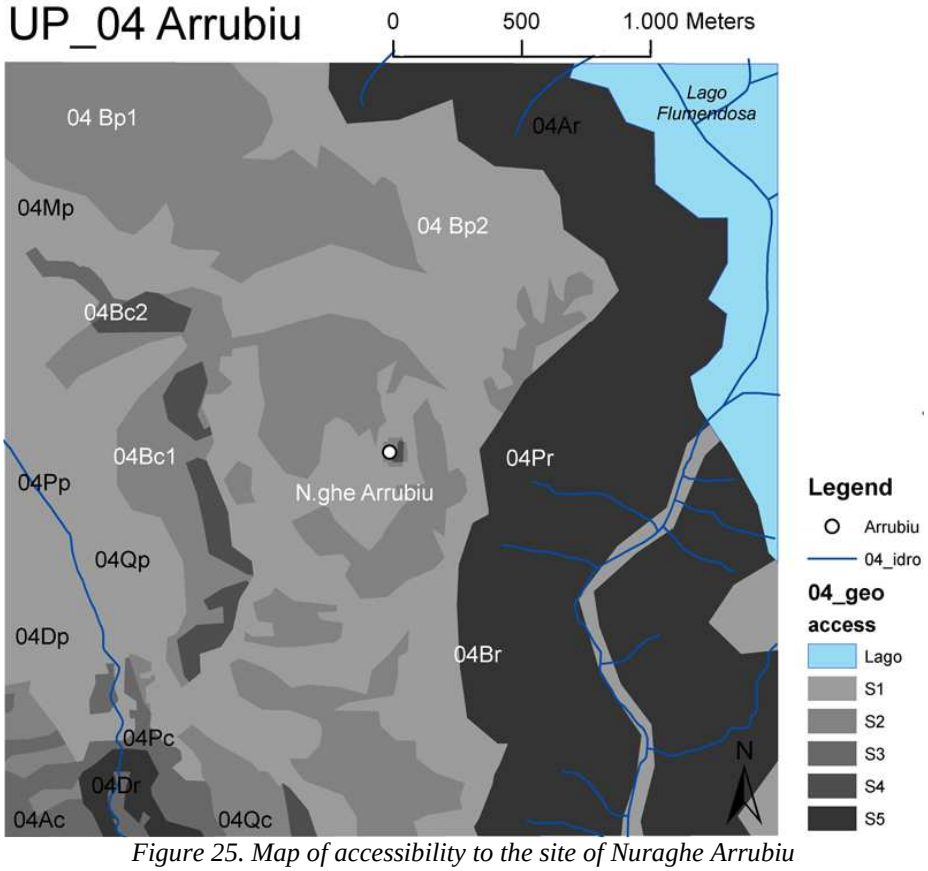

Figure 25. Map of accessibility to the site of Nuraghe Arrubiu

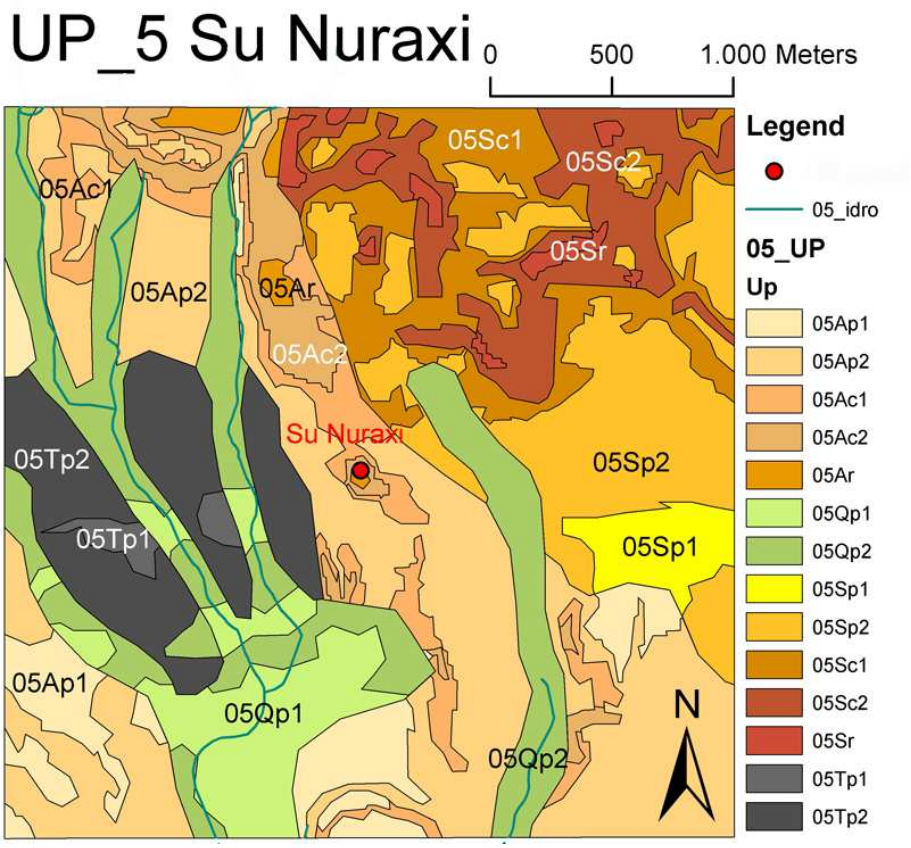

Figure 26. Map of UU.PP. Nuraghe Su Nuraxi

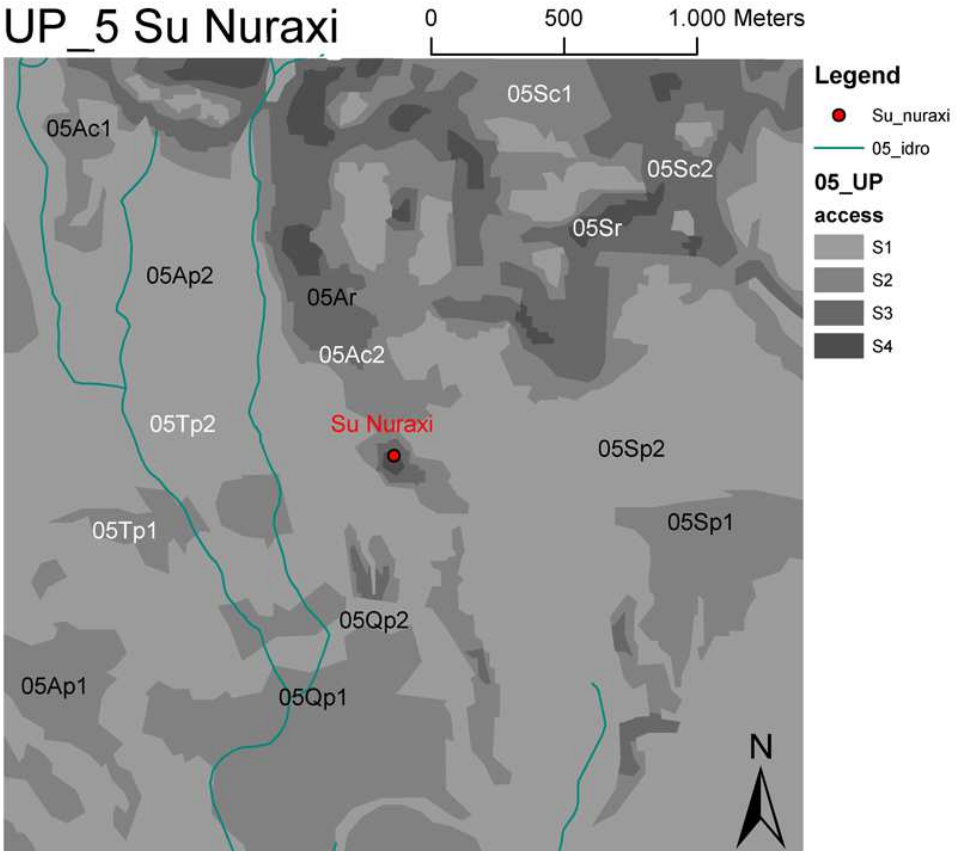

Figure 27. Map of accessibility to the site of Nuraghe Su Nuraxi

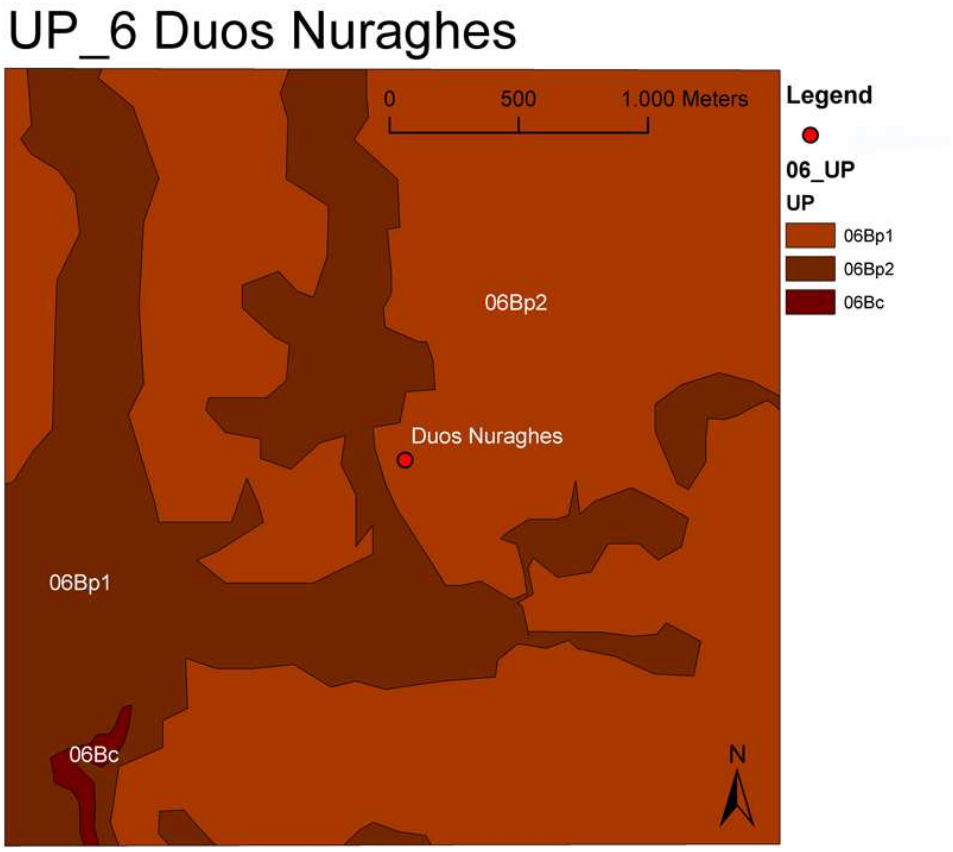

Figure 28. Map of UU.PP. Duos Nuraghes

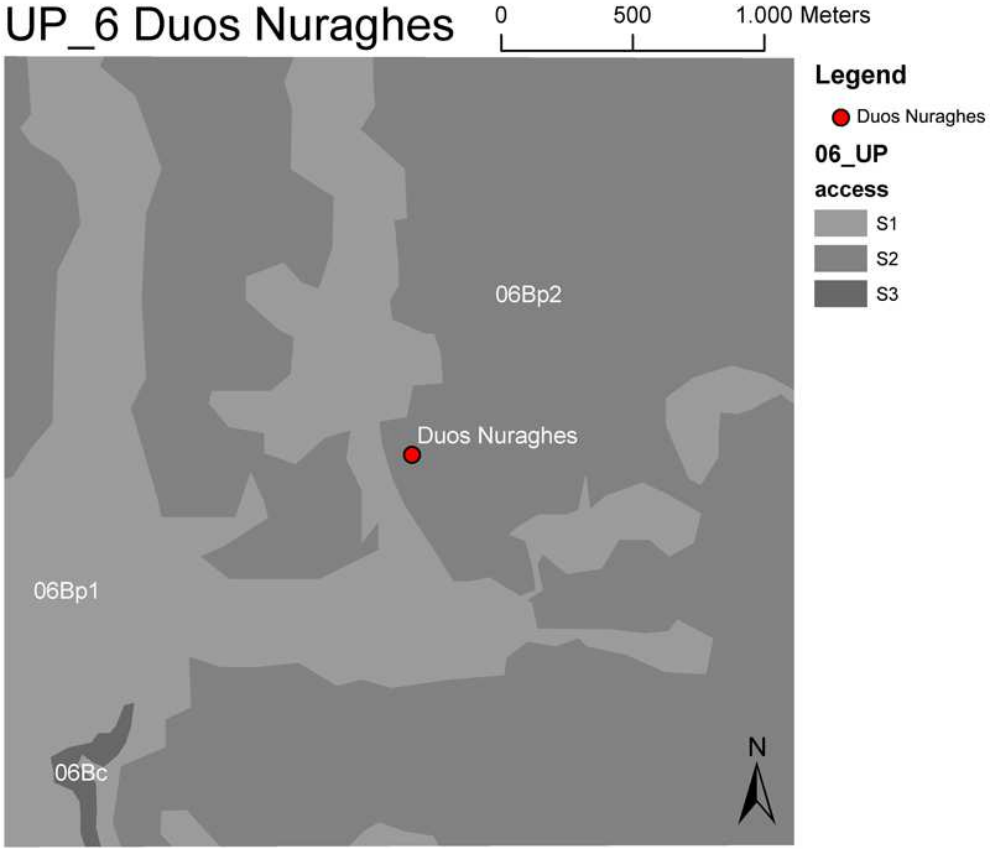

Figure 29. Map of accessibility to the site of Duos Nuraghes

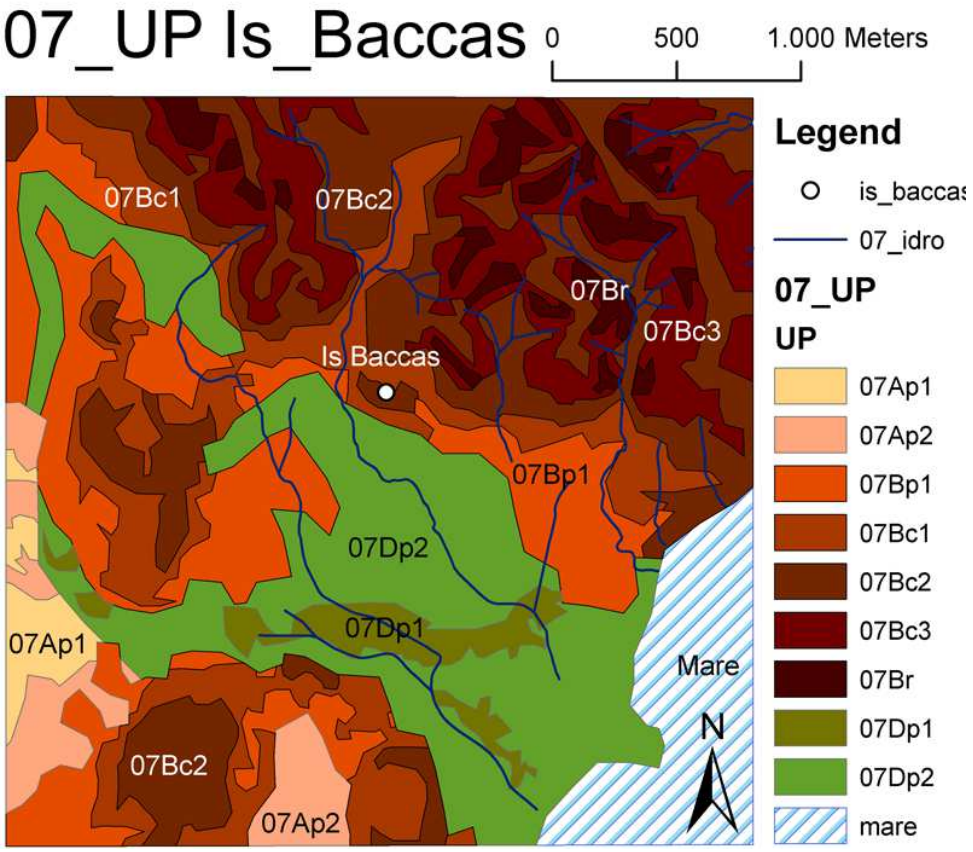

Figure 30. Map of UU.PP. Nuraghe Is Baccas

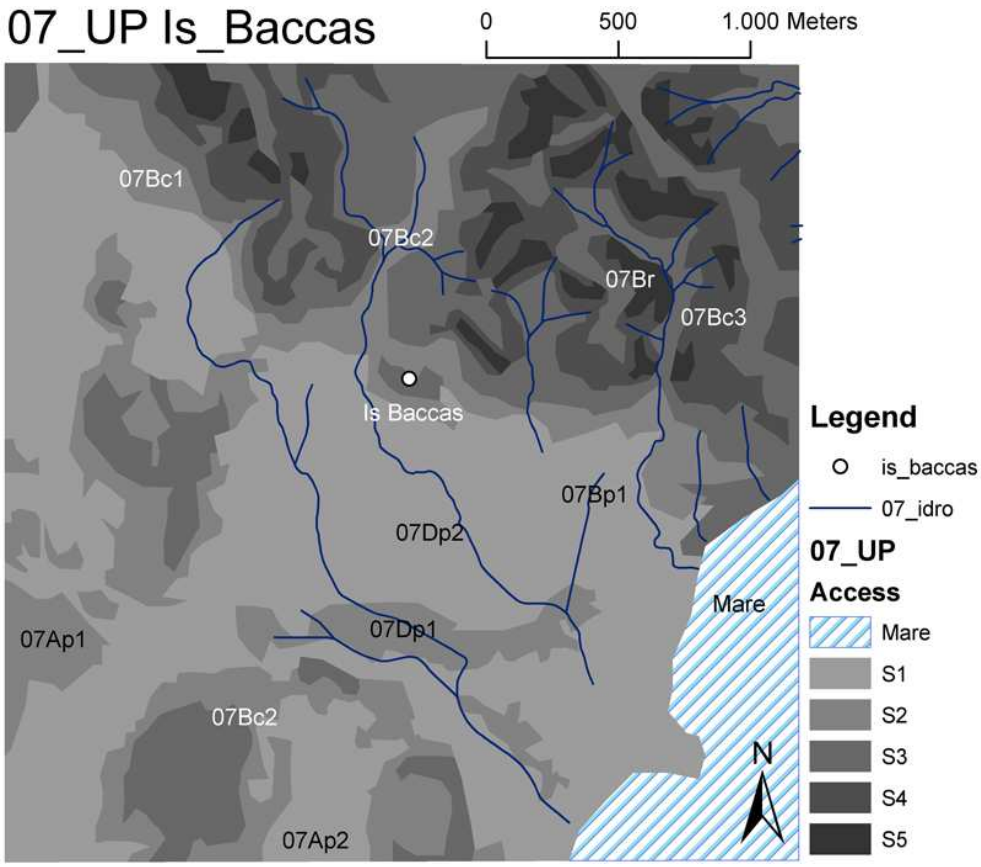

Figure 31. Map of accessibility to the site of Nuraghe Is Baccas

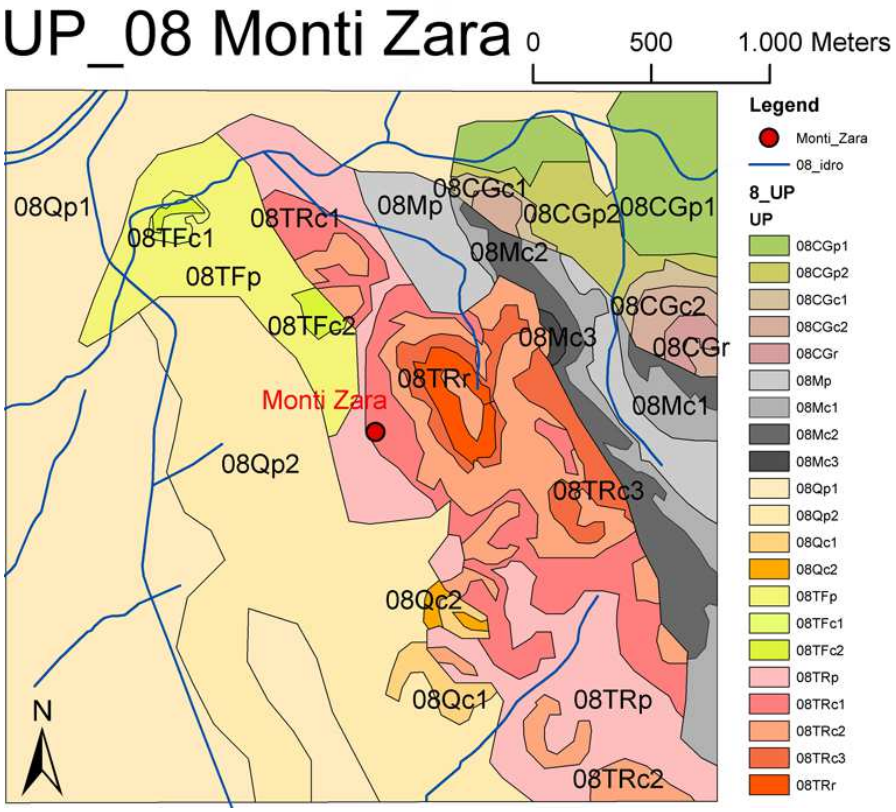

Figure 32. Map of UU.PP. Monte Zara

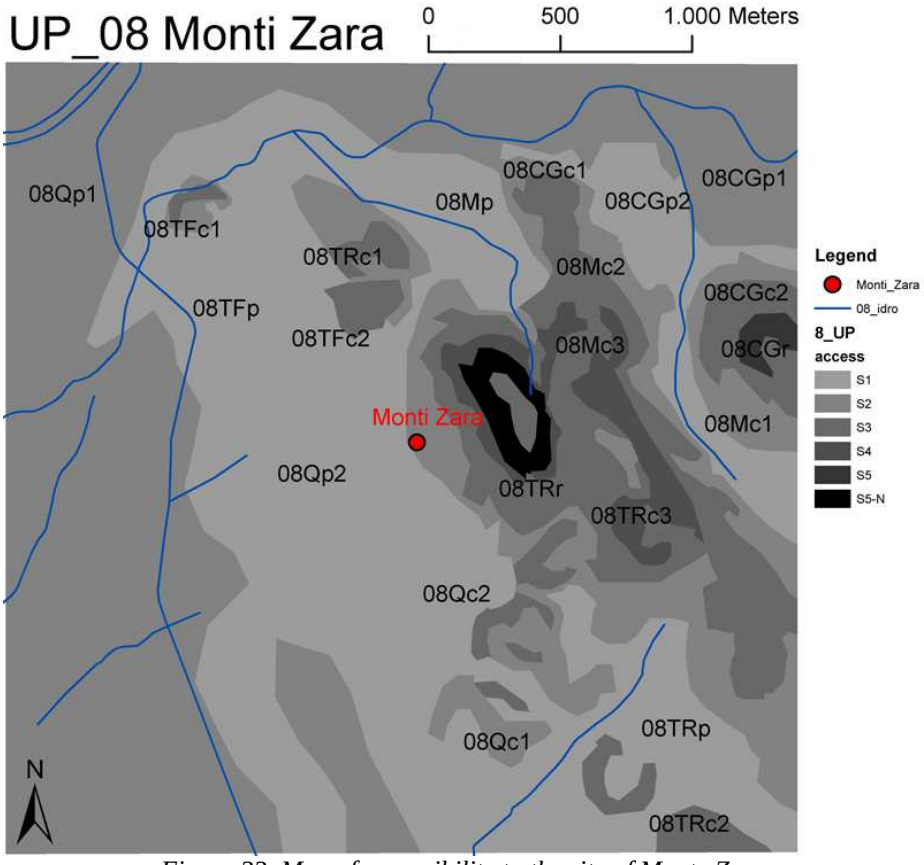

Figure 33. Map of accessibility to the site of Monte Zara

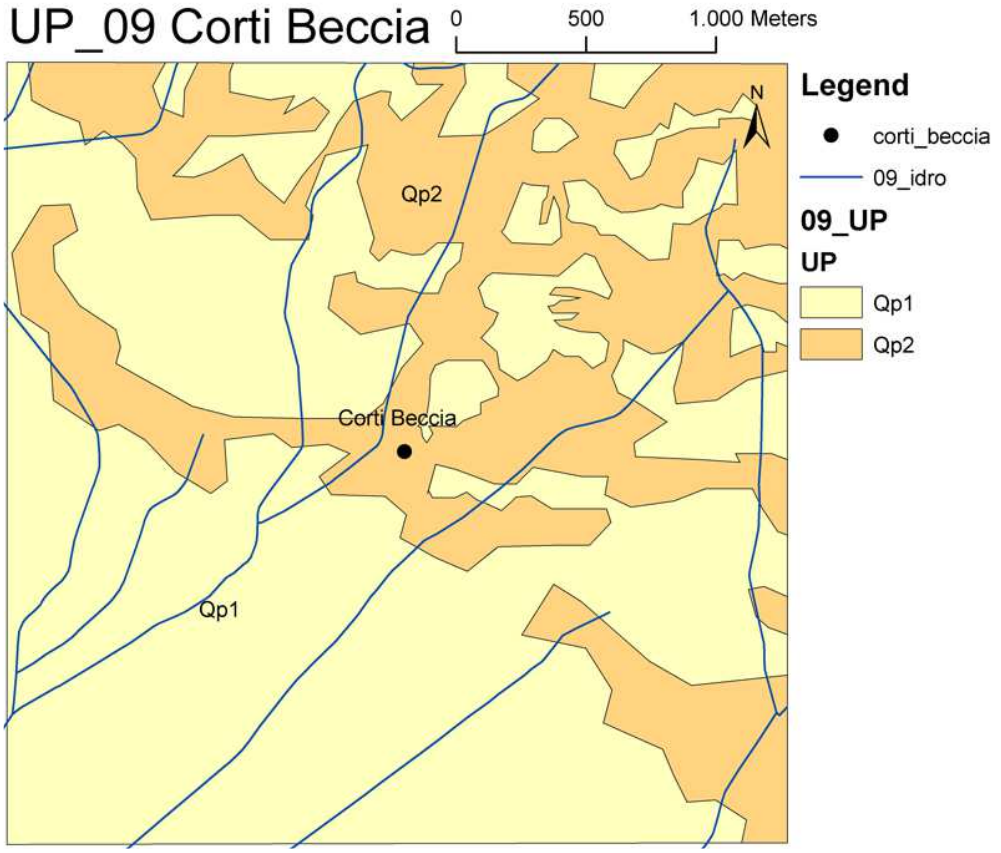

Figure 34. Map of UU.PP. Corti Beccia

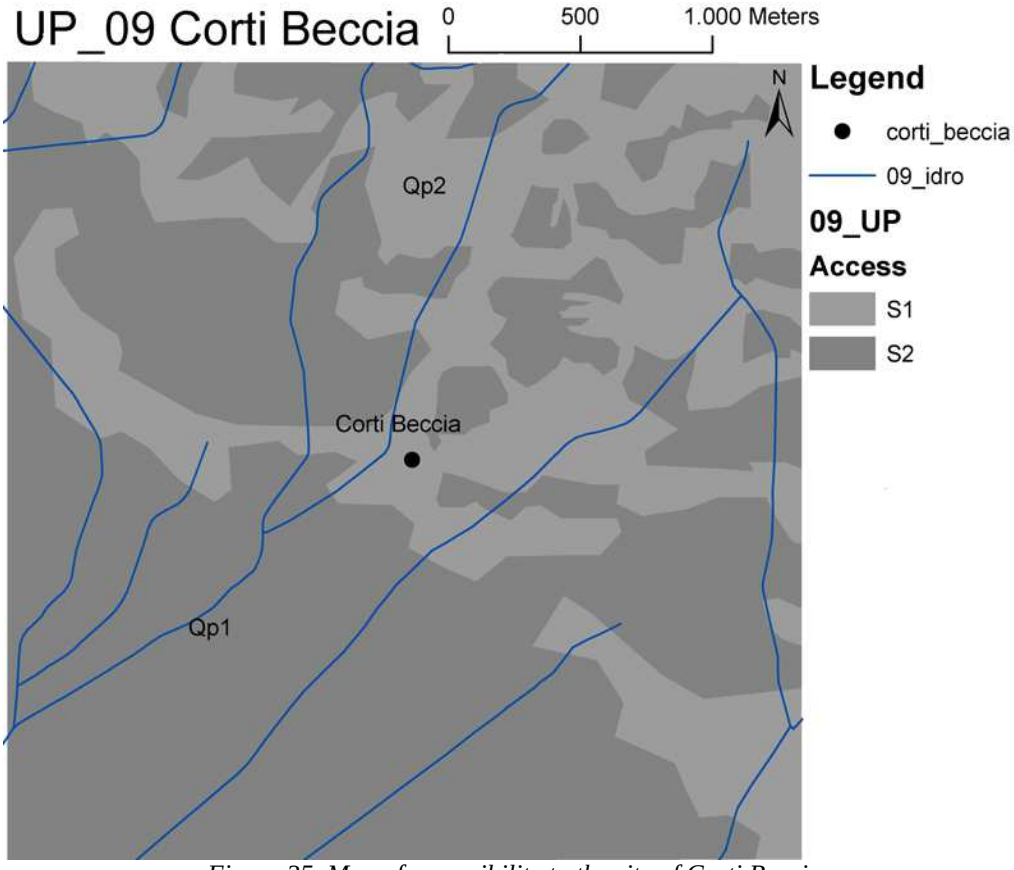

Figure 35. Map of accessibility to the site of Corti Beccia

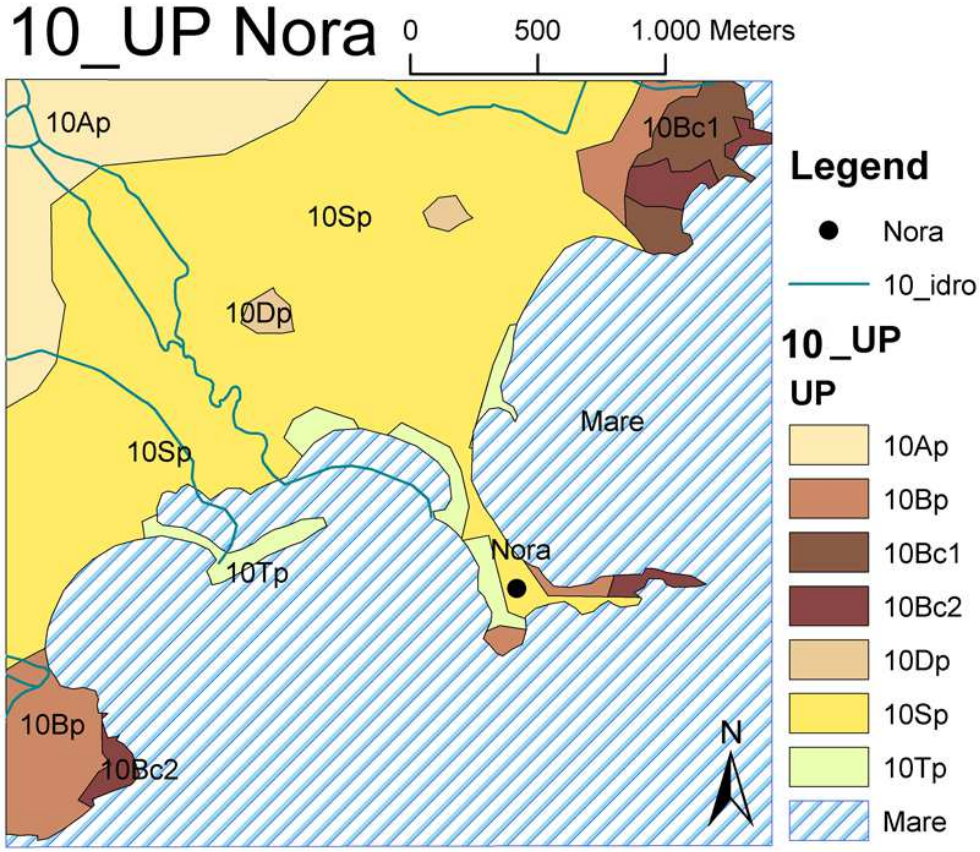

Figure 36. Map of UU.PP. Nora

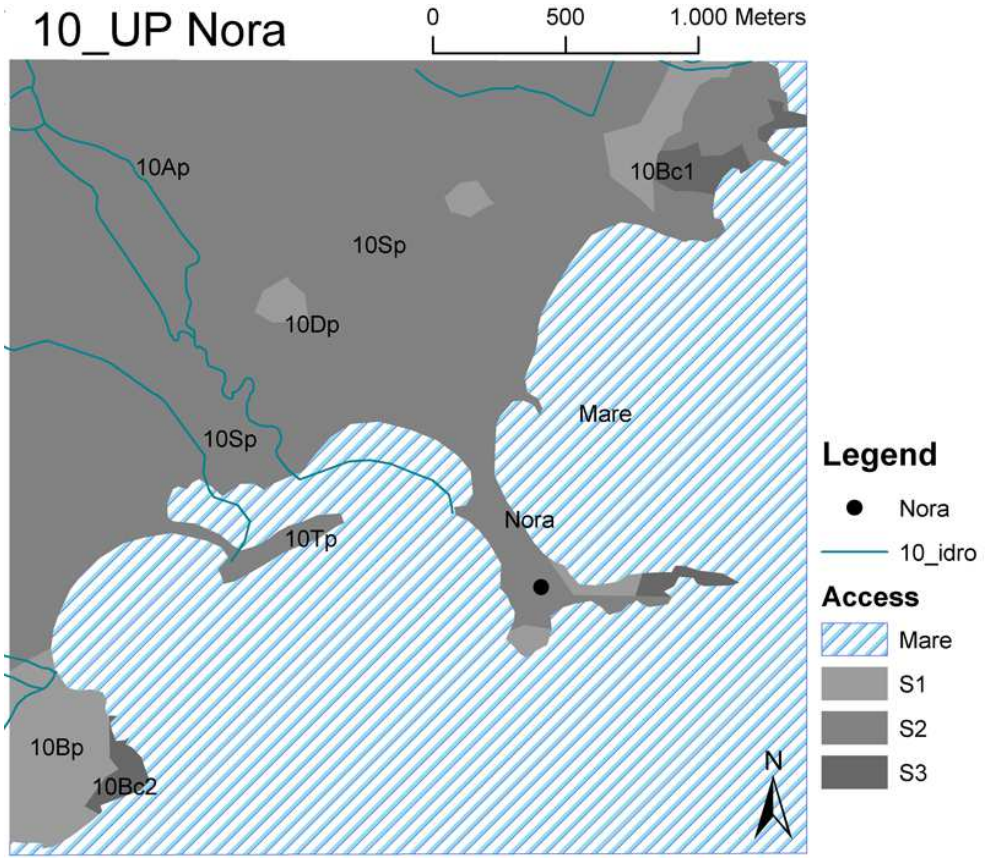

Figure 37. Map of accessibility to the site of Nora

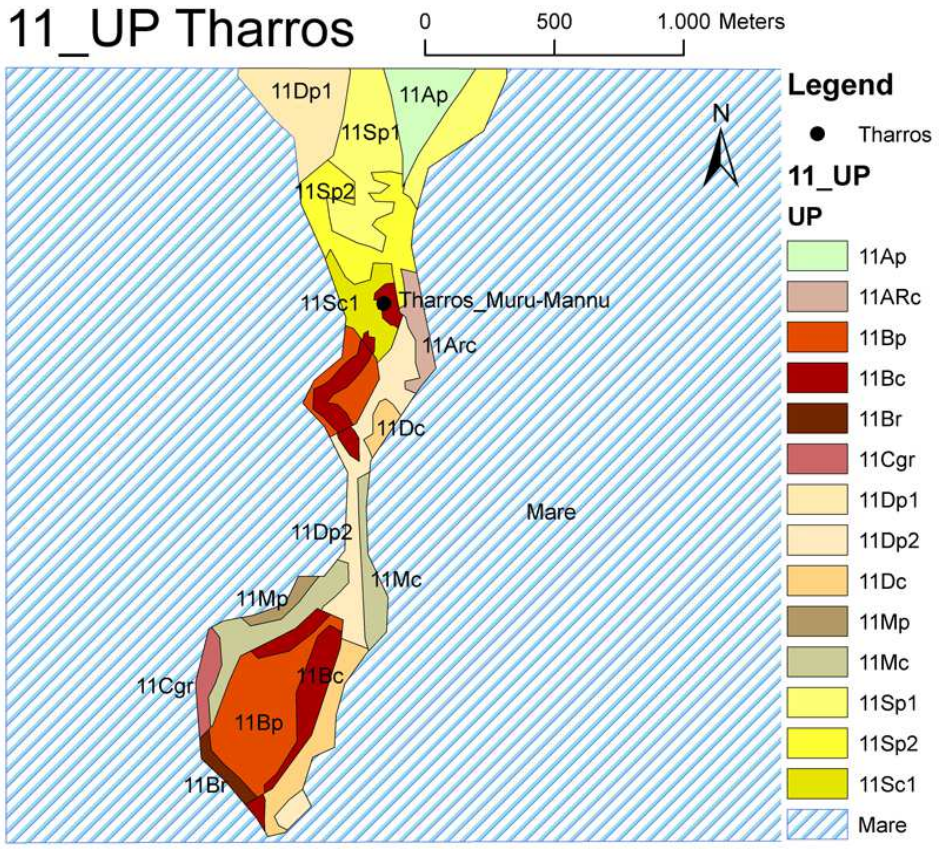

Figure 38. Map of UU.PP. Tharros

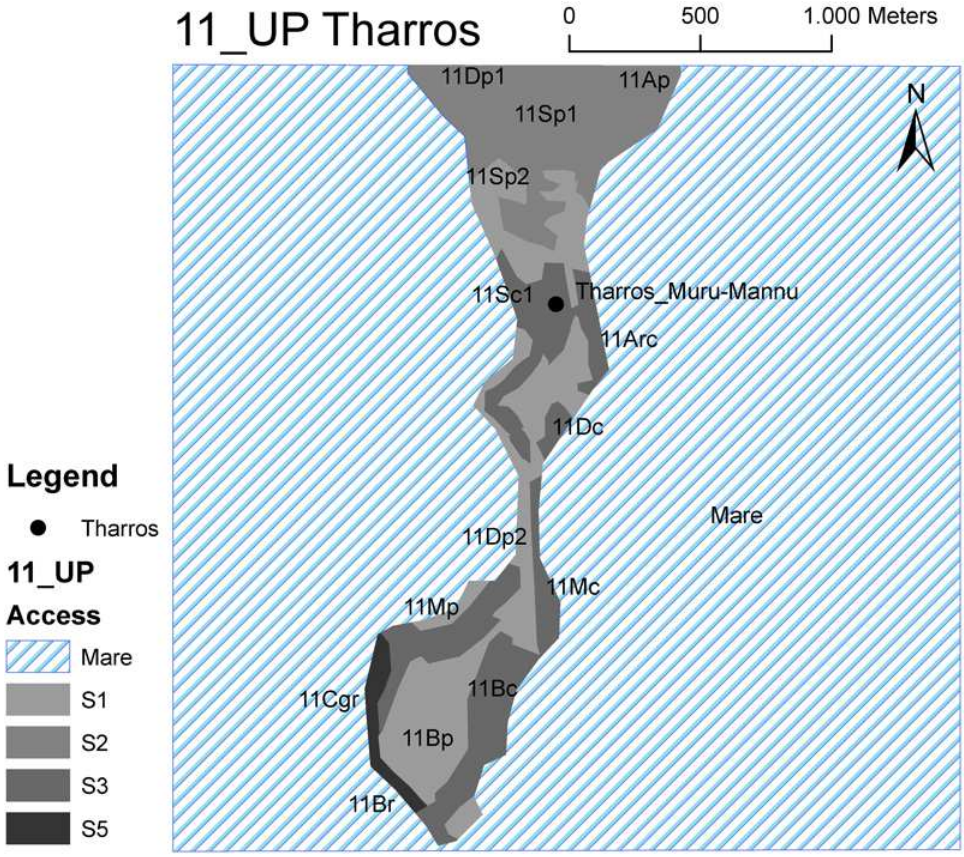

Figure 39. Map of accessibility to the site of Tharros

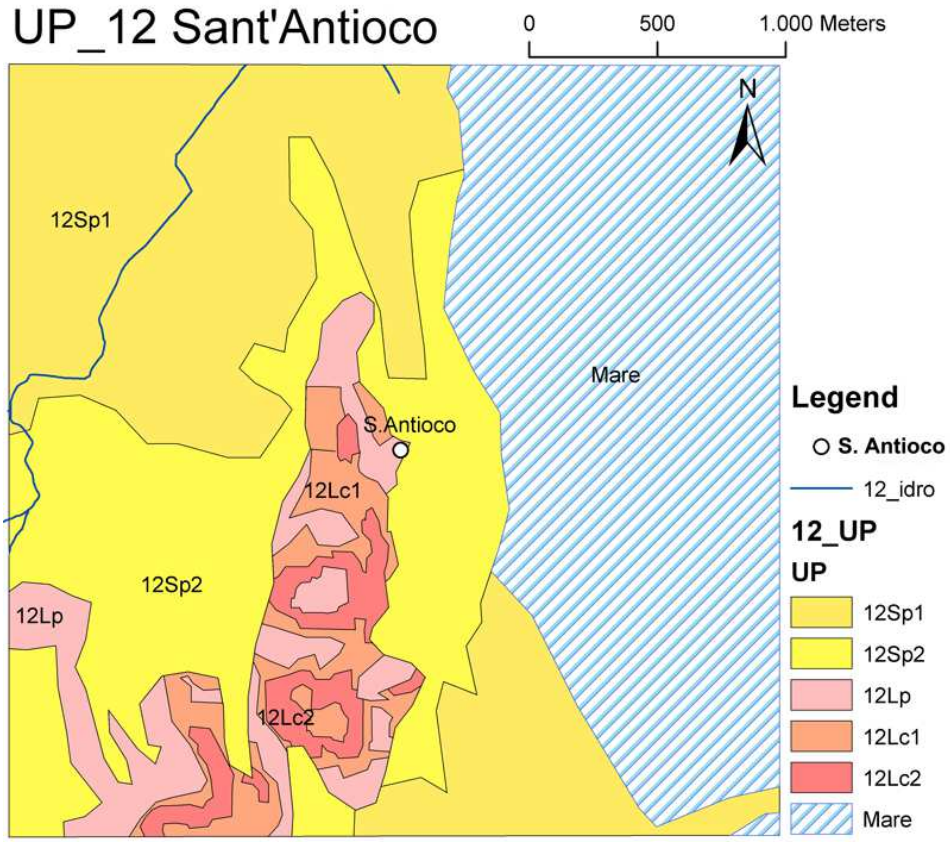

Figure 40. Map of UU.PP. Sant'Antioco

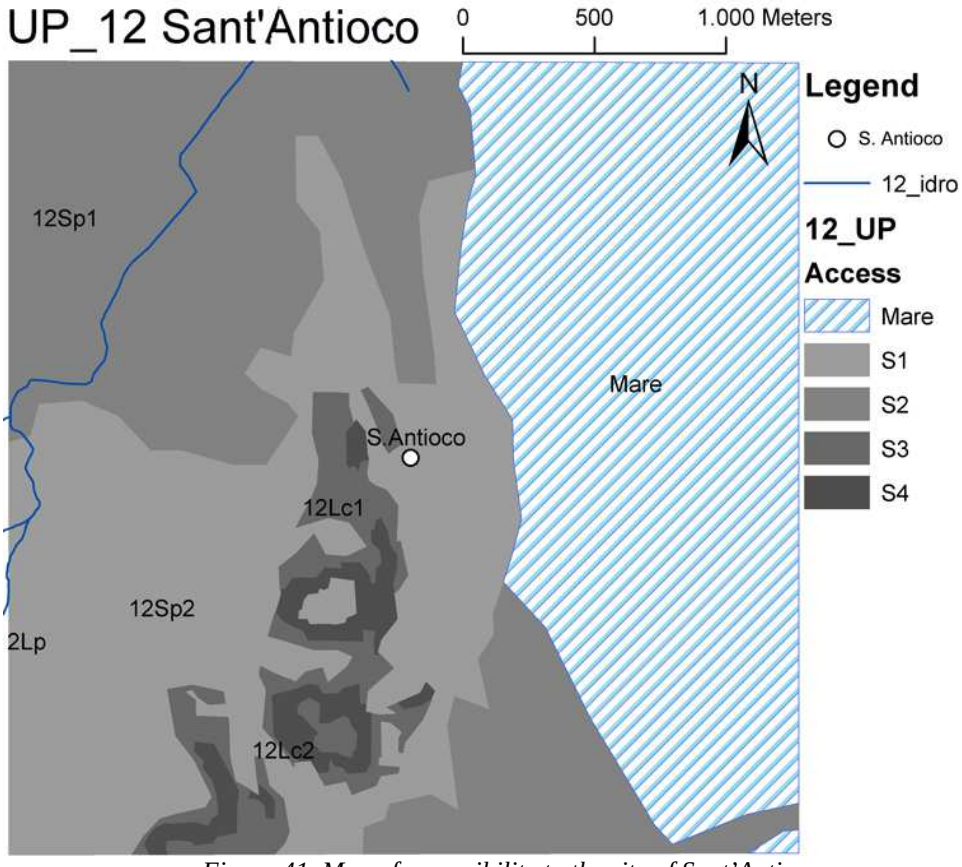

Figure 41. Map of accessibility to the site of Sant'Antioco

2.6 The cost model

The cost model will allow us to create a hypothetical road network between the sites along the coast and those that are inland. Hence, for its application Nuraghe Antigori[147] has been chosen as the site along the coast, and Nuraghe Arrubiu (Orroli) and Su Nuraxi (Barumini) as inland sites.

A territorial mask has been created, by way of a vector polygon that includes the three sites, to which the model and consequent evaluations will be applied.

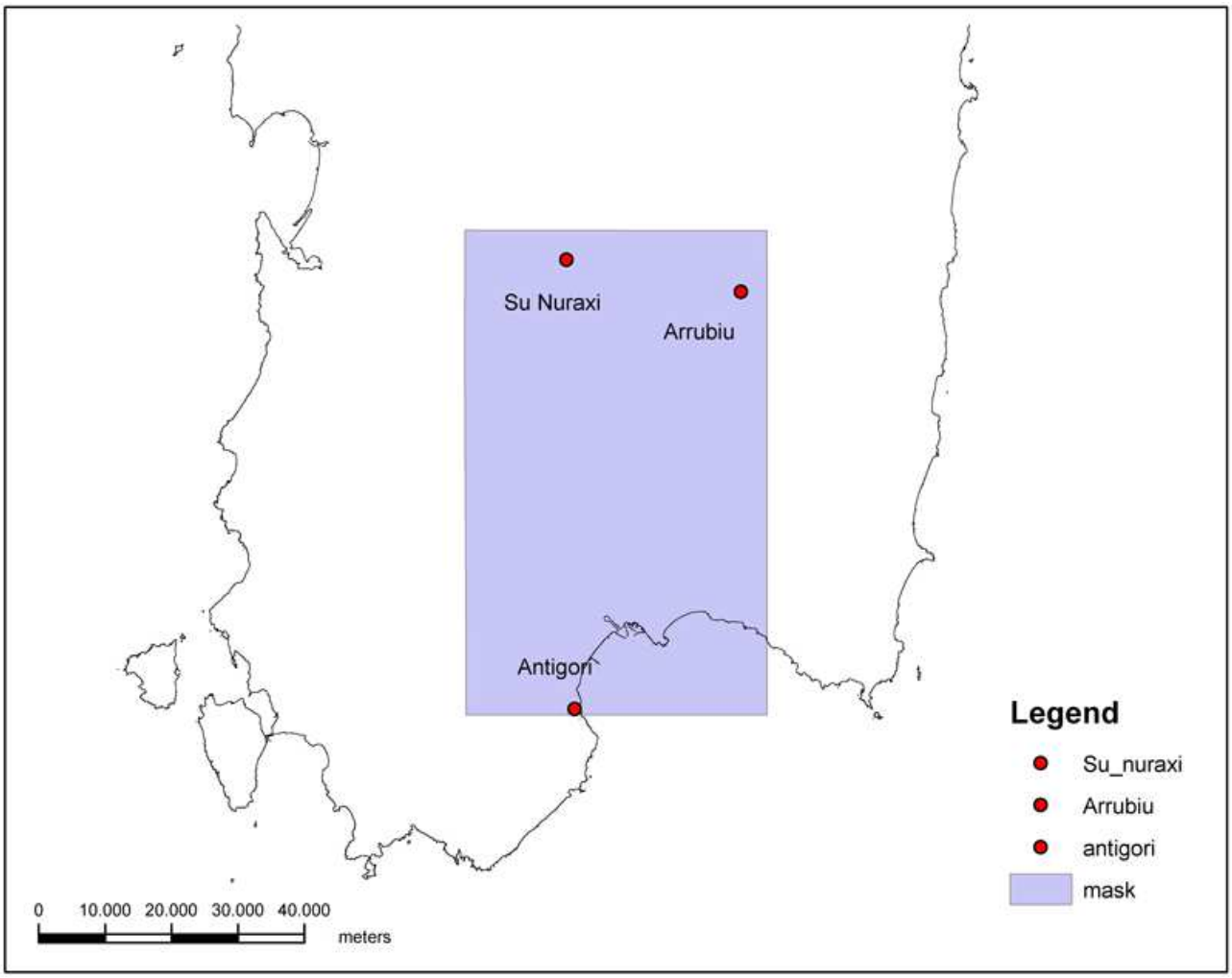

Figure 42. The territorial mask that delimits the territorial area of the three sites.

The cost model proposed, delimited by the mask, is the result of the joining of the principal variables, with which the landscape units have been created: slope and the lithological and soil situation.

We preferred not to use the Land Units and variables, as the portion of territory taken into consideration was too large.

[147]Nuraghe Antigori was chosen as site along the coast as it was that in which the largest quantity of Mycenaean pottery material was found during an archaeological excavation.

Yet since the experimentation of the model lies in the application of principles of evaluation already carried out in the creation of the Land Units, the two variables to be used are both associated with the accessibility classes on which this work is based (S1,S2…N).

For the creation of the model it is necessary that each variable have its own weight and, consequentially a numeric value, therefore the classes of accessibility will have a numeric classification.

2.6.1 The creation of a lithological and soil map

As regards the slope map, it is sufficient to delimit the portion included within the mask, while the lithological and soil map was created *ex novo* for the application of the cost model. This is result of evaluations stemming from the merging of the geological vector map and the soil vector map, both at a scale of 1:250,000.

The soil maps at a scale of 1:250,000, indicate the typology of soils and among the other characteristics of the database with which it is connected, their depths.

As this map certainly is less detailed, in the delimitation of the polygons, with respect to the geological map, we chose[148] to use the element of the soils that was most significant and relevant to the issue at hand: the depth of the soils[149]. In fact, this reflects a series of aspects of the terrain relating to potential walk-ability, such as the stoniness of the ground and the risk of getting bogged down. The joining of this data with the underlying geological formation produced a new and experimental map: a reasoned synthesis of the thematic data available, in light of the objectives of the research project.

This superimposition produced 13 geological/pedological units:

- The recent flood lands on the geological map were divided into two units on the basis of the soil conditions:

  Recent flood lands with very deep soils (≥150 cm).

  Recent flood lands with the risk of water retention (Cagliari zone)[150].
- The andesites and basalts have on average shallow soils (40 cm), hence the unit: Basalts with shallow soils
- The depth of the soil in the Limestone/Sandstone areas is 50-80 cm: hence the unit Sandstones with moderately deep soils.

[148]Dr. Antonia Arnoldus Huyzenfeld, lecturer in Geoarcheology at the University of Siena - Grosseto, is to be thanked for the suggestion of creating this map and for having patiently assisted in providing all the tools necessary for the experiment.

[149]A transfer function was applied: i.e. the use of an existing cartographic datum for a reason for which it was not provided.

[150]The depth of the soil is given as being 80 cm, this is possible in this case only if the waterline interferes.

- The depth of the soils over the Clays and Sands of Pleistocene terraces is divided into 2 classes: very deep (150 cm) and deep (120 cm). We chose to create a single unit, clays and terrace sands, with deep soils.
- The Alkaline basalts, and andesite basalts have 30 cm of soil. They are hence put together with basalts with shallow soils.
- The limestones (of differing consistency, sandstone-like, marl-like) have soils of 100 cm. Soft limestone with deep soils.
- The crystalline, compact, Palaeozoic and Mesozoic limestones have soils 35-40 cm deep, hence: thick limestones with shallow soils.
- The conglomerates and sandstones have soils 50 cm deep, hence we created a unit for conglomerates and sandstones with shallow soils
- The conglomerates and Pleistocene sandstones have soils which vary from 120 to 150 cm in depth: hence conglomerates and sandstones with deep soils
- Screes, with moderately deep (80 cm) soils.
- The Mesozoic dolomitic landscape has a rather limited territorial extension within the mask, hence it has been placed together with the thick limestones, with shallow soils (40 cm).
- The leucogranites and monzogranites occupy two zones, one with 80 cm and the other with 100cm of soil cover. Their distribution has been observed in comparison with the slope map and the decision was made to create a single unit: granites, with moderately deep soils
- Marls, and sandstone-like marls with moderately deep soils[151].
- The Ordovician Metaconglomerates, with 30 cm of soil. As these are metamorphosed conglomerates they may be assigned to conglomerates and sandstone with shallow soils.
- Metapelites with 40 cm of soil, meta-sandstones with 30-40 cm of soil, metasilites and Ordovician meta-sandstones with soils of 30 cm have been assigned to the group: sandstone, with shallow soils
- The Ordovician meta-vulcanites, rhyolite, rhyodacites and dacites from the calc-alkaline Oligo-Miocene volcanic cycle with a soil depth of 30-50 cm form the unit of the Acid Vulcanites , with shallow soils.

The following table displays the single lithological-pedological units with their accessibility characteristics:

[151]In this case there is a gap in the information on the map concerning the soils that cover two small areas, that are surrounded however by soils of a depth of 80 cm. Near Cagliari there is a small area with soils of 30cm, however, since the soil depth of 80 cm is dominant, it was deemed necessary to create a single unit.

Map code	Lithological-pedological units	Accessibility characteristics
A	Recent flood lands, with very deep soils	some risk of getting bogged down
B	Basalts with shallow soils	very stony and rocky
C	Thick limestones, with shallow soils	very stony and rocky, irregular relief
D	Screes with moderately deep soils	moderately stony
E	Conglomerates and sandstone, with shallow soils	moderately stony
G	Granites, with moderately deep soils	not very stony (granite when altered becomes sand)
M	Sandstones, with shallow soils	moderately stony
N	Marls and sandstone-like marls with moderately deep soils	stony
O	Soft limestones with deep soils	not very stony
R	Conglomerates and sandstone, with deep soils	not stony
S	Recent flood lands, with the risk of water retention	high risk of getting bogged down
T	Clays and terrace sands, with deep soils	not stony
V	Acid vulcanites with shallow soils	very stony and rocky,

Table 5. Units of the Lithological-pedological map.

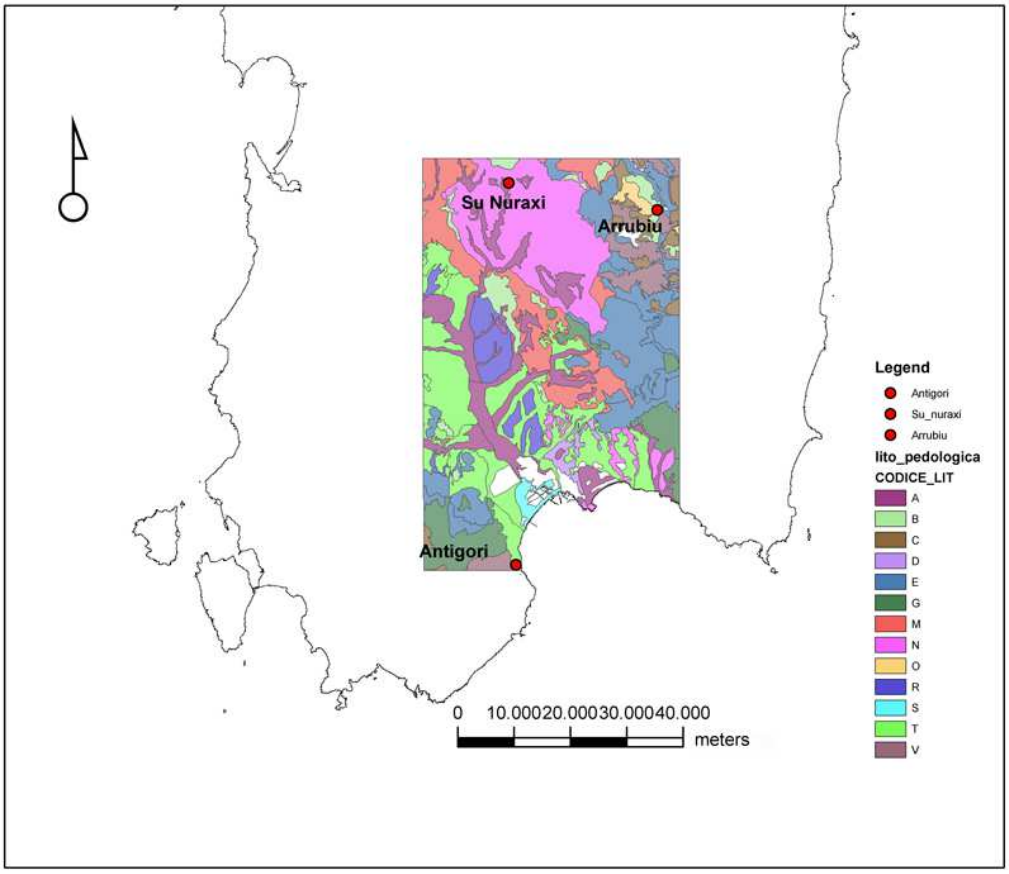

Figure 43.Lithological-pedological vector map

2.6.2 Classification of the variables and numeric evaluation

On the basis of the following classification of accessibility/negotiability (Tab. 1, p..39) it is clear that class S1 is the ideal situation for accessibility/negotiability, hence that which will be of greatest value within the cost model.

We have chosen assign a scale of numeric values to this classification in which 100 is the maximum and 0 the minimum. Therefore following an evaluation in which 100 is the maximum value and represents an ideal situation for negotiability, class S1 will be evaluated as 100, while class N will be evaluated as 10. In our evaluation we cannot assign 0 to any class; in fact class N does not denote a situation of total inaccessibility, but rather a lack of accessibility with ordinary means[152].

The numeric evaluation of the classes of negotiability/accessibility are established as follows:

Accessibility class	Definition	Numeric value
S1	Easily negotiable on foot, for animals and for draught animals	**100**
S2	Possible to negotiate with little difficulty on foot, with animals and with draught animals	**90**
S3	Moderately negotiable on foot or with animals, difficult to access for draught animals	**70**
S4	Difficult to negotiate on foot or for animals, very difficult for draught animals	**50**
S5	Very difficult to negotiate on foot or for animals, inaccessible for draught animals	**30**
N	Impossible to negotiate with ordinary means	**10**

Table 6. Numeric evaluation of the accessibility's classes

Within the cost model, the two variables taken into consideration have difference weights. Slope is the predominant variable, both because when discussing negotiability, with simple human means, that which is taken into consideration in this work, it is always of greater importance, and because, overall, it is the variable which has undergone less change from the Bronze Age to today[153].

[152]Before defining a territory totally inaccessible one must first consider a very large number of factors and ask oneself how, for who, and when the territory taken into consideration was inaccessible. Throughout history humankind has demonstrated an ability to adapt to territorial situations which for some could appear to be at the limits of habitability. Class N is not accessible with ordinary means, but not inaccessible. For example, the evaluation of accessibility in the Andes, for the populations that live there, is quite different to that which a European living in a large city would make. Hence the classification of accessibility that is presented here, as well as its numeric value are an arbitrary system, based above all on knowledge of the territory that is taken into consideration. Despite several trials, the conclusion has been reached that it is impossible to find an objective classification that defines a group of values.

[153]In applying the cost model to current maps, we are aware of the limitations of the operation, in that we are unable to reconstruct a reliable DEM that could reflect the real situation in the Bronze Age, and the resulting slope map. However, during the Holocene Sardinia had a geological history that was rather stable and the slope map is a manifestation of geological processes. While not considering the phenomena of deposition/erosion which the landscape undergoes. "Le forme del rilievo sardo rispecchiano in pieno sia l'assetto strutturale delle rocce che lo costituiscono, sia gli eventi geologici che si sono succeduti nel corso delle ere" (Ulzega 1988, 11).

- Variable 1.: Slope

The slope map obtained from the DEM in raster format, with 20,20X20,20 m pixels, classified beforehand according to six classes of accessibility/negotiability (S1, S2...N), have a weighting of 70% within the cost model.

By way of a simple proportion[154], by which, given two known values (S1 absolute value= 100; S1 in the slope variability = 70), it is possible to calculate the values of the remaining classes (S2, S3, S4, S5, N) in order to assign to each slope class, evaluated on the basis of the accessibility scale, the correct numerical value.

Hence, by multiplying the absolute value in each accessibility class (S2=90; S3=70; S4=50; S5=30; N=10) by the weighting that slope is endowed with in the cost model (70) and dividing the result by 100, we obtain values for each of the accessibility classes within the slope variable indicated in the table:

Slope class ID	Class limits %	Evaluation of accessibility	**Numeric evaluation of accessibility**
1	0 – 2 %	**S2**	**63**
2	2 – 10 %	**S1**	**70**
3	10 – 20 %	**S2**	**63**
4	20 – 35 %	**S3**	**49**
5	35 – 50 %	**S4**	**35**
6	50 – 70 %	**S5**	**21**
7	> 70 %	**N**	**7**

Table 7. Slope classes with numeric evaluation.

- Variable 2.: Lithological-pedological map

The 13 units of the Lithological-pedological map were also evaluated following the accessibility classes, as was the procedure for slope:

Map code	**Lithological-pedological unit**	**accessibility characteristics**	**evaluation for accessibility**
A	Recent flood lands, with very deep soils	Some risk of getting bogged down	**(S2)**
B	Basalts, with shallow soils	highly stony and rocky	**(S3)**
C	Thick limestones with shallow soils	highly stony and rocky, irregular relief	**(S4)**
D	Screes, with moderately deep soils	moderately stony	**(S3)**
E	Conglomerates and sandstones, shallow soils	moderately stony	**(S3)**

[154]The numeric value to be assigned to each slope class is calculated by way of the simple rule of three.

G	Granite, with moderately deep soil	not very stony (granite, with alteration becomes sand)	**(S2)**
M	Soils, with moderately deep soils	moderately stony	**(S2)**
N	Marls and sandstone marls, with moderately deep soils	stony	**(S3)**
O	Soft limestones with deep soils	not very stony	**(S2)**
R	Conglomerates and sandstone, with deep soils	not stony	**(S1)**
S	Recent flood lands, with the risk of water retention	high risk of getting bogged down	**(S5)**
T	Clays and terrace sands, with deep soils	not stony	**(S1)**
V	Acid vulcanites with shallow soils	very stony and rocky	**(S4)**

Table 8. Lithological-pedological units with evaluation of accessibility.

In order to be able to use the Lithological-pedological map within the GIS platform, it was necessary to transform it from a vectorial format to a raster format.

Since slope was given a weighting of 70%, a weighting of 30% was given to the Lithological-pedological map. The same proportion used to evaluate the numeric value of the slope classes was used to assign numerical values to each of the Lithological-pedological units.

The Lithological-pedological hence have the following values within the model:

Pedological unit code	Accessibility characteristics	Evaluation for accessibility	Numeric value of accessibility
A	Some risk of getting bogged down	**S2**	**9**
B	highly stony and rocky	**S3**	**15**
C	highly stony and rocky, irregular relief	**S4**	**21**
D	moderately stony	**S3**	**15**
E	moderately stony	**S3**	**15**
G	not very stony (granite, with alteration becomes sand)	**S2**	**9**
M	moderately stony	**S2**	**9**
N	stony	**S3**	**15**
O	not very stony	**S2**	**9**
R	good, no stones	**S1**	**3**
S	high risk of getting bogged down	**S5**	**27**
T	good, no stones	**S1**	**3**
V	very stony and rocky	**S4**	**21**

Table 9. Lithological-pedological units with numeric value.

2.6.3 The calculation of the cost model

The values obtained for the single classes of our variables indicate a greater or lesser degree of negotiability/accessibility of each, hence, the higher the value, the higher the degree of negotiability.

Since the GIS system will calculate the road network by make the route pass through the cells (pixels) that weigh the least, or in other words, that have a lower cost of negotiation (fatigue), it will be necessary to invert the values.

Therefore the more accessible a class is, the lower its cost of negotiation will be and vice versa, the less accessible/negotiable a class is, the higher its cost of negotiation.

Maintaining the same value proportions, once the data have been inserted into the GIS platform, a simple inversion was enacted.

Hence the two variables, while maintaining the numeric parameters of classification central to the cost model, will have the following values of cost of negotiation, as can be seen in the following tables:

Slope class ID	Class limits %	Evaluation of accessibility	**Numeric evaluation of accessibility/negotiability**	**Evaluation of the cost of negotiation (GIS)**
1	0 – 2 %	S2	**63**	**21**
2	2 – 10 %	S1	**70**	**7**
3	10 – 20 %	S2	**63**	**21**
4	20 – 35 %	S3	**49**	**35**
5	35 – 50 %	S4	**35**	**49**
6	50 – 70 %	S5	**21**	**63**
7	> 70 %	N	**7**	**70**

Table 10. Evaluation of the cost of negotiation for the slope classes

Pedological unit code	**Evaluation of accessibility**	**Numeric evaluation of accessibility/negotiability**	**Evaluation of the cost of negotiation (GIS)**
A	S2	9	27
B	S3	15	21
C	S4	21	15
D	S3	15	21
E	S3	15	21
G	S2	9	27
M	S2	9	27
N	S3	15	21
O	S2	9	27
R	S1	3	30
S	S5	27	9
T	S1	3	30
V	S4	21	15

Table 11. Evaluation of the cost of negotiation for the Lithological-pedological units

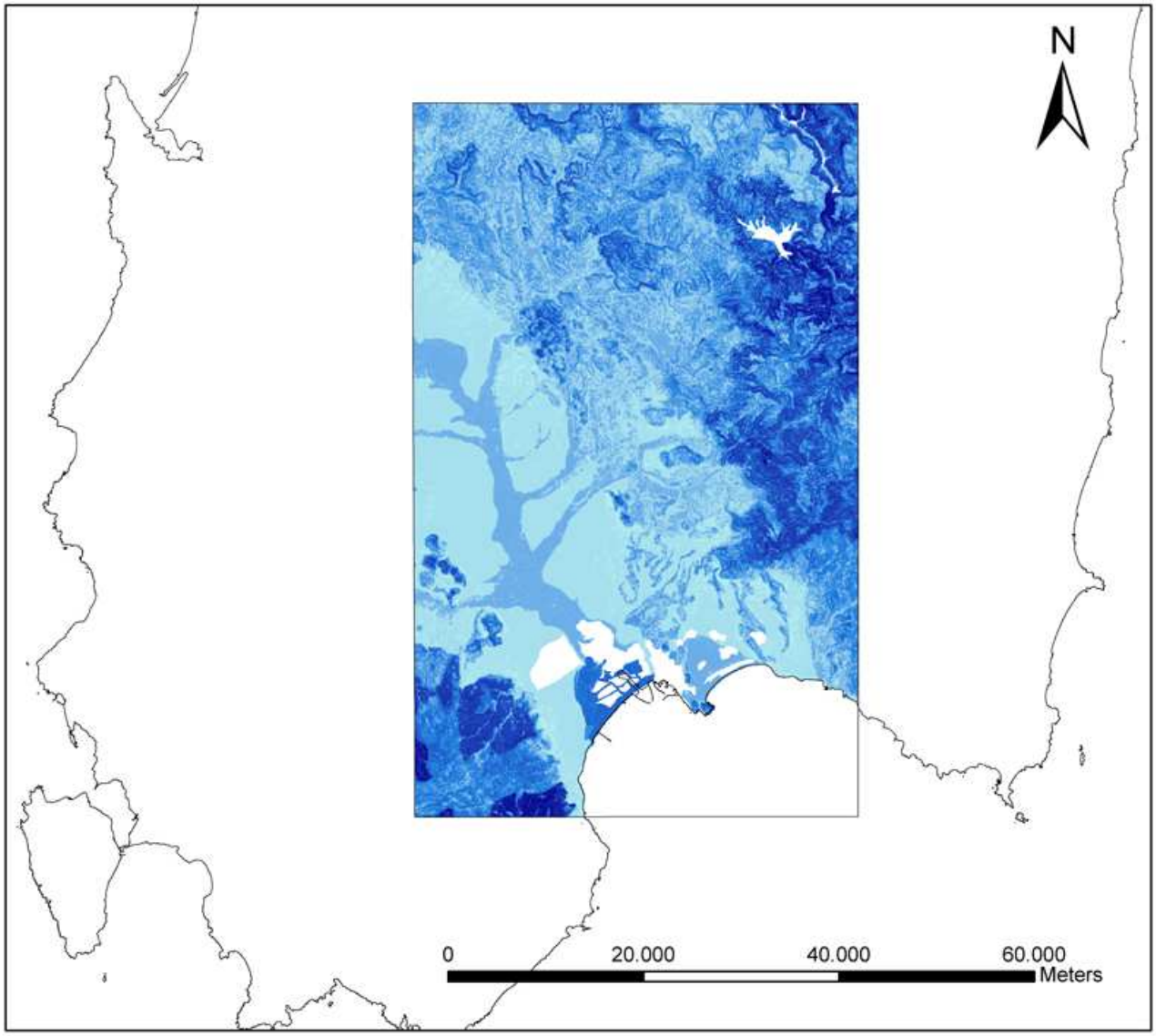

Figure 44. Raster image (cost model) obtained via the multiplication of the two variables

Following the creation of the cost model we first attempted to reconstruct the route from Nuraghe *Antigori* towards *Su Nuraxi* and then from Nuraghe *Antigori* towards Nuraghe *Arrubiu*. In other words, we created a Least Cost Path.

The GIS software created a buffer zone which indicates the cost of negotiability from Nuraghe Antigori towards the surrounding territory.

Having established the departure point (*Antigori*) and that of arrival (*Su Nuraxi* and *Arrubiu*), by way of the *shortest path* function in *spatial analyst*[155], the calculator created a line that indicates the zone in which according to the model proposed, the costs of negotiability are the least.

The analysis may be considered an anisotropic analysis (Weathley and Gillings 2002, 151; Pizziolo and De Silva 2001, 280; Gherdevich 2008, 43). In fact, during the elaboration of the Least Cost

155 Spatial analyst is a function of ArcMap 9.1 software, which allows routes in territories to be created.

Path (LCP), the "Cost direction" file, which departs from Nuraghe Antigori is taken into consideration. In order to understand how much the "Cost Direction" file was of influence in the creation of the Least Cost Path, the same procedure was adopted for Su Nuraxi and Nuraghe Arrubiu. The route that departs from Su Nuraxi towards Nuraghe Antigori and that from Nuraghe Arrubiu towards Nuraghe Antigori, show minimal differences in comparison to the potential paths that have been reconstructed and can be seen in the following figures.

- The route from Antigori (Sarroch-CA) to Su Nuraxi (Barumini-CA)

The image below shows a hypothetical route (red line) that leads from *Antigori* to *Su Nuraxi.*

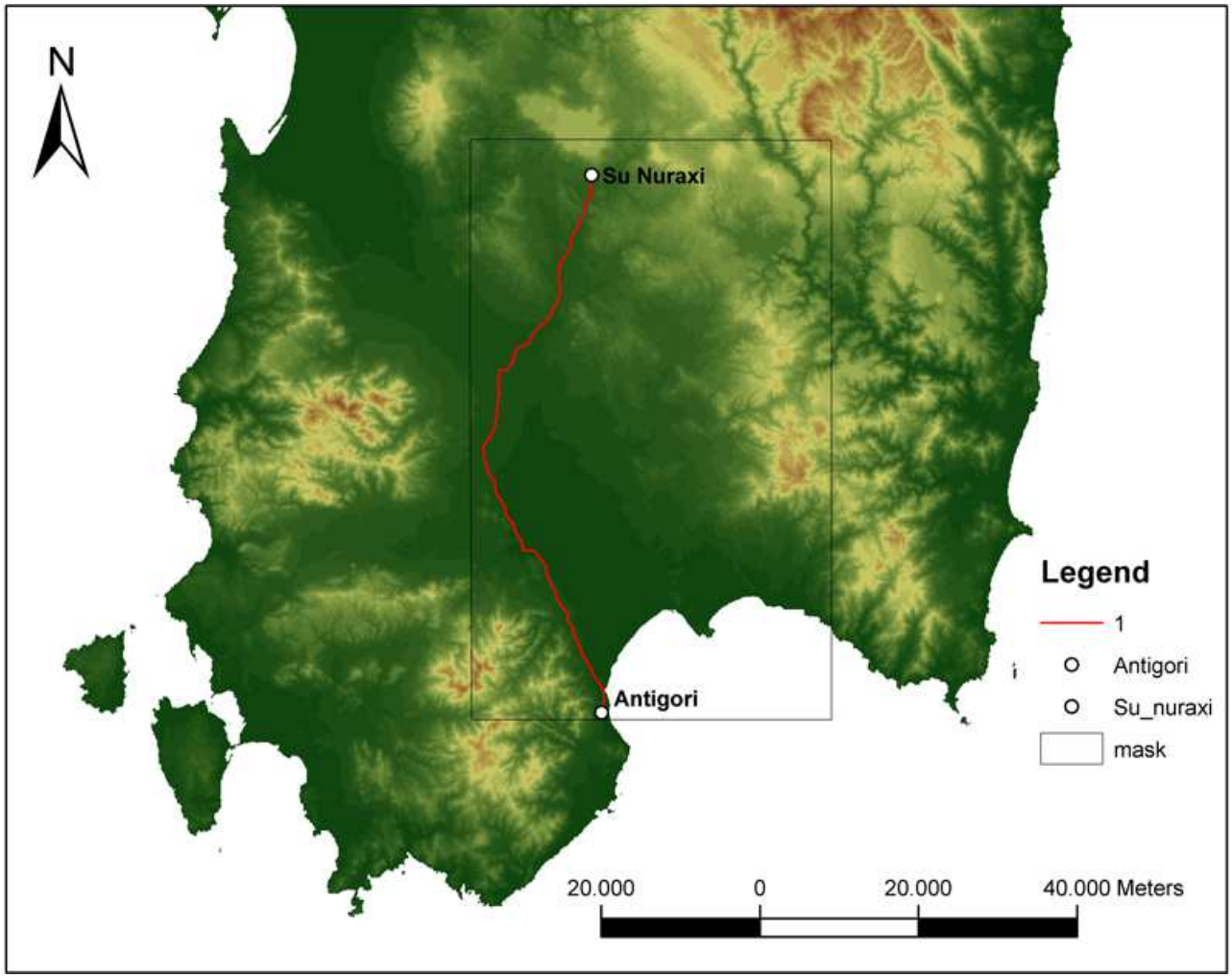

Figure 45. A reconstruction, on the basis of the cost model, of the route from Nuraghe Antigori to Su Nuraxi - Barumini.

- The route from Antigori (Sarroch-CA) to Arrubiu (Orroli-Nu)

The image below shows a hypothetical route (blue line) that leads from Nuraghe Antigori to Nuraghe Arrubiu.

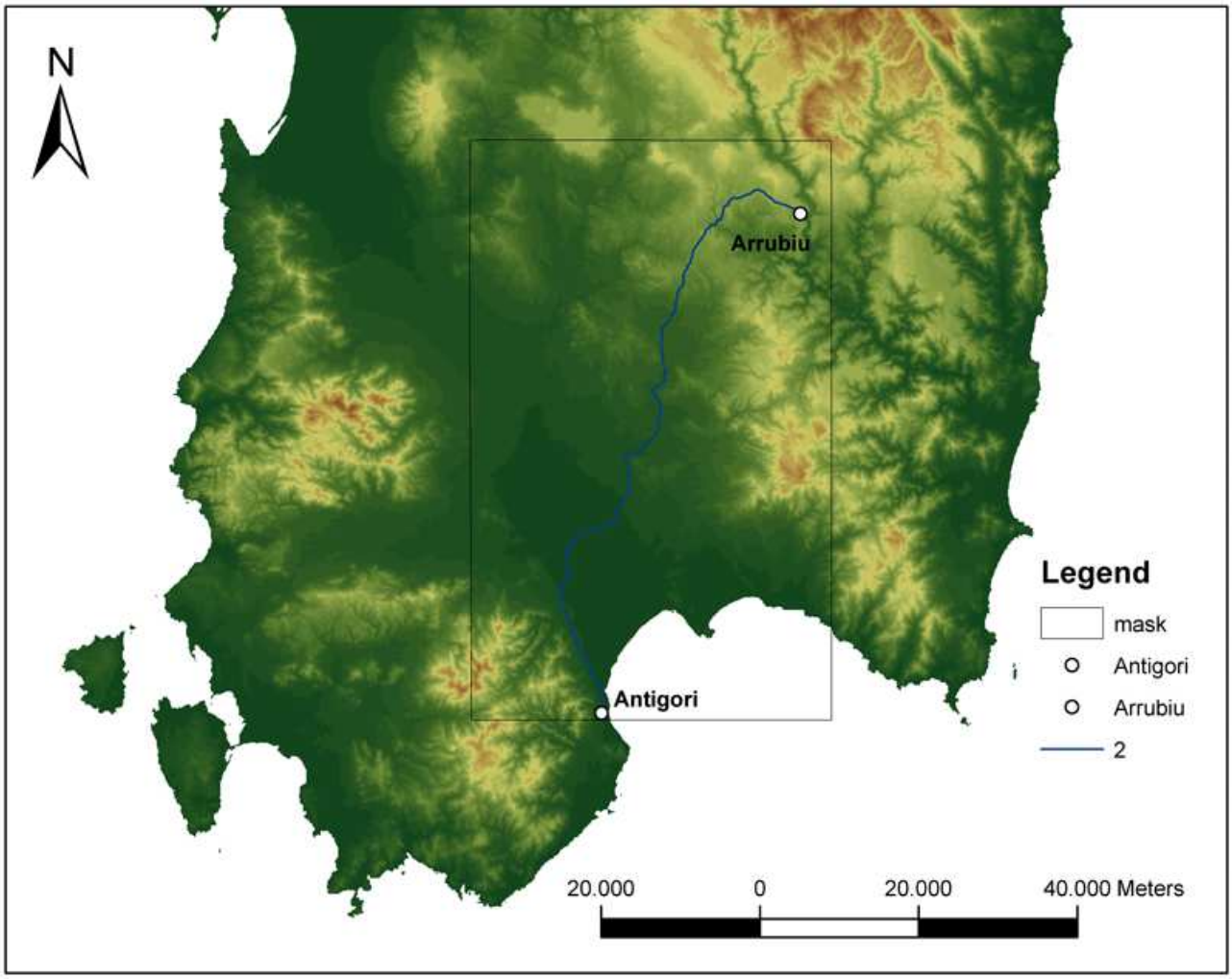

Figure 46. A reconstruction, on the basis of the cost model, of the route from Nuraghe Antigori to Nuraghe Arrubiu - Orroli.

In order to understand whether and how much the cost model may have provided plausible data, a punctual shape file, indicating all the sites in which Mycenaean pottery has been found was superimposed over the two hypothetical routes.

The sites of *Corti Beccia* and *Monti Zara* also lie within the territorial mask on which the cost model was applied.

An interesting point, one that will be discussed in the final evaluation, is that these two sites are located close to the hypothetical routes created on the basis of the cost model

The site of *Corti Beccia*, is in fact c. 4 km from the route that leads from *Antigori* to *Su Nuraxi*, while the site *Monte Zara* is c. 700 m from the route that leads from *Antigori* to Nuraghe *Arrubiu*.

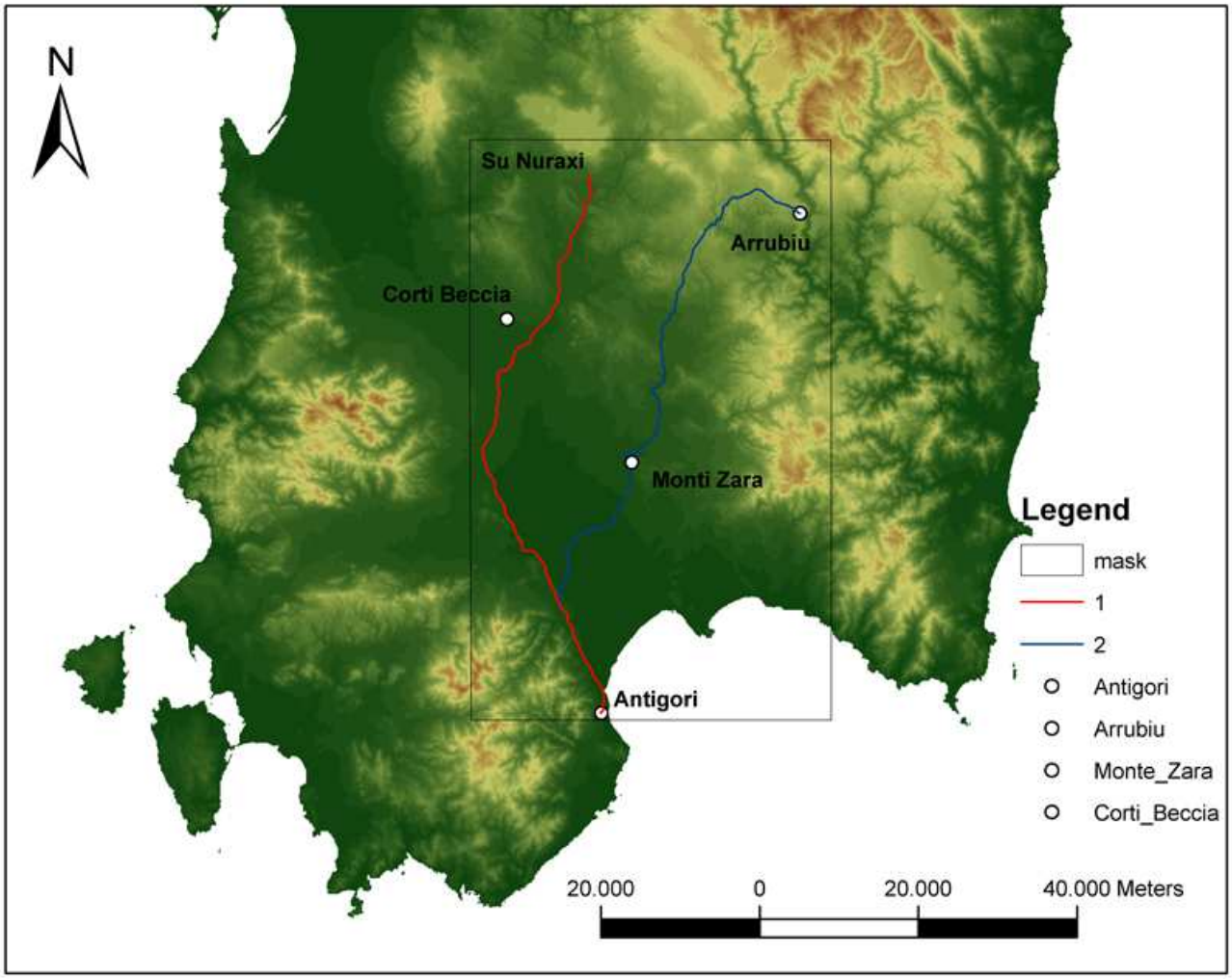

Figure 47. The two routes pass close by to the sites of Corti Beccia and Monte Zara

2.7 Final Evaluation

The experimental methodology and the results obtained in this work are the fruit of a process in which multi-disciplinary comparison and discussion are the main actors.

After initial consultation, the gathering of data and the preliminary phases in which the objectives of the research project were identified, it appeared necessary to accept the need to "classify in order to evaluate".

Classification is at the basis of a methodological process that allows one to *order* the data and make them potentially objective and useful for the community, as long as the latter recognises the differences and affinities, particularities and peculiarities of each piece of data, so as to interpret and understand it.

The process that is at work is simple: classification gives rise to a phenomenon of associations which allow one to delimit, at a mental level, guidelines so as to be able to prompt a critical attitude to this, and the resulting evaluation.

The key to this lies both in the methodology and in the parameters for classification, and in the evaluation of the result. The data and the information connected to them appear to contain intrinsic lines for classification, which are perceived at a personal level and are made explicit in groupings and associative systems. However, this is a subjective procedure, which may have objective results only in a defined space and time.

The consciousness of this, which may almost be defined as a limitation to the necessity to classify, should push the research process towards continuous evolution, i.e. a vortex of classifications always made the subject of debate due to the acquisition of new data and new hypotheses for classification. Acquiring such consciousness, means understanding that one will never be able to formulate absolute postulates, and truths beyond debate, which are often not only an obstacle to research, but are the aim of that natural process, a part of humankind itself, that desires satisfactory explanations, in a given time and a given place: the necessity to have answers.

Classification is often highly necessary, however one must not forget that this has intrinsic limitations, which may be extremely large. In fact, classifications of data, however accurate or detailed this may be, lead to the glossing over of details that may be fundamental within the analysis.

Therefore, it is impossible to create classifications that have absolute value.

The material data (Mycenaean pottery materials) on which this work is based, leave a number of questions unanswered. With regards to this, mere typological-material information and relative comparison, do not appear to be sufficient, in order to obtain plausible answers as to their circulation and presence in the island. Yet since this work is a first attempt at the territorial study of the distribution of Mycenaean pottery materials in Sardinia, it was necessary to assign some aspects of the landscape to classes, with the aim of being able to identify possible lines of assonance or dissonance in a particular anthropic process.

The potential for careful territorial study in the field of archaeology is extremely vast, and with reference to the issues presented herein, it constitutes an innovation and an experiment that has turned out to be extremely interesting and fruitful.

The innovation that we have attempted to bring about in these pages has been that of classifying certain territorial districts, following objectives decided upon beforehand, on the basis of techniques from the natural sciences, with the aim of obtaining a more orderly and reasoned vision, which could avoid the excesses in subjectivity that often occur in the evaluation of archaeological landscapes which are often based on the sensitive experience of observation of the landscape.

Even though this sensitive experience, the result of observation, often provides extraordinary intuitive leaps, it also has a series of flaws, which prevent the axioms from which these are obtained from re-evaluation.

In fact, classifying the accessibility of the sites taken into consideration and the negotiability of the surrounding territory by way of common criteria, allows us to observe which peculiarities these sites and their territory could have, factors that may have led to their having in common the presence of Mycenaean pottery materials.

Furthermore, this allowed the proposal of a possible road network for distribution, which, while based on the territorial data classified, following the parameters illustrated in the preceding chapters, permits the evaluation of the importance taken on by the territory in the Middle and Late Bronze Ages.

By way of the analyses conducted, it has been possible to note that there are four Nuragic sites (*Antigori- Sa Domo 'e s'orku- Is Baccas- Nastasi*) which are placed in proximity to the sea at an average distance of less than 1km and always on a small promontory or in any case in a higher position than that of the surrounding terrain.

The three sites that overlook the Gulf of Cagliari (*Antigori*, *Sa Domo 'e s'Orku* and *Is Baccas*), are among those that are the most interesting in terms of the information obtained: they appear to form a territorial district aiming to control the coastline. Each of these sites is in an optimum position from the point of view of defensibility and the analyses conducted confirm their function of controlling the territory.

On the basis of the Land Units created it may be noted that the best way to approach the monument from the coast is just one, and this exploits the optimum characteristics of the territory.

In August 2006 a survey was conducted of the three sites of *Antigori*, *Sa Domo 'e s'orku* and *Is Baccas*, aiming to verify how much the parameters for accessibility to the sites, obtained on the basis of the creation of Land Units, corresponded to reality. The results were highly satisfactory: in fact the best, and in many cases the only, access was that produced by the Land Units created.

Although all four sites overlook the coast, the only possible access to the monument, as a result of the territory and the position of the site, forces one to walk around the relief on which the site is placed so as to reach it from the side opposite to the coast. Furthermore, the access to the site is always under the control of those within the monument and in general it is a path which runs alongside a torrent or river. In the case of Nuraghe *Antigori* even the only access to the site is difficult, as a result of both the slope and the nature of the terrain.

Between Nuraghe *Sa Domo ‘e s’orku* and *Nuraghe Is Baccas* an inland path that runs along the basalt hillside is also visible (south of *Sa Domo ‘e s’orku* and north of *Is Baccas*). This also makes communication between the two sites possible.

While from the site of *Antigori* one may keep watch over the territory as far as Nuraghe *Sa Domo ‘e s’orku* to the south, and towards the Campidano area to the NNE, from *Nuraghe Is Baccas* the territory can be viewed as far as the peninsula on which Nora is found.

For the inland sites such as *Su Nuraxi* and *Nuraghe Arrubiu* the situation is different. Their distance from the coast made it unnecessary to evaluate their relations with the sea; therefore an attempt was made to evaluate those with the surrounding territory.

Also in this case, one notices the elevated position of the Nuraghes in comparison to the surrounding territory.

In these cases the accessibility of the site seems to be greater in comparison to the sites along the coast.

Su Nuraxi is potentially accessible from both sides. To the N and NE the site is protected by sandstone hills, nevertheless, its position provides a view of a vast plain that goes from NW to E.

Even more interesting is the situation of the Nuraghe *Arrubiu* and its position with regards to the *giara* on which it lies. In fact, the borders of the *giara* appear to mark the limits of accessibility to the site thanks to the steep marl slopes around it.

For sites like *Corti Beccia* the situation is somewhat different. In this case the site is not on a relief, but on a plain, which as previously described in Chapter IV, is nevertheless in a higher position, for example, in comparison with the marsh (today no longer visible) in the vicinity.

For Monti Zara the position is similar to the situation of the Nuragic sites along the coast. In fact, the site overlooks the surrounding plain, but behind it lie the steep sandstone formations of the mountain by the same name. One exclusive consideration must be made for the Phoenician-Punic sites along the coast, such as *Nora*, *Tharros* and *Sant’Antioco*.

As a result of their peculiar position close to the coast, that identifies them as being the most important Phoenician-Punic, and then Roman, centres of the island, investigation focussed instead on the relative problems of the ancient landscape. This permitted, for example, consideration of the hypothesis that during the Bronze Age the island of Sant'Antioco could have been connected to Sardinia via an isthmus. In the same way it favoured the study of the problematic aspects of the ancient landscape that must be taken into consideration during an evaluation of the archaeological landscape.

Thanks to the classification of the territory taken into consideration and the data available we may identify four situations of accessibility.

The first, and perhaps most interesting, is that of Nuraghes *Antigori*, S*a Domo 'e s'Orku* and *Is Baccas*. The second type concerns *Su Nuraxi* and Nuraghe *Arrubiu* and probably also *Duos Nuraghes*; the third has been encountered in *Corti Beccia* and *Monti Zara*, and finally the fourth is that of *Tharros*, *Nora* and S.Antioco.

It is precisely for this reason that we decided to experiment with *cost surface analysis* and a consequent trial for reconstruction of the road network from sites such as *Antigori* towards *Su Nuraxi* and *Arrubiu*.

The results of the cost model applied is the direct consequence of the classifications made on a territorial basis.

The resulting road network proposal is interesting due to the objectives established at the start of the project. In fact, the proximity of sites such as *Corti Beccia* and *Monti Zara*, to the hypothetical road network discussed in p. 117, may lead one to think that the distribution of Mycenaean pottery in the island could have been influenced also by territorial factors, which, due to movement on foot and without aids such as the horse, certainly must have played an important role.

However, the curiosity stemming from the result of the road model obtained has led us to carry out further trials in the final phase of this work. As the points covered in this project aim to include in the near future also other material data of probable Mycenaean origin, an attempt was made to evaluate the relations between the site of *Mitza Purdìa*, in which a fragment of an ivory head was found, and the road network obtained via the cost model.

The result is that the site in question is just 887 m from the hypothetical route.

This may be further proof that the territorial basis on which the evaluation was carried out deserves great attention due to the understanding it offers of a complex situation that arises from the presence of Aegean material in Sardinia.

3 Analysis of Sardinia's archaeological contexts[156]

"The context of an artefact consists of its adjacent matrix (the material surrounding it, usually some kind of sediment, such as gravel, sand or clay), its position (horizontal or vertical within the matrix) and its association with other findings when found with other archaeological remains, usually within the same matrix) "(Renfrew-Bahn, 2005, 35).

This is the description of the archaeological context as defined official manuals on archaeology.

At the present state of research, it is possible to list eighteen sites where Mycenaean (or supposedly so) pieces were found, that is, material of foreign origin that literature has often regarded as Aegean or Mycenaean.

In the following pages, a comprehensive presentation of the sites where individual elements have been found is provided, in order to organise, based on published data, all the useful information that allows a reappraisal of the scientific positions on the "Mycenaean and Sardinia", i.e. through the analysis of the findings and the assessment of contextual elements, it might be possible to reconstruct the environment of the Mycenaean presence attested in Sardinia.

Since the literature regarding the context of those findings has been published over the last twenty years of research, the term *context* here acquires the widest meaning provided by all relevant literature: "The situation or the circumstances in which an object or a group of objects is found" (Francovich-Manacorda 2000, 92). It is well known that the term is attributed many different meanings in archaeology. For this reason, by analysing the individual situations of the discovery of the findings, I will try to investigate how the term *context* was defined and used in relation to the Mycenaean findings in Sardinia and I will try to provide as much useful information as possible to reconstruct the scope of discovery.

3.1 Nuraghe Antigori

The Nuraghe Antigori excavations were carried out from 1979 to 1986, with discontinuity and few resources.

The absence of a consistent archaeological documentation and the report on the excavation led to a revision of the publications by M. L. Ferrarese Ceruti and of the scarce material found in the archives of the *Soprintendenza Archeologica per le Province di Cagliari e Oristano*. Therefore it seems appropriate to re-evaluate existing publications in chronological order, to re-assess our

[156] The definition of "context" in archaeology is wide-ranging and, in time, it has been referred to a number of specific concepts of this discipline (Francovich Manacorda 2000, 90-92). It is not easy to provide a comprehensive definition, but its importance is commonly regarded as fundamental and essential in any reconstruction of archaeological data.

knowledge on the findings in the Nuragic monument. The first publication on Mycenaean pottery regards a finding at Nuraghe Antigori, which dates back to 1979.

Then, the publications by Roberta Relli and Antonio Forci, on the publication of tower C and the 2011 pre-print edition of tower C, which introduces, albeit sparingly, some new information, are worth mentioning.

Figure 48. Plan of Nuraghe Antigori (Antigori 2011)

3.1.1 Space "a"

The first findings are the results of illegal excavations in Space "a". Thanks to the reports by two students (Ceruti 1979, p. 242, note 1)[157], Maria Luisa Ferrarese Ceruti was able to appreciate the Mycenaean pottery found in Nuraghe Antigori. Following these findings and the permission granted

[157] Two students, Giulio and Roberto Copparoni, during an excursion in the Nuraghe, discovered some fragments of Mycenaean pottery.

by the then Superintendent Ferrucio Barreca to Ferrarese Ceruti, archaeological excavations were performed.

The illegal excavation damaged a section of *space a*, but some strips of land were spared along the walls. These made it possible to identify some stratigraphic traces. The first notice shows the discovery of “numerosi frammenti micenei, appartenenti ad oltre un centinaio di vasi, trovati assieme a ceramica nuragica, tra la terra rimossa dall’azione di clandestini” (Ferrarese Ceruti 1979, 242). M. L. Ferrarese Ceruti, recovering part of the existing stratigraphic data subsequent to the illegal excavations, first recognized eleven layers on the northern side of the room (Ferrarese Ceruti 1979; ead. 1980; ead.1981).

A subsequent archaeological intervention allowed her to identify three other layers: so fourteen layers were well recognizable and the first Nuragic compartment was identified in the fourteenth layer. The excavation had a maximum depth of 160 cm.

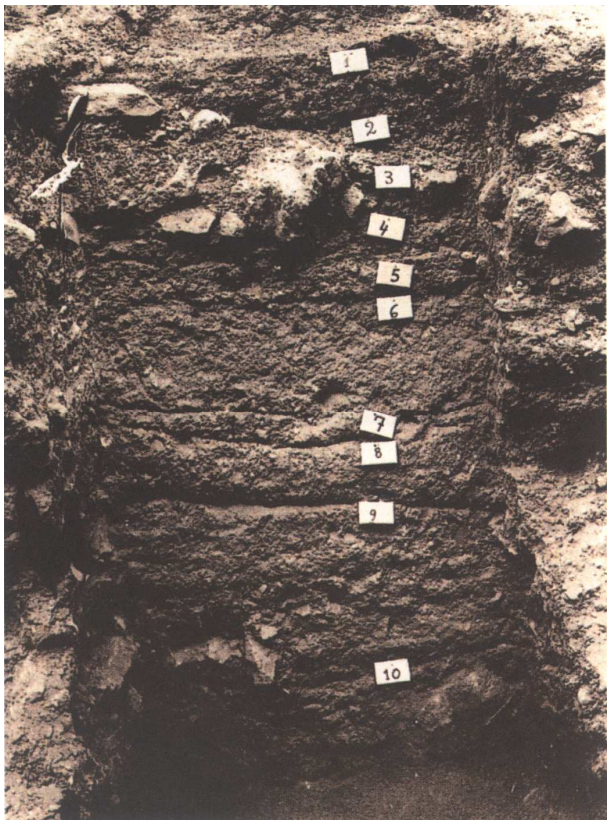

Figure 49. Stratigraphy of space a (Ferrarece Ceruti 1981, 385)

As maintained in the publications related to the excavations and the findings of Space “a”, the ninth and tenth layers were those in which the largest amount of Mycenaean pottery was found, together with local Nuragic pottery, such as "ciotole, ciotolette, le olle con orlo ingrossato a cordone o con alto colletto distinto, i grandi tegami troncoconici a pareti alte. Le ciotolette sono spesso di forma emisferica e presentano, all’interno, ad un centimetro circa di distanza dall’orlo, una solcatura orizzontale, profondamente incise, che sagoma la superficie” (Ferrarese Ceruti 1979, 244).

During the stratigraphic excavation about twenty Mycenaean fragments were found in the ninth and tenth layers, and the remains of a pithos decorated with beads was found in the thirteenth layer (Ferrarese Ceruti 1982a, 390). With the discovery of clandestine excavation, 160 Mycenaean fragments were brought to light.

After a first study of the pottery, archaeologist M. L. Ferrarese Ceruti published a classification, identifying four types of "Mycenaean" pottery (Ferrarese Ceruti 1981, 607).

- Refined products: *Vasi di medie dimensioni, impasti e ingubbiature color crema, e pitture brillanti rosse, brune o nere nelle quali si riconoscono le tematiche tradizionali delle conchiglie, delle spirali, dei semicerchi concentrici*" (Ferrarese Ceruti 1981, 607)[158].
- Common pottery: "C*on impasti scarsamente depurati, ben cotta, talvolta sommariamente decorata con pittura opaca, che doveva costituire il vasellame giornaliero o i grandi contenitori di derrate. La superficie esterna mostra una leggera ingubbiatura color nocciola chiaro o giallastra con linee orizzontali rosse o brune sovradipinte, ora piuttosto evanidi, disposte sulle anse, sul corpo e in prossimità dell'orlo o del fondo dei recipienti*" (Ferrarese Ceruti 1981, 607)[159].
- "*Vasi caratterizzati da superfici color cuoio, con sfumature varianti dal bruno chiaro al giallastro, con pittura rosso bruna a riflessi violacei, i quali mostrano una colorazione a linee parallele, una superiore e due inferiori, che racchiudono una linea ondulata di variabile altezza. Vasi di medie dimensioni, forme chiuse con alto collo distinto, o aperte, su basso piede ad anello o a disco. Nelle forme aperte il vaso si presenta decorato anche all'interno da linee orizzontali, sotto l'orlo e in prossimità del fondo. Sull'orlo sono disposte una serie di linee verticali e parallele, a gruppi intervallati fra loro*" (Ferrarese Ceruti 1981, 607)[160].
- "*Ceramiche acrome con superfici nocciola, grigie o rosso-brune segnate da fitte e sottili linee orizzontali, all'interno più larghe e lucide rispetto al fondo opaco, dovute alla traccia lasciata dalla stecca che ha appiattito le ondulazioni derivate dal tornio, le quali restano in ogni caso ben visibili*" (Ferrarese Ceruti 1981, 607)[161]

[158] "vases of medium dimensions with cream-colored dough and slip; red, brown or shiny black paint, which displays traditional themes, such as shells, spirals and concentric semicircles".

[159] "mixes poorly cleaned, well cooked, sometimes decorated with matte painting. The potsherds included plates and large food containers. The outer surface shows a slightly light brown or yellowish slip, painted with horizontal red or brown lines, rather vanished, placed on the lugs of its body and near the rim or the bottom of the vessels".

[160] "Pots surfaces characterized by leathery texture, with tones ranging from light brown to yellowish brown, with violet red paint. They show marks in parallel lines, one above and two below, enclosing a wavy line of variable height. Medium-sized vessels, separate closed shaped vessels with high neck, or open ones, on the bottom ring or disc foot. The open vase is decorated with horizontal lines, on the inside, under the rim and near the bottom. On the edge, a series of vertical lines are painted: one parallel to the other, in groups interspersed among them" .

[161] "Achromatic clay surfaces with brown, gray or reddish-brown, marked by thick and thin horizontal lines, within larger and more polished than the opaque background, due to the trace of the cue that has flattened the waves derived from the lathe, which remain visible.

Plus a new type of Nuragic pottery:

- "*Altri frammenti, dagli impasti compatti e piuttosto ben depurati, di ottima cottura, con fratture nette e dalle superfici e impasti di color grigio – ardesia le cui forme sono del tutto estranee a ceramica nuragica. Alte anse a nastro sopraelevate sull'orlo o piedi a disco di vasi dalle forme aperte o ancora, ciotole, con orlo ingrossato a cordone*" (Ferrarese Ceruti 1981, 606).[162]

Layer	Findings	Description	Depth
1		brown soil, loose	(cm 10; cm 15)
2		brown soil, loose; compact brown soil for long trample, fireplace with ashes and animal bones	(cm 8; cm 15)
3		Stones of middle dimensions, few pottery.	(cm 4; cm 10)
4		brown soil with few potsherds	(cm 7; cm 15)
5		brown soil with a few shards Beat rock-solid for a long trample. Yellow –brown soil	(cm 8)
6	Nuragic pottery	Yellow soil, very loose with ash traces and animal bones.	(cm 17)
7	2 fragments of Mycenaean pottery; Nuragic pottery		(cm 5)
8		Wrought floor	(cm 10; cm 14)
9	Nuragic pottery; Mycenaean Pottery "Grigio Ardesia" pottery	very hard soil dissolved without a trace of ash	(cm 28)
10	Nuragic pottery Mycenaean pottery "Grigio Ardesia" pottery	very hard soil dissolved without a trace of ash gray and very loose soil with traces of ash	(cm 18; cm 5)
10 a	Nuragic pottery Mycenaean pottery Grigio Ardesia pottery	Pit between the rock wall and north wall	
11	No findings	Wrought floor yellowish	
12	No information	No information	No information
13	Fragments of a *Pithos*	Stones floor	(1 m)
14	Nuragic pottery		

Table 12 Space a. Schematic synthesis of findings with related layers and other archaeological information

Ferrarese Ceruti already questioned the nature of the compartment, advancing the idea of a place reserved for worship, because of the discovery of the two-edged hatchet/boat and because its structure did not seem to have a defensive nature, despite part of the fortress walls (Ferrarese Ceruti 1981). Based on the analysis of the structure of the Nuraghe Antigori complex, Alessandro Usai, identifying five construction phases of the complex, that the building of A compartment between the second and third construction phase, along with other smaller buildings, consisting of small

[162]"Other fragments of rather compact and well-purifies dough, very well baked, with sharp breaks and slate-gray surfaces and mixtures, whose forms are completely unrelated to Nuragic pottery. High ribbon handles or disc-shaped feet the wide open vessel, or bowls, with thick cordon rim." Dr. Ferrarese Ceruti also wrote that "alcuni di questi frammenti ricordano la ceramica minia grigia tarda dalla casa VI F di Troia, databile al Terzo Elladico IIIC e altri dello Scoglio del Tonno" (Ferrarese Ceruti 1981, 607).

blocks of polyhedral metamorphic rock and granite, and "sulla base delle osservazioni di stratigrafia strutturale e soprattutto delle informazioni recuperate dai depositi stratificati degli ambienti scavati, si può avanzare una datazione [...] al Bronzo Recente Avanzato"(Usai 2011, 12). He also does not exclude that the compartment could have a worship function, given the limited thickness of the walls, the limited floor space that suggests the presence of a single floor, and access is extremely uncomfortable. But this also adds to the possible storage function of the compartment, that I personally consider a more plausible and justifiable hypothesis, because of the enormous concentration of Mycenaean, Minoan and Cypriot ceramics found there (Usai 2011, 13).

It seems clear that the compound is prior to the presence of Mycenaean ceramics, since the Nuragic pottery was found in the deepest layer. The discovery of fragments of a Cretan pithos on the floor is equally significant. This further endorses the hypothesis that the compound was suited to store food, since the very beginning. The presence of fragments of Minoan pithoi in one of the deepest layers is therefore significant. Indeed, in Minoan environments, the use of pithoi was intended primarily to preserve crops and their use is attested even for the transport of pottery.

- Mycenaean and Aegean remains in the compound: imports and "*local imitations*"[163].

This chamber is so far the place where the greatest amount of Aegean pottery in Sardinia was found. In the mid-80's, 125 cards of Mycenaean archaeological material discovered there were published.

It was possible to re-examine about one hundred items (ID 005-040, 048-068, 070-107, 110-128), now kept in the town of Sarroch. Very few of them provide stratigraphic indications; most of the findings of compartment A were recovered from the earth removed from the excavation and therefore have no reference. 21 pieces will be hereinafter analysed with sound indications of origin, compared to the 105 fragments (005-009, 011-073, 080, 084-092, 094-102, 104-106, 110-114, 116-117 119-125 , 128) which have no stratigraphic information. The direct consequence is that the data on the discovery are still very limited and must be taken into account carefully.

Through the examination of bibliographical materials, the archaeological data cards published by Ferrarese Ceruti (Schedule RA) and the direct analysis of foreign material, the stratigraphic information related to the findings are summarized as follows:

layer 6: 2 findings (ID. 103, 126);

[163] The term "local imitation" has been often used in all the chapters of this work, in order to facilitate reference, based on its common use in the traditional bibliography on Mycenaean pottery in Sardinia. It would be most appropriate to start using the term "locally produced Mycenaean pottery" and, in our case, "Mycenaean ceramics of Sardinia or Antigori", as Reinhard Jung writes, referring to pottery productions which have been identified as Mycenaean, but were produced outside the Helladic mainland (Jung 2010, 152).

layer 9: 5 findings (ID 010, 044, 048, 079, 081);

layer 10: 4 findings (ID 033, 076, 077; 199);

layer 10 SE: 4 findings (ID 007, 024, 082, 086);

layer 13: 6 findings (ID 035, 036, 038, 080, 083, 115).

The two pieces of layer 6 are probably local imitations, as the type of clay and their decorations suggest. Because of their fragmentary nature, it is very complicated to define their shape; however, the dough, the colour of the clay and the decoration are peculiar. They both belong to the class of pottery found at Nuraghe Antigori, orange on the external and internal surfaces, with a decoration that often consists of alternating semicircles. It is very difficult to find any reference with the decorations catalogued by Arne Furumark, but the semicircle decoration may remind one found in the bowls of Knossos, belonging to the "Sex southern half group" (Hatzaki 2007, 250, fig. 6.37-2)[164].

A distinctive feature is the decorative horizontal band that runs along the outer surface (and often inside) and a decoration characterized by oblique strokes along the edge, similar to paint drops.

These reasons suggest that both fragments belong to open forms, as proved by some potsherds from Kommos, that will be described in the next chapter.

In layer 9, imports are found (ID 010, 079, 081) together with local imitations (ID 044, 048).

The ID 10 is a fragment of wall, already catalogued by Ferrarese Ceruti[165]. Even if the card referred to two fragments, it is now possible to re-examine only one of them. The original card included a decorated rim and wall fragments and a wall fragment, which will now be analysed. The clay analysis confirmed the origin of the fragment, recognized as a Minoan import (Ferrarese Ceruti Vagnetti - Lo Schiavo 1985, 17). The decoration is indeed a fairly common element, consisting of alternating linear segments that decorate a main motif, that is referred to as *dark on light fine ware*, due to its colour. The LH IIIB Knossos findings display the same decoration as the Maytiktiyikhos 'Kitchen' Group, characterized by fine buff fabric and dating back to the early LM IIIB (Hatzaki 2009, figure 6.26.2, 236; figure 6.27.5, 237; figure 6.28.1, 6.28.4, 239)[166].

The ID 79 is a clear open form import, probably a crater (FT 284). Its decoration is too small to allow any comparison, but it reminds of the forms represented on the pottery imported in Nuraghe Antigori.

The ID 081 is a fascinating artefact, one of the best preserved, discovered in the underground. This is a FT 284, with horizontal stripes and a spiral FM 57 pattern. Although the card published by

[164] "Sex southern half group is represented by a series of deposits from the Knossos town. […]. There are suddicient stylistic features and correlations with deposits from other regions of Crete and of the Aegean to suggest that this group represent a subsequent ceramic phase, which could be labelled LM IIIC Early" (Hatzaki, 248).

[165] Schedule RA 97713

[166] The ID 169, found in Nora, seems to have a similar decoration, although reddish, rather than dark.

Ferrarese Ceruti[167] suggested a specific date for the LH IIIC, the combination of form and patterns suggests a more likely chronological indication of LH IIIB (Furumark 1941, 358).

In layer 10, an imported fragment is found (ID 76), while the other two are local imitations (ID 033, 077).

The ID 076, an open-shaped vase, although it cannot be confirmed in terms of shape, because of its fragmented nature, nor characterized by specific decorative elements (thin horizontal stripes which run parallel along the body of the pot) that may facilitate a classification, has, however, an interesting small lead cramp.

This element was fairly common in Sardinia, not only during the Nuragic age, but known since the beginning of the Neolithic Age; nonetheless it is absolutely unusual, if not entirely missing in the Mycenaean and Aegean contexts. A repair that shows a very "local" touch. It provides very useful data for understanding both the value of non-native pottery and the interaction between both cultures.

The indications found in relation to some materials and referred to as SE, found no reference in literature, nor in the documents by Ferrarese Ceruti. It may be assumed that the SE indication could be a spatial indication and therefore it might refer to layer 10 of the SE section, but there is not enough information to confirm this hypothesis.

It is only possible then to report that in layer 10SE, only 4 Nuragic samples could be found.

Two fragments (ID 007, ID 024) are currently untraceable and only a B/W picture is available in the catalogue cards prepared by Ceruti. Both refer to two closed vessels: the archaeological cards are classified respectively as an jug edge and the remaining portion of the shoulder and the neck of a jug[168]. It is very difficult to determine the jug type according to those classified by Furumark, as no drawing is available. As the light colour of the clay suggests, they are probably imports.

Also the handle mount (ID 086), characterized by a circular section and a perpendicular outline, probably imported, may belong to a closed container, such as an ovoid jar FT 69/109, or a jug.

While the ID 082 finding (three fragments belonging to the same container), listed as potential imports, might instead be a local imitation[169]. It is not possible to determine the shape of the container, but the presence of an internal slip that prevents from seeing, or even feeling, the traces of the lathe, suggests an open vessel and a local imitation, rather than an import. The internal slip colour may belong to several archaeological findings in Antigori.

[167] The ID 081 artefact consists of several fragments. The first cards were created before the restoration of the pieces could be operated; therefore some fragments have different inventory numbers, although referred to the same findings. There are three different inventory numbers: RA 97722 card; RA 97777 card, referred to the handle which the LH IIIC chronological hypothesis refers to; and the RA 100755 card.

[168] Schedule RA 97710 and schedule RA 97724

[169] Reference is made to the card No RA 97826, catalogued by Ferrarese Ceruti

All 13 fragments found in the layer are clearly imports (because of the color and treatment of clays) and belong to closed containers.

The ID 035 is the flat bottom of a vase with rather thick walls, certainly pertaining to a wheel-made vessel; the ID 036 is the wall of a closed jar, light coloured on the outside and the inside surfaces and decorated with vertical stripes; the ID 038, also belonging to a closed container, displays clear signs of a potter's wheel and very coarse inclusions on the inner surface. The ID 083 is the wall of a large closed vessel, decorated with two parallel horizontal bands on the outer surface. Another interesting aspect is the discovery of Cretan pithos fragments in layer 13 (ID 080). Their Cretan origin was confirmed by chemical analysis (Jones 1987, 268). A single fragment was published, although there are now 18 shards stored in the warehouses in Sarroch. The herringbone decoration is typical, characterized by deep cuts in the raw clay, with a color ranging from gray to light beige, with coarse inclusions, highly visible even in the inner surface and typical, consisting of small ground fragments of pottery (chamotte).

Finally, the ID 115 is the thin wall of an unidentified vase. Definitely not suitable for carrying food or other vessels, but clearly imported.

The presence of large food vessels in one of the oldest layers of the compartment, clearly imported, is a very significant feature, both for the nature of the same compartment and from a chronological point of view. Indeed, it is clear that the first imports to be certified in *vano a* are the Cretan pithos and other Mycenaean pots, which prove it and provide data on the age of this layer.

Although, as already said, the context is not fully defined, if we wish to acquire the limited information available as valid, the underground of the room suggests that the pottery was imported inside large ceramic pots, and that the room was immediately adapted to create a storage space for imported products, though its construction was prior to the arrival of Mycenaean pottery. The appearance of *grigio ardesia* pottery is recorded immediately after the first appearance of the Mycenaean pottery and remains in the chamber even after the arrival of Mycenaean pottery.

Among the fragments found in the soil dug up by marauders, it is possible to recognize not only the pottery classes identified by Ceruti, but also Cretan pottery (ID 114. ID 115, ID 116)[170]

For example, the pithos fragment in layer 13, is a clear import (ID 114. ID 115, ID 116)

Lucia Vagnetti performed a first examination of the imported materials, confirming her hypotheses, through the analysis of their clay. (Vagnetti 1987, 19).

[170] The motiv of ID 116 have a good comparision with a Minoan flower (Hallager Hallager 2003, 206)

3.1.2 “Space o” or “Burial cave o”

In the publications of 1982, detailed information about the burial cave o appears. According to these texts, finding No 28 – the lead double-axe miniature, later reinterpreted as a boat (Lo Schiavo 1986, 194) - and finding No. 29 - a flared bowl- come from burial cave o.

Burial cave o is located to the north or west of the Nuragic complex of Antigori (published in the plan in 1982), but none of the publications by Ferrarese Ceruti provides information about its nature and its possible stratigraphy, as the excavations seemed to suggest.

Only a 1986 article on the reinterpretation of the lead double axe/boat by Fulvia Lo Schiavo, allows us to gather some information about cave o.

“É attestato che nel 1974 la grotticina era già stata violate ed in superficie giacevano abbondanti ossa umane; invece non è oggi controllabile la notizia secondo cui il reperto si trovava sotto una grande lastra di pietra. Quando ebbero inizio gli scavi regolari, l’anfratto era ormai totalmente svuotato el aroccia portata a nudo per tutta la sua lunghezza. (Lo Schiavo 1987, 193)”[171] .

This finding unfortunately lacks stratigraphic information.

The two publications only informed of the discovery of a small boat together with a “flared cup” (Ferrarese Ceruti 1982a, 392; Lo Schiavo 1987, 193).

It is highly probable that the discovery of clay and leaden findings was not a simultaneous occurrence, but that the materials were revealed to the Soprintendenza at the same time.

The ceramic fragment (ID 042) is part of a monochrome rounded cylix (FT 258 or 259) from the LH IIIB, as its diameter and extroversion shape confirm it. They are quite likely to be imports, due to the quality of the clay.

Figure 50. Fragment of lead from burial cave “0” (Ferrarese Ceruti 1981, 385.)

[171] The presence of human bones inside the small cave is confirmed by a report by a Honorary Inspector of the *Soprintendenza per i Beni Archeologici per le Province di Cagliari e Oristano*. (Lo Schiavo 1987, footnote 4 page 195)

If Fulvia Lo Schiavo’s interpretation is true, the finding is to be interpreted as a leaden ship, such hypothesis being supported by the fact that most of the boat reproductions in the Aegean context come from tombs; this does not confirm, however, that space o was a "burial cave".
If Fulvia Lo Schiavo’s interpretation is true, the finding is to be interpreted as a leaden ship, such hypothesis being supported by the fact that most of the boat reproductions in the Aegean context come from tombs; this does not confirm, however, that space o was a "burial cave".
Illegal excavations may have stirred further stratigraphy and the abundance of human bones may be attributable to a burial of a later period. In the immediate vicinity of cave o are the remains of some Roman houses. The presence of a grave from a later age in a Nuragic context would not be a novelty. Similarly, if cave o was used as a burial site during the Bronze Age, it is one of the most interesting data of the Antigori Nuragic complex. If the leaden element was a small boat used as a funeral vessel, the burial of one or more individuals may be assumed: probably individuals outside the local community in Antigori, but linked to the transport and shipping of pottery and probably related to the presence of Aegean material in the Nuragic site.
Any assumption about it, although it is a very charming hypothesis, has little value since it is not supported by information from archaeological excavations and stratigraphies. Therefore it does not deserve too much attention, because it is not supported by an appropriate scientific archaeological discourse. In addition, we are unable to date nor review the boat.
This does not help any confirmation, denial or further statement on the subject.
The lead isotope analysis to N. and S. Gale is still unknown and this prevents from having a clearer idea about the discovery.

3.1.3 Tower C

The excavation on top of tower C was carried out in September 1982.
The tower was standing on two levels. Only the lower tower still has the Tholos. The excavation, however, affected the top floor. Here the room was affected by the collapse of masonry structures. The stratigraphy has not determined much differentiation: five layers have been mentioned, but from the description provided in the publication, an unconventional way of classifying the stratigraphic sequence emerges. All levels have been identified, but not all are numbered. It's really difficult to consider the layers as "stratigraphic units"; therefore, according to the modern stratigraphic analysis, such as "human or natural action". Nevertheless, in a recent publication, Antonio Forci and Roberta Relli write "l’indagine archeologica del 1982 ha tuttavia evidenziato una sequenza stratigrafica in cinque livelli, sigillati da uno strato di crollo, dei quali il II

e il V sterili, il I con esclusiva ceramica nuragica, III e il IV con ceramica nuragica associata ad un'esigua quantità d'importazione micenea" (Forci Relli 1995, 121).

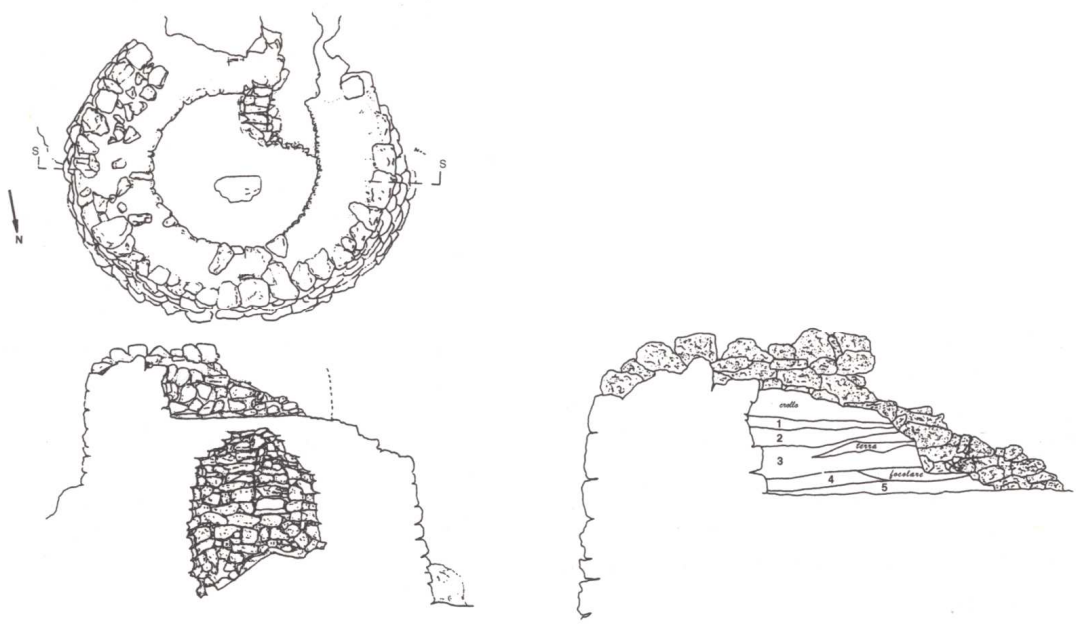

Figure 51. Plan of the tower C (Ferrarese Ceruti 1986, 442, fig. 3-4).

The division of layer 3 into two layers on the basis of the higher concentration of potsherds at the bottom or on top of the layer, serves as an example. Another example of this strange classification is the identification of the fireplace on the north side, bound by a semicircle of stones. It is difficult to understand the sequence of relative chronology concerning the relationship between the stove and layer number 4, or between the lens and layer number 3.

Although the design of the section shows a coincidence in time between layer number 4 and the fireplace, the publications do not allow to understand the stratigraphic sequences, nor the physical relationship between the layers, nor the relationship phase.

Three fragment have been published, ascribed as Mycenaean, coming from layer 3b (ID 144, ID 145, ID 146). The ID 146 is a wall fragment of a large closed pot, decorated with two parallel horizontal bands on the outer surface, ascribed as imported, due to the colour of the clay and the type of inclusions. Another imported fragment is the ID 145, a clay wall, very light, monochrome, with visible micaceous inclusions, the shape of which is difficult to identify, definitely belonging to a closed container.

The ID 144 is the walled edge of an open vessel, with marked vertical walls. The fragment is a local imitation, as the imperfect baking and splinted finish on the surfaces of the leather-to-dark coloured potter's wheel marks show.

In layer 4, traces of ash, rich in food remains, have been found, with a great number of gray pottery. Here, fragments of iron, of askos and of a "vaso a fornello con presa trapezoidale ad appendici triangolari sporgenti sull'orlo" have been found (Ferrarese Ceruti 1986, 184). These two potsherds remind of later shapes during the Late Bronze Age (Depalmas 2009, 137), and along with the piece of iron, they would suggest that the layer is more recent, especially since they were found together with the gray pottery.

Between layer 4 and layer 5 (beaten clay), there is a layer consisting of unnumbered "frammenti nuragici accuratamente disposti l'uno a fianco dell'altro sì da ricoprire tutta l'area del vano" (Ferrarese Ceruti 1986, 439). This setting suggested that it was a kind of floor, or an intentionally broken vessel, or the use of containers already broken and reused. Two fragments of pottery were found, one import (but we can not exclude the local production) (ID 147) and a wishbone handle, long believed to be a local imitation (ID 174): "essi non facevano parte della ceramica utilizzata per il pavimento ma erano tra la cenere del focolare" (Ferrarese Ceruti 1986, 439). Therefore, both fragments apparently were found in layer 4, together with the piece of iron (Vagnetti 1992, 633).

The ID 147 is a fragment of an open container, probably a "cup", with a decoration on the inner surface, consisting of a spot of paint with egg-shaped contours, not well defined, most probably belonging to a more complex decoration that, due to the fragmentary nature of the piece, is very difficult to reconstruct.

The ID 174 is a fragment that has aroused most interest in the literature on the "Mycenaean in Sardinia" topic. The wishbone handle is a loop, typical of Cypriot tradition. Its discovery confirms the international profile of Nuraghe Antigori imports. It was published for the first time as a relic of local imitation (Ferrarese Ceruti 1986, 439), then the analysis performed by Jones explained that there was a chance that it was an import "despite its presence in Group A, there is little to support a local origin for the wishbone handle, 74, its fine fabric contrasting markedly with the local fabrics at Antigori" (Jones Day 1987, 259), but that, at the same time, "the possible Cypriot connection cannot yet be explored because the corpus of comparative chemical data for Cypriot Base Ring ware is too small" (Jones 1987, 259; Vagnetti 1997, 633) [172].

[172] Several different opinions were submitted about the origin of the loop, and especially different interpretations from Jones' analysis. With reference to the article by Jones and Day of 1987 and the article by Vagnetti-Lo Schiavo of 1989, P. Bernardini wrote: "Con questi due frammenti non siamo però in presenza di prodotti fabbricati a Cipro; le analisi condotte sulle argille escludono questo tipo di identificazione. Se i due frammenti fossero prodotti localmente, in analogia con quanto avviene all'Antigori in rapporto alla ceramica micenea, la testimonianza non sarebbe per questo meno importante, poiché imitazioni di forme di ambito cipriota significano la conoscenza da parte dei ceramisti locali di originali circolanti nello stesso periodo; ma anche questa eventualità sembra da escludersi almeno per uno dei due frammenti" (Bernardini 1993, 34).

The drawing of the section do not show the pottery floor, nor is it numbered. Similarly, we can see that the furnace in which foreign fragments were found seems to have a physical relationship with the contemporary layer 4; and layer 4 seems to consist of the hearth ashes residues.

I believe it is very difficult to establish the stratigraphic relationship between the pottery floor and the previous layers, like between layers 3a, 3b and 4, characterized by the great amount of slate-gray pottery, and the fireplace.

Where had the fireplace been created? Did it use to be on the pottery floor or, as the image of the publication shows, on level 5? It is very complex to provide information on the fragments of the so-called *level 3b* and on foreign fragments found in the hearth ashes, on in layer 4 (ID 147, ID 174). As the chronology of the layers is not clear, using the foreign fragments as reference elements to define the layers' chronology seems risky.

Layers	**Materials**	**Description**	**Thickness**
Without number		Collapse layer	
1	Front of the lamp; Bottom of an askos vase Fragments of large bowls with "reverse elbow-shaped handle"	Thin layer with very small fragments	
2		Space floor with two large sandstone blocks(one is a wedge). They indicate a departure from the compartment when a nuraghe had already been degraded	
3		Cultural layer of compact yellow brown soil;	
3a	Nuragic bronze sword, 'a stocco' or votive sword; Nuragic pottery "grigio ardesia", Brown Nuragic pottery (open shapes with bottom).	a fire along the N wall of the room surrounded by a semicircle of stones of medium size.	
3b	3 fragments of Mycenaean pottery (two local types and one imitation)		
4	Nuragic pottery "Grigio Ardesia; -Rim bowls and jars with a thickened cord rim; -a very big fragment of an askos; -many bottom bowls; -fragment of *"vaso a fornello con presa trapezoidale ed appendici triangolari sporgenti sull'orlo"* -fragment of Iron -remains of Ostrea; Cardium;	Large lens of ash in the centre. Loose brown soil, with pottery and remains of food	
	1 fragment of wishbone handle 2 fragments of pottery: 1 import and 1 imitation	fireplace	

Without number		Wrought floor of fragments of Nuragic pottery	
5		Barren clay	The thickness of the layer increases as the centre of the room at the fireplace

Table 13 Tower c. Schematic synthesis of findings with related layers and other archaeological information.

Despite these unclear aspects, three main types of Nuragic pottery were identified.
The excavation of "tower c" has allowed a publication and a description of the various pieces of slate-gray pottery and, therefore, the recognition of their shapes became possible (Relli 1994; Forci Relli 1995).

3.1.4 Space p and Space q

The excavation of *space p* was contemporary to the excavation of tower C and *space q*.
It is located in the north-eastern-western part of the side, like *space q*.
They appear to be alien to the Nuragic fortification and they refer to a group of huts together with *spaces n, r, s*. M. L. Ferrarese Ceruti wrote that it is highly probable that "*p*" and "*q*" were the oldest huts of this group. Space *p* is rectangular and is close to space *o*. They share a wall. Likewise space q has the south-eastern wall border close to space p. The walls of space *p* lower to the north-west of the Antigori promontory and the extreme proximity of the wall structures to the rock caused its collapse. The same occurred to the wall structure of *space q*, which has a more external position. Alessandro Usai believes that the construction of both building p and q might be set between the second and third phases, along with all those smaller buildings, built with small granite and metamorphic rock blocks (Usai 2011, 12).
Both spaces have an interesting stratigraphy. Ferrarese Ceruti found eight levels in space *p* and six levels in space *q*. The drawings of the sections (Ferrarese Ceruti 1986, 442, fig. 10) show that there had been settlement levels before the construction of the wall between space *p* and space *q* (level 7s number and 8a).
M. L. Ferrarese Ceruti wrote that the wall was erected as the archaeological sediment increased in space "*p*" and, for this reason, it was very difficult to understand how both spaces are covered. Maybe the two spaces are a single space and the wall was functional only for an hypothetical conical coverage. In order to demonstrate this assumption Ferrarese Ceruti uses the stratigraphic relation and the materials found. For example, she found two fragments of the same vase (maybe a stirrup jar), one from level 4 of space *p* and one from level 3 of space *q* (Ferrarese Ceruti 1986, 440).

Unfortunately we are merely able to accept the content the 1986 article, although it appears to be plausible. Indeed, there are only notices about the foreign fragments of pottery, but there is no information about the stratigraphic levels.

Therefore the report of the space *p* and *q* excavations only includes a list of the recovered fragments and an architectural analysis, which can be understood also through an inspection of the site. The contemporary Nuragic fragments are not published as well as the documentation on their stratigraphy. The only article about these two spaces is a brief preliminary report.

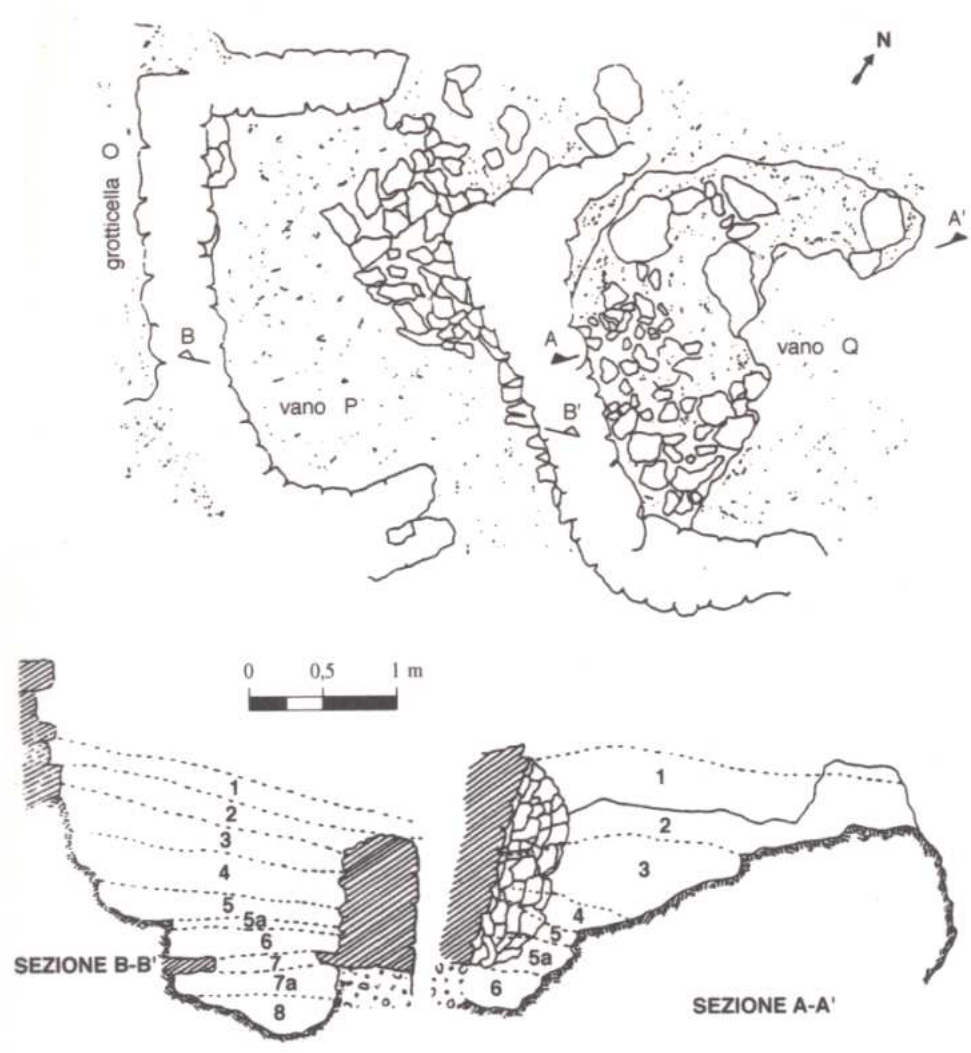

Figure 52. Plan and sections of the space p and space q (Ferrarese Ceruti 1986, 443, fig.10).

The discovery of the Mycenaean pottery was limited in compound p to layer 3 (ID 159), 4 (ID 161, ID 165), 5 (ID 160, ID 162, ID 163, ID 164), while in compound q to layer 2 (ID 155, ID 156, ID 158) and 3 (ID 154, ID 157).

The ID 159 certainly is a fragment of an import, probably a fragment of the upper wall of a Stirrup jar, decorated with a band running along the shoulder of the vase.
The ID 161 is also a small fragment of import. Due to its small size, understanding its shape is complex, if not impossible. It has the same clay colour of fragment ID 159, colour decoration 5/8 5.2 YR, consisting of a vertical zigzag pattern, that reminds of the FM 61-11 fragment. This fragment, according to Ferrarese Ceruti, however, belongs to the same vessel of fragment ID 157, that was found in layer 3 of compartment q. In terms of thickness and clay colour, this hypothesis may be plausible, but there is no connection between the two fragments. In addition, the zigzag decoration (or wolf-tooth) on both fragments, however, is different: the ID 157 is thinner and its colour is 5/8 10R. So there is no evidence that suggests that the fragments belong to the same piece.
The ID 165 is instead a small wall rim, probably belonging to a pot of local imitation, as the clay colour and the surface treatment suggest. The decoration is a band that runs along the lip.
One of the four fragments found in layer 5, the ID 160, is a figulina clay wall, very light in colour, belonging to a closed vessel, perhaps a jug, with two dark decorative stripes, now worn-out and difficult to analyse. The ID 163 is the wall of an open vessel, characterised by polished surfaces and external decorations, consisting of two parallel stripes of red paint and a lattice pattern. The fragment is similar in clay colour and decoration to other fragments of "local imitation", found in compartment a[173]. The ID 164 is the fragment of the wall of a closed vessel. The outer, partially scraped-off surface, possibly due to the junction of a handle (Ferrarese Ceruti 1986, 440), displays a single red paint stripe decoration.
ID 155 is a fragment of a probably closed vase, of which a wall shard and a rim, decorated with a reddish stripe, remain. Its small size makes it impossible to define its shape. The ID 156 is a fragment of the wall of a closed vessel, decorated with two parallel horizontal reddish bands. The traces of the potter's wheel may be found on its inner surface.
The ID 158 is a circular section handle of a large vase, with a painted decoration around the juncture. The inner surface is polished, however, as if the traces of the lathe we erased in purpose. It seems to bear traces of paint. The ID 154 is a common fragment in Antigori, in terms of decoration. It is a wall fragment of an open vessel, with an external decoration consisting of two parallel horizontal bands, which concentric semicircles possibly starting from it.

3.1.5 Tower F.

"La torre F domina il versante sud orientale del colle, ha pianta circolare e le sue massicce strutture, in grossi blocchi di quarzite disposti a filari, racchiudono una camera circolare, con altezza massima

[173] Even one of the fragments found in compartment A, in the soil removed by mauraiders, is decorated with a dash pattern interlaced with a rhomboid figure (Schedule RA 97806)

di m. 3,78, alla quale si accede per una scala di quattro gradini che occupa lo spazio solitamente riservato, nelle torri nuragiche, all'andito d'ingresso" (Ferrarese Ceruti 2011, 14).

The stratigraphic sequence of the F tower shows a better situation in comparison to space a.

Indeed, no illegal excavation was conducted on this site, thus allowing a fairly good stratigraphic sequence, making it possible to study the finding's relations.

Layers	**Materials**	**Description**	**Dept**
1		Collapse layer with humus and a few boulders	
2		Collapse layer with light brown soil	
3	Nuragic Pottery 2 Mycenaean fragments (the result of a run-off)	Collapse layer with stone increase	
4	Nuragic Pottery (Fragment of careened bowl with Herringbone decoration and decoration "a cerchielli ad occhio di dado)	Reddish-brown cultural soil layer; some ash patches	
5	Nuragic Pottery	Crawl space floor, basis for the layer 4. Ash in the interstices of the stones.	
6	Some Nuragic Pottery and a snake fibula of south Italy (IX-VIII sec. a. C.)	Brown layer; loose soil	
7	Nuragic pottery, Obsidian	Brown layer; compact ground	
7a	Some Nuragic pottery	Wrought floor, yellow, base for the layer 7	
8	Nuragic Pottery "Grigio ardesia" pottery	Cultural layer reddish brown. There is the presence of a lens of ash.	
8a	Nuragic pottery	Wrought floor yellowish brown	
9	Nuragic Pottery (like layer 8) 10 fragments of Mycenaean Pottery Cockade ornament from necklace	Loose stone foundation, cluster of small to medium sized stones, mixed with soil	

Table 14 Space F. Synoptic table on the findings, their layers and other archaeological information..

The presence of some Mycenaean findings, in association with the "grigio ardesia" pottery in the oldest layers of the towers, confirms the Maria Luisa Ferrarese Ceruti's remarks on the *space a* excavation (Ferrarese Ceruti 1982a, 390):

- the "Mycenaean presence" began most probably after the first Nuragic settlements;
- there is no sign of destruction and related stratigraphic layers.

In layer 3 (ID 142-143) two pottery fragments were found: two decorated walls, which may not be reconstructed. The type of clay and decoration suggest that the items are imported. It is interesting to see how the slate-gray pottery and the Mycenaean imports, in this compartment, have coexisted from the very beginning and how the slate-gray pottery has remained even later.

Among the non-Nuragic fragments from layer 9 (ID 132, ID 134-140), eight fragments belong to local imitations, an imported fragment (ID 140) and a small piece (amber color) with a circular shape, jagged edges, and a small hole in the middle (ID 141). According to Ceruti, it was probably a cornelian decoration of a necklace, the chronological attribution of which was uncertain: “invano si sono cercati confronti precisi. Di certo esso non appartiene ad una produzione indigena; per le sue ridottissime dimensioni potrebbe essere assai più tardo rispetto alla ceramica micenea [...] ma contro questa ipotesi osta il fatto che il vano f non ha restituito alcun documento posteriore all’età nuragica” (Ferrarese Ceruti 1983, 408).

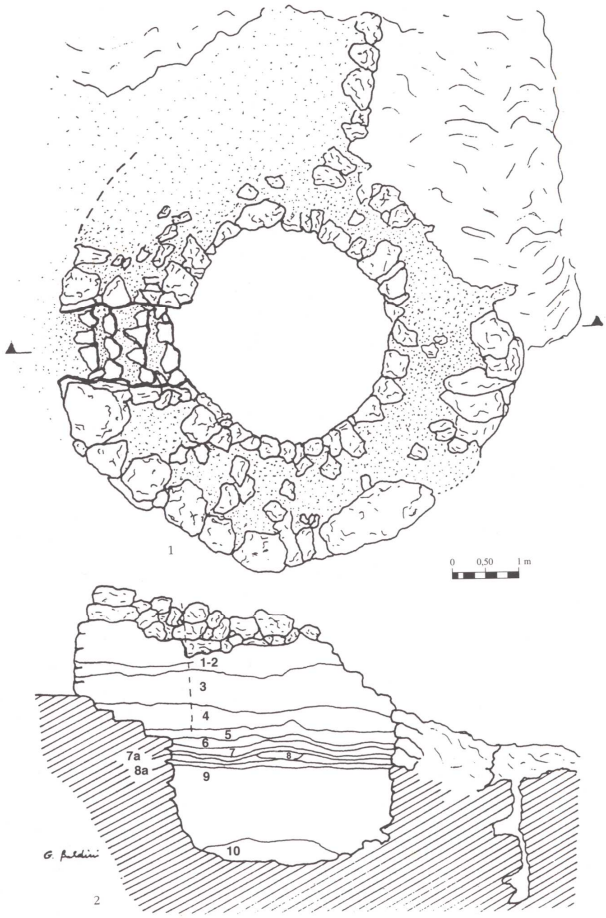

Figure 53. Plan and section of Tower F (Ferrarese Ceruti 1983, fig. 1-2, p.409).

Cornelian was a popular material throughout the Mycenaean world, and also among the Minoan during the Palatial Age. There are several seals and even some necklace ornaments. The colour of the piece (4/8 2.5 YR) suggested that the piece was made of cornelian. It looks like a necklace decoration, made of glass paste. “Most of the bead types with grooves or incised decoration are

faience beads" (Nightingale 2003, 312). And indeed, it is very difficult to decorate the cornelian with fluted engravings, as the fragment is. The same fragment, which certainly requires a deeper analysis than a simple post-mortem examination, is very similar to some small flat-bi-conical radially grooved beads, found at the Elateia-Alonaki necropolis (Nightingale 2003, 318 fig. 1/14)[174]. The elements of comparison are part of the LH IIIC contexts and "from the few dated beads it is visible already at this stage that most types of beads are found in the entire LH IIIC period as well and possibly further on. The bead types are the same as in Mycenaean palatial times" (Nightingale 2003, 313). Equally, very similar necklace ornaments are found in the tomb of Katsambas in Knossos, which have a very similar decoration, but are made of ivory (Alexiou 1967, 57).

The ID 140, a fragment is ruined and does not provide much information. The thin and accentuated concavity of the wall would suggest that the stirrup jar, the three thin parallel lines which run on a light figulina clay, are not sufficient to provide chronological data.

There is some similarity between the colours of the clays and the imitation findings in both colour and in the type of clay: less and less purified than the imports, with coarse inclusions and no lathe traces. The decorations found have always the same dull red colour, which ranges from 4/4 2.5 YR to 4/4 10R.

The ID 134, that belongs to an open container, is a rounded-lip[175] edge and the remnant of the wall. The above-mentioned typical decoration is the same as that found in some findings of the compartment, consisting of a pictorial band that runs horizontally on the outside and inside, reddish in colour (4/4 2.5YR) and a decoration consisting of oblique strokes along the edge, similar to drops of paint. Also the ID 137 is a rounded-lip rim and belongs to an open vessel, with the same horizontal band that runs on the outside.

"Data la loro posizione stratigrafica nel vespaio di colmata essi non sono riferibili ad una fase di vita del vano" (Ferrarese Ceruti 2011, 15), so clearly the idea was that *compartment f* and its dating followed the Aegean remains in Antigori.

Already in her 1983 publication, Ceruti wrote that the ceramics could be dated back between LH IIIB and LH IIIC: inevitably the Helladic context dating model arises again, a model that is at the basis of much of modern literature. Ceruti, in her posthumous publication, writes "*le strutture più recenti dell'Antigori, e in particolare la torre F, si datano quindi a tempi posteriori al IIIC, anche*

[174] I wish to thank Georg Nightingale for his invaluable help, who, while examining the pictures and the drawing of the find, was lavish with useful advice, putting his knowledge and experience in Aegean archaeological grassy materials at my disposal.

[175] Although it is a local imitation, it may help check Arne Furumark's indications for the lips evolution in association with some forms and in time. For example, "the rounded lip occurs also on jugs etc.of forms that previously had a short spreading lip, or none at all (types 68, 69, 109, 110, 128, 129)" (Furumark 1941, 82).

se non di molto: lo strato 7 si formò tra la ristrutturazione segnata dal pavimento 7a e la formazione dello strato 6, fissata dalla fibula serpeggiante meridionale tra la seconda metà del IX e il primo quarto dell'VIII sec. a.C." (Ferrarese Ceruti 2011, 16).

The same compartment is likely to be framed in Nuraghe Antigori's second building period. This is a plausible element, both in terms of architectural structural analysis (Usai 2011, 11-12) and because Mycenaean pottery in the loose stone foundation 9 suggests that is was not used in the site, as older fractures show and since it lay intermingled with loose earth and small stones.

Nonetheless, no element suggests that the compound was built after the LH IIIC. Therefore, a similar chronological position should be re-evaluated and reconsidered. No element helps answer the "how long?" question and understand how many years the different cultural layers of tower F lasted, in order to establish, for example, how long the slate-gray pottery was used after the compartment was built.

3.2 Nuraghe Sa Domo 'e s'orku (Sarroch)

The first surveys on this Nuraghe were conducted by Antonio Taramelli in 1923. He does not report much on the excavation, but he highlights its territorial potential: "si presentava in condizioni favorevoli per darci le testimonianze dei primi rapporti fra l'elemento proto sardo indigeno ed i sopraggiunti coloni oltre – marini" (Taramelli 1924, 277).

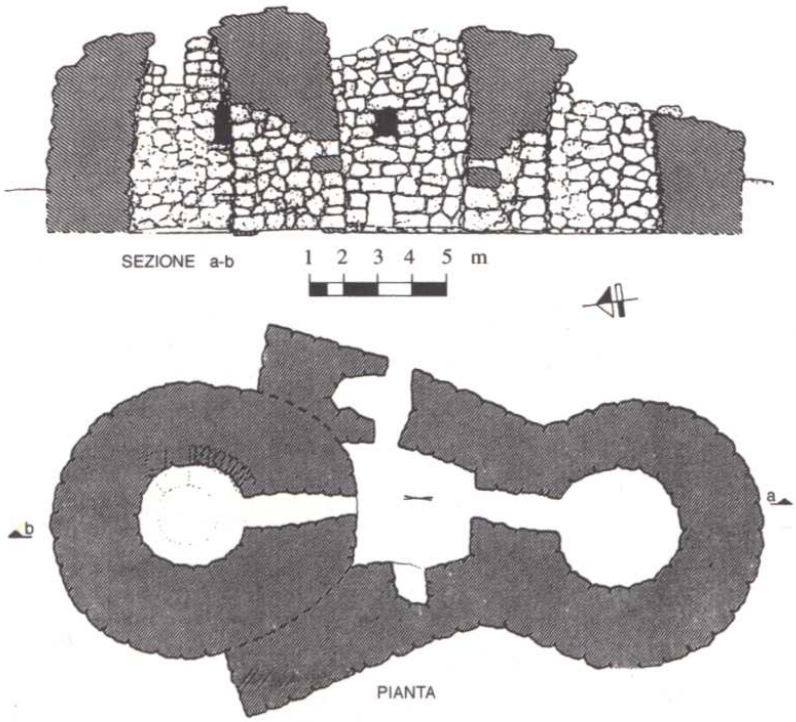

Figure 54. Plan and section of the Nuraghe Sa domo'e s'orku (Ferrarese Ceruti1982b, 401, fig.2).

After removing the rubbles, the monument was thought to be used until the Roman rule, but “conservava uno strato assai più antico con focolari ricchi di residui di pasto e di cocci nuragici, di frammenti di armi in bronzo, conservati fra le ceneri. Solo alcune perle di vetro; di origine orientale ci fecero conoscere i rapporti di scambio con i coloni norensi e calaritani” (Taramelli 1924, 278).
It was not possible, even for the Ferrarese Ceruti, to review the Nuragic materials of Taramelli's excavation, nor is it possible to understand which period they might refer to, since their location is not known. In 1978, Ferrarese Ceruti was able to resume excavations at the levels which had not been explored by Taramelli. She wrote that it was possible, with the first excavation, to get "al piano di posa di un bancone posto nel cortile sulla sinistra dell’ingresso alla torre aggiunta, lungo il muro meridionale del cortile e, sull’altro lato, poco oltre il livello della soglia della torre antica. Crolli recenti avevano poi spaccato le pietre che costituivano il bancone, suggellando il terreno archeologico che si trovava sotto di esso” (Ferrarese Ceruti 1982b, 177). But just beneath the counter, Ferrarese Ceruti reports on the discovery of a layer with “minutissimi ma molto numerosi frustuli di bronzo, ciotoli di fiume tondeggianti raccolti in mucchietti in prossimità delle pareti del cortile (proiettili da fionda?), ceramica indigena di ottima fattura, grigio-lucente, analoga per forme e tipo a quella dei coevi strati del Nuraghe Antigori” (Ferrarese Ceruti 1982b, 178). Here fragments of Aegean pottery were found, that Ferrarese Ceruti says “trovano riscontro tra la ceramica d’uso degli strati con manufatti micenei, e databili al III C, con i quali trova anche stringenti analogie la ceramica indigena” (Ferrarese Ceruti 1982b, 177). It is interesting to note the chronological and typological interpretation submitted by Ferrarese Ceruti for the fragments found.
To date, it has been possible to review five foreign findings (ID 149, 150, 151, 152, 153).
The ID 149 and 150 fragments, were described as “una brocchetta di argilla figulina biancastra, decorata da linee orizzontali in pittura opaca rosso-violacea” (Ferrarese Ceruti, 1982, 177), found in layer 3 of trench D. The fragments belong a closed container, of which part of the wall remains, along with the decorated juncture of the neck. The very purified clay, very light in colour and almost completely free from inclusions, seems to confirm that it is an imported piece.
Its shape is difficult to reconstruct. The "brocchetta" (jug) label is fairly generic. Indeed, the piece might belong to the "globular shapes" catalogued by Furumark, and thus to a "collar necked jar" or an "amphora". But this is not enough to have historical information about the exhibit and the attribution of the piece to the LH IIIC period is quite risky. Above all, it would seem methodologically unfitted to provide local production with the same chronological context of Mainland Greece. This modus operandi has produced rather imprecise results in the scientific literature, supporting the idea that most of the "Mycenaean-Aegean" findings, including the attested local production, could be attributed to LH IIIC.

Another published fragment, from the yard, trench A layer 4 (ID 151), belongs to a closed vessel. This fragment is very similar in type and colour of the clay decoration to the class of locally produced pottery, also recovered in Nuraghe Antigori[176]. Another probably Aegean fragment (ID 152) is the remain of a raised base, made of figulina clay, worked on the lathe with beige slip on both the external and internal surfaces. Not published by Ceruti and not provided with any RA schedule, the fragment is labelled as B3, and therefore it suggests its was discovered in layer 3 of trench B[177].

There is no information on its stratigraphy, nor on the excavation procedures, so it is very difficult to understand where the trenches were dug, and reconstruct the context of the discovery of several pieces[178]. It is impossible to draw a connection between the Nuragic and foreign shapes, found on the same layer, because no publication of the materials of the monument is available.

In 1985 some slate-gray potsherds from the same dolmen were published. Their discovery near the Nuraghe, according to Ceruti, confirms that "le genti egee sono certamente giunte nella Sardegna meridionale durante il decorrere della *moda* della ceramica grigio-ardesia" (Ferrarese Ceruti-Lo Schiavo- Vagnetti 1985, 10-11). This means that the presence of slate-gray pottery is not connected to the arrival of Aegean people or material on the island, but it was produced independently and subsequently used on a regular basis[179]. The only aspects that may be deduced are related to the structure of the monument and its value within a territorial analysis, being part of the Nuragic building system that overlooks the *Golfo degli Angeli*.

3.3 Is Baccas (Pula)

The promontory on the east side of Is Baccas, facing the sea, is characterized by a rocky outcrop that coincides with the highest peak, at 91 m above sea level. The visible archaeological structures lean towards the East-West outcrop. A part of the back wall remains, made of small stones and certainly intended to contain a small room on the top of the summit. Another trace of the wall, consisting of two rows of stone wall, cuts the East-West wall in NE direction. This may be the limit of a smaller room on the western summit.

On the south side of the hill, three small blocks of basaltic large rocky outcrops may be seen, similar in quality to the outcrops, which, together with the small clayey archaeological material,

[176] See, i.e. ID 048

[177] Maybe the drowing of this fragment is published in Ferrarese Ceruti 1985, 434, fig. 12. There is not a description

[178] There is also a group of previously unpublished fragments, stored at the warehouses of Sarroch, found in Nuraghe Sa Domo 'e s'orku: some bear the wording "Trench B near the front door". They are figulina clay fragments, but the impossibility to acquire any data on their discovery, their fragmentation and the absence of diagnostic pieces do not help reconstruct the context of discovery and therefore to understand the relationships between the material and the allogenic Nuragic material.

[179] See, i.e. the state of tower F.

suggest the presence of a Nuragic settlement. Other clay material, visible on the ground, suggests later attendance. The walls to the south, west and north are characterized by traces of terracing, built in the modern age, perhaps, but hardly noticeable due to the large amount of rubbles and vegetation covering them. The west side, facing the road that leads to the resort of Sarre Perda 'e Sali, is practicable and, due to the lower slope, it allowed easier access to the top of the promontory. The west and south sides are those with greater concentration of stone collapse and pottery materials. Indeed, right on the southern slopes, during the reconnaissance of the Nora project, most of the pottery, Botto Rendeli writes: “essi sono nella gran parte ascrivibili al Bronzo Recente e Finale, in linea con la documentazione proveniente dal soprastante nuraghe, ma sono attestati anche frammenti ceramici dell’età del Ferro e di epoca punica” (Botto Rendeli 1997, 723). The interpretation on the two fragments found is regarded as acceptable, especially because only the pictures of the publication and the information therein are currently available, and it is not possible to review the fragments[180].

The ID 166 is a wall, decorated with dotted rhombi (FM 73 n) that is a characteristic feature of the LH IIIB. The shape is comparable to a stirrup jar (FT 150) or to a narrow necked jug (FT 120-121), restricted to the Mycenaean IIIB2 context (Botto - Rendel 1997, 726).

The ID 167 is the fragment of a wall, regarded as a local imitation because of its clay colour and the dashed bands of paint; it prompts a comparison with the class of imitation pottery found at Nuraghe Antigori (Botto Rendel 1997, 723).

It is unclear why this imitation, unlike the ID 166, should belong to a slightly more recent historical context, in particular, the twelfth century BC. (Botto Rendeli 1997, 726).

Although this chronological comparison was performed by comparing Antigori's findings, we should note that no information is available that could help determine by how long local imitations are subsequent to imported models.

The findings of local imitation are likely to be recent but they might also be contemporary, and, since no adequate stratigraphic information is available, the case remains at hypothesis level.

The few Antigori's stratigraphies show that often the findings of imported and local imitations coexist in the same layer. Similarly, the impossibility to obtain more information on the findings and the current impossibility to review them, make it difficult to provide a precise chronological interpretation.

3.4 Nora (Pula)

The context of discovery of the Mycenaean finds is Nora also pose some challenges.

[180] During a search of the Nora warehouses and the museum, neither of the findings could be found, preventing a review of the material and the acquisition of more information to expand the database of this essay.

- *Macellum*.

The first discoveries occurred during the 1992 campaign in compound 4 of the North-Eastern section of the *Macellum*. The compartment had already been excavated during the Fifties and in the 1992 campaign, in the US 3006 layer, one of the discharge levels "costituiti in grande prevalenza da materiale edilizio ed allotropo" (Rossignoli 1992, 225), just below the natural hoard, the Mycenaean fragment was found.

"La cronologia di questi scarichi, che segnano evidentemente la disattivazione definitiva dell'ambiente, non è precisabile" (Rossignoli 1992, 225). The compartment does not provide any information in relation to its functional use, only giving a hint on some accommodation actions taking place for the construction of the structure. From a chronological point of view however, the discovery of a coin of Julia Domna establish a *post quem* term to the third century AD, and the presence of a fragment of geometric pottery could confirm an earlier Phoenician attendance.

Paolo Bernardini published some photos of two "Mycenaean" fragments from the Nora site and certainly relevant to the 19992 excavations (Bernardini, 2010, tab. IV.2). The absence of photos and drawings of the finds in the 1992 publication did not help understand which of the two findings are referenced to in the publication[181].

The discovery of the Mycenaean fragments confirmed the interest and attendance in the area, increasing the importance of the Gulf of Cagliari as the place mostly involved; however, no useful data could be collected on the relationships with any pre-existing Nora Nuragic community.

- *Forum*

The discovery of four fragments at the *Forum* confirms the importance of the area during the Bronze Age.

The ID 168 is the edge of a small clearly imported bowl, with some exterior decoration consisting of concentric semicircles, surely part of a more complex motif, comparable to FM 43.

The ID 169 is the fragment of a wall of a figulina clay open vessel, with complex decorations on the outside. Two parallel horizontal stripes which run along the surface of the vessel and a series of perpendicular bands: in this case, it is likely a FM 43 piece, but the fragmentary nature of the piece hinders any chronological identification. Both fragments, compared to local imitation findings found at Nuraghe Antigori, confirm their imported nature.

The ID 170 refers to two fragments which do not seem to belong to the same pot: one shoulder and the fragment of wall, probably belonging to an alabastron with a straight wall and an angled shoulder (Cucuzza 2009, 4). The fragment is decorated on the outside with three parallel horizontal

[181] I wish to thank Dr. Paolo Bernardini, the then director of the Archaeological Museum of Cagliari, who, in summer 2007, made it possible to directly examine the two fragments.

orange bands (10YR 10/8 yellowish red). The straight wall is generally applicable to LH IIIA:2 and LH IIIB specimens and, as proposed in the publication, is likely to be referred to a FT 94 (2009 Cucuzza, 5). The fragment was found in the US 11029 (Area III, period IX, Event A, Activity A2). This US is not particularly important and has returned many other note-worthy items. It is the result of the excavations conducted by Gennaro Pesce in the Fifties, and therefore the result of the tampering of contemporary excavations. Therefore the fragment itself provides us with very interesting information, but the context of its discovery that does facilitate research activities.

The ID 171 is the fragment of a closed vessel which still displays the remaining stretch of a wall, decorated with a clay monochrome foot (Cucuzza 2009, 4). The element is not similar to any other finding but it reminds of a "torus-type base" (Furumark 1941, 91)[182]. The fragment comes from the US 5168 (Area I, period IV, Event A, activity A4). This US is part of those layers of "interro eterogeneo di minor spessore, livellati pochi centimetri sopra la quota delle rasature murarie più alte, in modo da creare il piano di posa delle lastrature del foro" (Ghiotto 2009, 262). This means that the geographic position of the piece is not the original one and that context information, again, is not useful to provide an insight of the recoveries.

The ID 172 is the fragment of a wall of an open-shaped vessel, provided with a decoration on the outer surface consisting of two parallel horizontal black bands. The US 11014 (Area III, Event VIII, Period A, Activity A2) is the result of those illegal activities in the post-forensic ancient structures, which had been conducted to harvest building and stone material for the construction of other structures, such as, the Aragonese towers clearly visible also on the peninsula. Therefore, the stratigraphy of the fragment is of little importance here.

The ID 173 is the fragment of a closed-shape wall with exterior decoration consisting of 5 black parallel stripes of different sizes. The fragment comes from the US 5258 which is related to one of the earliest stages of the settlement. The US is indeed located in area I, i.e. the space located near the western porch, and relevant to the earliest stages of settlement which have been regarded as the base of the Forum structure. An alabastron piece, potentially dating back to LHIIIA:2, seems to be the most ancient Mycenaean finding in the south of Sardinia and, together with the alabastron found at Nuraghe Arrubiu Orroli and Mitza Purdia's warrior ivory head, it would suggest that the Mycenaean came to Sardinia around the early stages of LHIII.

The findings, although they were found in two different occasions and in different areas, and no proper context seems to be available to better understand the cultural process connecting foreign

[182]This type of base is likely to belong to metal pots and dates back between LH IIIA:1 and LH III C, and belongs to closed-shape vases (Furumark 1941, 98).

groups to their contemporary local counterparts during the Bronze Age, are however a fairly good sample group.

3.5 Medau Is Lais (Tratalias)

The discovery by Paolo Bernardini, published in 2006 (Bernardini, 2006, 110), is the result of a surface survey (Relli, 2004, p. 361; Lo Schiavo - Usai 2009, 13) led by Roberta Relli and Antonio Forcu, in the Municipality of Tratalias, also known as Medau Is Lais.

The area of discovery, even heavily worked by agricultural activities, has led to the discovery of several fragments of slate-gray Nuragic pottery and the small piece of figulina clay. There is a good chance that a Nuraghe or a Nuragic village were there. This is deduced not only from the underground discovery of Nuragic pottery but also from the presence of large blocks of carved stone, which are now no longer 'in place' due to human unremitting activities, intended for stone clearance[183].

The fragment plays a crucial role for two reasons: because it was found together with slate-gray pottery and due to the local context of discovery. It is worth remembering that the whole area has a significant territorial interest (Bernardini, 2006, 110-111) and that the place where the fragment was found is located between the Sulky site and the Su Benatzu cave in Santadi; in the latter, that is a site of paramount importance, a Cyprus a tripod and a golden blade were found (Lo Schiavo - Usai 1995, 172-174). The fragment (ID 175) belongs to a closed container (probably an alabastron), certainly imported, like the colour of the clay suggests. It is decorated on the outside and consists of a rather wide horizontal black band, with an irregular outline and a thinner parallel line.

3.6 Nuraghe Su Nuraxi (Barumini)

As already mentioned in the previous chapters, although the archaeological complex of Su Nuraxi is one of the most famous monuments of Nuragic Sardinia, the information related to the context of discovery of the two fragments, recovered during the excavations in the Lilliu huts, respectively at huts 17 and 23 of the nuragic village and published in 1981 by Maria Luisa Ferrarese Ceruti (Ferrarese Ceruti, 1981, 609, M Fig 17) is inversely proportional.

Currently, neither of the fragments may be found and therefore it is impossible to verify the information published about it, let alone to provide a comprehensive description of the pieces. There are only two photographs of the pieces: there are no drawings, nor metric references. From

[183] I wish to thank Dr. Roberta Relli for providing valuable data on the results of the surface survey.

existing photos, a yellowish fragment (ID 176) displays a surface that was probably slipped on the outside; while the other (ID 177) is reddish/orange and belonged to a wall.

In 1985, Lucia Vagnetti provided clarifications on its own findings of Barumini and reference ID 176. She writes: “One of them belong to a class of pottery widely represented in nuraghe Antigori with a leather-colour burnished surface and a decoration in red or violet paint, usually rather matt. It is certainly produced under Aegean influence but the area of production (which in the opinion of the writer could even be Sardinia) is still a matter of discussion” (Lo Schiavo - McNamara - Vagnetti 1985, 8). The picture does not clearly show the decoration, but we can not exclude the possibility that the fragment may belong to a local imitation.

Similarly, with reference to the ID 176, as mentioned in the first chapter, she expressed doubts about the source of the Mycenaean fragment and writes "certainly not Mycenaean […] and after a first direct examination, the present writer proposed to assign it to *Red Lustrous Wheel – Made ware* , possibly traded via Cyprus. Further research and a thesis defended at the University of Cagliari on the material from the same hut (no.20) in Barumini, brought to light other shards belonging to the same vessel. Now it should be more correctly reconstructed as a closed vessel with a ridge at the base of the neck, a shape not represented in the very restricted range of shapes connected to the Red Lustrous fabric. This fact led to a reconsideration of the shard and to the rejection of the first hypothesis. In consideration of the context found in the same hut, that includes material datable from the late second to the early first millennium B.C., and of typological and fabric similarities, the shard could be better ascribed to Red Slip ware of Phoenician production from the Iron Age, a date that is compatible with the local context (Lo Schiavo 1985, 8). The quotation shows that there have been several interpretations on the pottery fragment and similarly a lack of clarity on the context may be perceived. Reference is made to hut No. 20, but several publications say that the huts where both fragments were found were No. 17 and No. 23. It is not clear which data may actually be taken into account. Besides, as it was not possible to re-examine the pieces, very little may be added on their quality and the context of discovery.

In a guide on the Nuragic complex, Lilliu writes: “Nel Bronzo recente sorge il più antico agglomerato accanto al fortilizio, del quale restano ben poche, anche se significative, vestigia. Si tratta dei vani 17 e 23 già esistenti nei secoli XIII-XII (hanno restituito cocci del Miceneo III c = 1210-1110 a.C.) (Lilliu - Zucca 2005, p. 43; p. 57). This also shows that, after the first publications of the two fragments, unclear data were reported. Still, the Su Nuraxi site is regarded as one of those places where Mycenaean pottery has been found in Sardinia (Lo Schiavo - Usai 2009, 11)

3.7 Duos Nuraghes (Borore)

The Duos Nuraghes excavation was part of a research project of the University of Pennsylvania, the Penn State Sardinia Program, which included 15 excavation campaigns at the Duos Nuraghes site.

“The architectural focus of the site are the standing ruins of two centrally located tholos nuraghi”. (Webster 1991, 184). An "A" tower that has revealed a stratigraphy between the end of the EBA until the Middle Ages, "one of the oldest continuously occupied tholos nuraghi known" (Webster 1991, 184) and a "B" Tower in a worse state than the tower A and dating back to the MBA, with discontinuous settling episodes until the Middle Ages. Around the two towers, excavations were also conducted in the adjacent village, or rather villages, as a West Village "extending 60 meter west covering some 3000 sq meters of gently sloping pasture" and an East Village "cover a much smaller area of ca. 1600 sq m extending eastward about 20 meters from the nuraghi" were identified (Webster 2001, 10). The whole area, around the village and the two towers, is surrounded by a stone barrier, probably dating back to the Iron Age.

The Mycenaean pottery fragment was found in one of the "domestic structures" (layer 14) of the first village plant, dating back to LBA2 (Webster2001, 54). Structure 14 was partially affected due to the excavation in trenches 5 and 6. They were discovered at different levels, unfortunately, while ploughing the soil. However, it was found "a painted wall shard in a very hard fine tempered yellow-red paste may be a much older Aegean import and thus in situ within the LBA2 context of Str.14. The shard probably from a jar has a light orange – brown slip painted on the outside in dark red – brown bands of different widths” (Webster 2001, 67). It has not been possible to retrieve the fragment (ID 178)[184], therefore reference may be made only to the drawing shown in the publication. Despite the description, it is very difficult to be sure whether the fragment is imported or a local imitation.

3.8 Monte Zara (Monastir)

The excavation of the site in Monte Zara - Bia de Monti in Monastir started as an emergency response to the widening of Highway 131, and was conducted between 1986 and 1987. It contributed to expand the knowledge "non solo del già noto e articolato complesso archeologico di Monte Zara, ma anche dell’edilizia insediativa e dei processi culturali proto sardi tra il Bronzo Recente e il Bronzo Finale” (Ugas 1992, 206).

[184] The 1991 publication reported the discovery of two fragments. Indeed, both fragments belong to the same vessel.

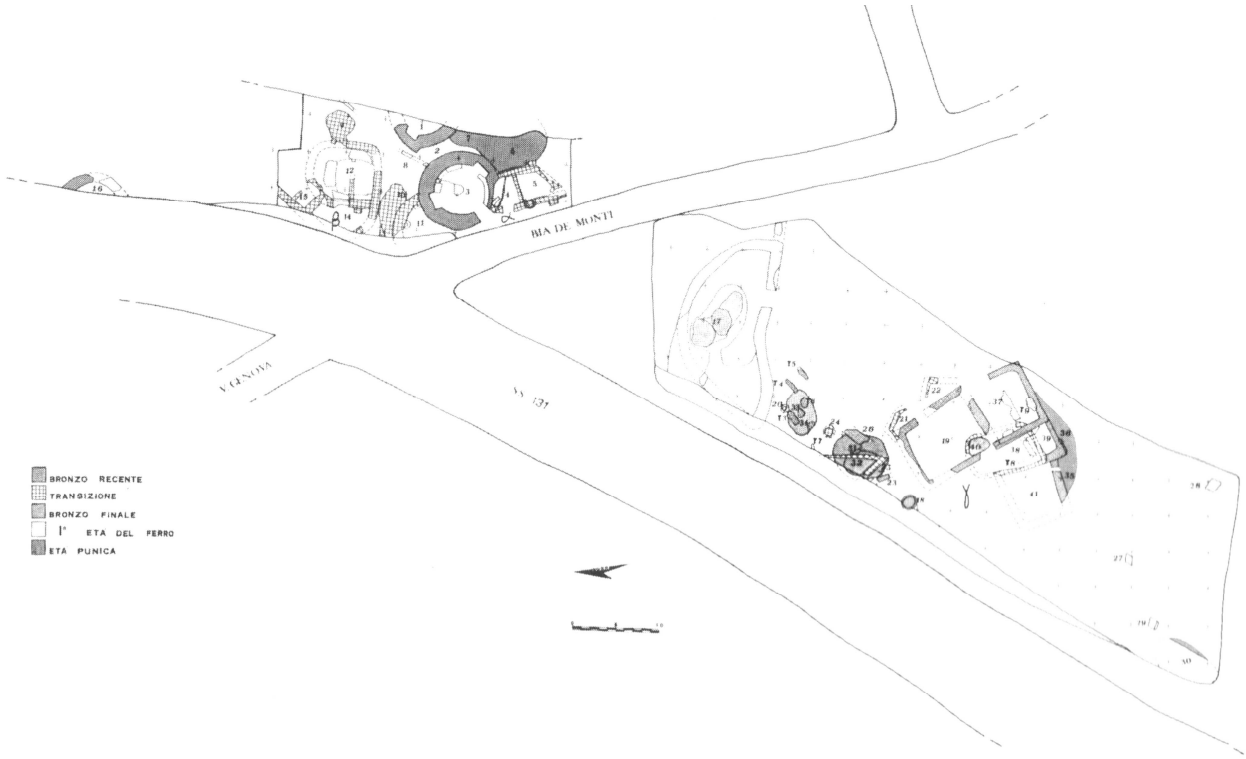

Figure 55. Plan of the site of Monte Zara (Ugas 1992, 225, tav. VII)

The site consists of 41 nuragic structures dating back to the Recent Bronze Age and the Late Bronze Age, except from a large megalithic enclosure that seems to belong to the early days of the Iron Age. The 32S structure where the Mycenaean fragments were found is a pit, dug in a trachyte layer and free from outside walls, also dating back the Late Bronze Age. It has been regarded as a settlement due to its size and position, similar to the huts in the Campidano region, with are affected by the previous Neolithic and Eneolithic influences also during the Nuragic Age: they were bases, dug on the ground without any support wall (Ugas 1999, 208)[185]. The pottery found inside the hut is the most representative. It was produced with slate-gray surfaces and mixes, including several fragments of "ciotole e coppe emisferiche, anfore a collo e tazzine ad ansa sopraelevata. Numerose sono le olle e le ollette con orlo ingrossato a spigolo e con le tipiche anse ad orecchietta" (Ugas 1999, 210). In addition to these pieces of pottery, reference is made to four clay Mycenaean pieces "riferibili al miceneo III B, sono considerati di fabbrica argolide da Klaus Kilian" (Ugas 1999, 210). The drawing and a B&W picture of Mycenaean pottery are presented in the publication. Unfortunately there is no description of the pieces, or any information on their stratigraphic position.

[185] In the Campidano context, an example is the village of Sa Osa, populated from the Middle Bronze Age to the Early Iron Age, which did not include a dolmen, and the huts consisted of semi-hypogean spaces, dug in the rock or the ground (Usai 2011, Soro-Carenti 2012).

All the information may be deduced only from the publication. Five Mycenaean fragments have been published. The ID 188 belongs to the fragment of a raised base, that *"occurs in all periods until the end of LH IIIB; in LH IIIC it is rarely found, if at all*" (Furumark 1941, 96), with a decorative band on the external surface.

The ID 189 is the fragment of the wall of a closed vessel; as the orientation of its pattern seems to suggest, it may be closed shape, perhaps the shoulder of a jar. The decoration consists of two parallel horizontal bands. On the other hand, the ID 190 is the small fragment of wall, that despite the drawing, could hardly be attributed to a closed or open shape vase. The ID 191 and 192 are also fragments of walls. The first is decorated on the outside, with two parallel horizontal bands thicker than 2 cm and another very thin band; the other wall is monochrome and carries no decoration.

No information is available on the quality of the clay, the texture and the colours. We may only accept Kilian's opinion, who maintains that all pieces are imported and no local imitation is recorded.

Similarly, the discovery is mentioned in the publication "di alcuni frammenti di grappe di piombo e pezzi di rame riferibili a oxhide ingots" (Ugas 1999, 210) within the 34S and 25 huts, where Mycenaean fragments have also been found.

It is not possible to know which stratigraphic relationship the copper and lead fragments and the potsherds had. We may only acquire the information of the discovery and use it for statistical purposes, but we can hardly make further assumptions without any stratigraphic information.

3.9 Mitza Purdia (Decimoputzu)

During the 1984 survey in the territory of Decimoputzu, in the area of Mitza Purdie, the fragment of the ivory warrior head, wearing a boar tusk helmet, was found.

Due to the installation of an orchard, a megalithic building was destroyed. The boulders were piled up at the edge of the field, leaving no traces of the building on the site. Only clay remains were found, confirming human presence.

The ivory element immediately aroused great interest. Its exceptional character left no doubt about its Mycenaean origin, since the earliest publications. The fragment shows both ancient and recent fractures, "conserva solo il copricapo, costituito da due file di zanne sovrapposte, entrambe con andamento nello stesso verso, separate tra loro da una duplice modanatura in forte rilievo. Residuano inoltre l'attacco del cimiero e parte della stephane a ricciolini" (Ferrarese Ceruti, Lo Schiavo - Vagnetti 1985, 12). The head, that displays several splits in the middle of the nose and is turned to the right, is mid-relief and has a cylindrical hole on the back.

Francois Poplin could assess the type of ivory used thanks to the fracture and the presence of the hole. The chalky appearance of the matter and the fact that the fragment appears worn out confirmed that the material used was hippopotamus ivory.

Figure 56 Fragment of ivory warrior head from Mitza Purdia in the National Archaeological Museum of Cagliari (Photo by L. Soro)

"Il pezzo è stato tagliato nella metà di un canino inferiore, in cui la commessura corrisponde alla faccia di applicazione (della placchetta) come sempre riscontrabile in queste piccole teste di guerriero. Questa metà è stata ottenuta per sfaldatura lungo la commessura o per azione di una sega? Bisognerà staccare il pezzo dal sostegno per stabilirlo, ma l'informazione essenziale, cioè il riconoscimento dell'avorio di ippopotamo è stata acquisita" (Vagnetti – Poplin, 2005 113).

This finding is very important, not only because it is one of the most ancient pieces of evidence of Mycenaean presence in Sardinia, but also because it serves as the geographic border of hippopotamus ivory trade in the Western Mediterranean Basin. The fragment, that includes only the helm consisting of two rows of fangs, is similar to several ivory heads which are very common especially in Mycenae. Other fragments were found to Archanes and Phylakì (Crete) and Enkomi (Cyprus). The fragmentary nature of the piece, the absence of any cheek guard, neck guard and the crest do not allow a comprehensive comparison with other examples found. We therefore restrict typological comparisons to the helmet of the statue. The Mitza Purdie piece is not common. While other units display three or more rows of overlapping wild boar tusks, (only the Phylaki piece in Crete displays only two rows of teeth), the Mitza Purdie piece has a single row of teeth, arranged in the same direction, not laid out alternatively, like the others found in the Aegean sea (Ferrarese Ceruti - Lo Schiavo - Vagnetti 1986, 13).

The pottery findings, unfortunately published without any stratigraphic information, may only be classified typologically. Forms related to the so-called pyxes (olle con orlo a tesa interna), two of which are decorated with engraved triangles, jars, little jars and vases with internal brims, characteristic of the Late Bronze period, bowls, large bowls; there are several pans, the colours of which are very similar to the slate gray pottery already found in Antigori (Sanna, 1984, 65-91). The chronology of the head, therefore, results only from the comparisons of the fragment. Philaki's tholos (Crete) dates back to LM IIIA; tomb 27 in Mycenae and Archanes date back to LH IIIA, while the fragment found at the House of Shields in Mycenae, and the fragment of Enkomi and Spata date back to LH IIIB.

Since the Mitza Purdie head is not similar to any other finding, it is difficult to place it on the time-line: it is clear that it is one of the oldest Mycenaean findings in Sardinia.

3.10 Nuraghe (A) Nastasi (Tertenia)

At this nuraghe's site, as already mentioned in the first chapter, the first Mycenaean material in Sardinia was found. The first description of the monument was published by Vincenzo M. Cannas, who wrote that the building was monumental and in 1966-1967 interested the then Superintendent of Antiquities of the Provinces of Sassari and Nuoro, who came to the site, in order to provide for its cleaning and restoration, bringing to the light a complex and huge settlement, by removing the remains of collapsed buildings. The Nuraghe consists of a central tower, to which a four-structure complex is attached, to the front and at its sides, creating an inner courtyard. The entire complex is NE-oriented; the monument may be accessed to through two entrances: a south one that leads to a trapezoidal space, which, in turn, grants access to two inner courtyards; and an east one, that grants access to the eastern tower.

During the late Seventies archaeological surveys were carried out, showing that information was minimal.

"I sondaggi condotti nell'area del Nuraghe hanno restituito numerosi resti, ma non hanno evidenziato alcuna traccia sicura di stratigrafia. Il terreno è stato esplorato con tagli o livelli successivi di vario spessore di cui vengono indicati talvolta la quota iniziale (il riempimento o l'architrave) e sempre quella finale. Il materiale rinvenuto nel terreno compreso fra le due quote è sempre riferito al livello finale del taglio e non alla posizione che ciascun oggetto occupa nel riempimento. Su queste basi una seriazione del materiale, riferita alla posizione di giacitura di ciascun oggetto nel terreno, appare difficile da determinare ed è quindi necessario l'ausilio del criterio tipologico" (Basoli 1979, 231). This picture well describes, as already mentioned in the first chapter, some difficulties in understanding the excavation technique and subsequent results. It is

very difficult to conceive the lack stratigraphic information when dealing with an excavation that does not seem to have hosted any previous legal (or illegal) archaeological excavation. After the development of traditional archaeological excavation techniques, since the Seventies horizontal incisions have been regarded as altering stratigraphic data, on the basis of the layer recognition criteria.

The publication provides a list of the materials found. In addition to a number of Nuragic clay elements belonging to different stages of the Bronze Age, a list of the elements which seem to suggest the presence of Mycenaean and/or Aegean material is provided: "due frammenti di lingotto di rame cretese-cipriota [...] tre vaghi di pasta vitrea azzurra" (Basoli 1979, 434).

The most interesting materials are from the eastern Tower b.

The embankment of the tower, consisting of the stones rubble was cut with two incisions. "uno il cui limite inferiore è di 0,40m e l'altro che poggia sul piano antico a quota 0,80 m" (Basoli 1979, 436).

The fragment of painted pottery comes from the lower level and it is interesting, since it was made of "argilla ben cotta arancio con inclusi bianchi, superficie esterna grigio verdina e banda nera leggermente lucente, di cui non è possibile ricostruire la forma" (Basoli 1979, 436).

As no picture or drawing of the fragment was published, the comparisons proposed in the publication may neither be confirmed or denied, and the fact that "nello stesso luogo e livello sono stati rinvenuti due frammenti di lingotto e l'umbone con parte dello scudo di un bronzetto di guerriero"(1979 Basoli, 436) does not provide any chronological information, according to the data collected from other sites.

With the publication of the Proceedings of the 2009 IIPP Scientific Meeting held in Sardinia, more information will likely be acquired.

3.11 Nuraghe Arrubiu (Orroli)

One of the most famous Mycenaean findings in the island is the alabastron discovered at Nuraghe Arrubiu. The five-lobed nuraghe underwent archaeological excavations between 1981 and 1991.

Five towers (GC) rise around a central one (A), connected by irregular walls which enclose a central courtyard (B). The whole structure is in turn surrounded by a seven-lobed rampart (HP) and has three courtyards. Along the southern side, another structure may be seen, provided with five additional towers. The village around the colossal structure was also identified, although no intrusive archaeological investigation has been carried out yet there. The nuraghe has been intensively occupied since the Nuragic age until IV AD. The Roman occupation was the heart of the so-called "wine laboratory" in courtyard B, but beneath its collapse layers, the Nuragic marked the

occupation during the Bronze Age. The 9 meter collapse layer that buried courtyard B serves as clear evidence of it.

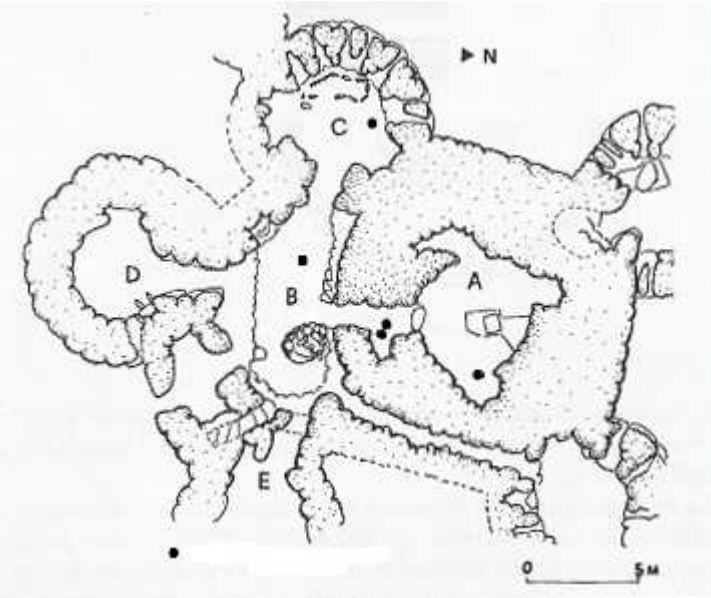

Figure 57. Plan of the Nuraghe Arrubiu with the distribution of the alabastron' s fragments (rounded black points) (Cossu 1995, 34, fig. 14)

The fragments of the vessel (ID 185) were indeed found in several places. Most of the fragments were found in front of Tower A niche, where a black and compact dirt floor with baked clay, along with coal material, covered the natural rocks and on which a stone pavement was laid (q. 500,95/93 -500,83). On the natural rocks, the dirt floor and the stone pavement, several alabastron angle fragments have been found: "un dato molto importante, perché dimostrerebbe che la rottura del vaso è avvenuta sul posto, è il rinvenimento, al clivaggio della terra, di alcune microschegge" (Lo Schiavo - Vagnetti 1993, 133). "Due frammenti di 'antipastiera', olle, tegami, un ciotolone ad orlo asimmetrico ed un'ansa a bastoncello di olla 'a bollilatte' were found together with fragments of the Mycenaean pot; (q. 501, 33) un punteruolo di bronzo a sezione romboidale; nella zona dei quindici frammenti il fondo di un vasetto a corpo globulare e piede ad anello di ceramica grigia, olle con orlo ingrossato all'esterno eccetera. Sono stati anche trovati un piccolissimo 'alamaro' piatto con un forellino centrale, apparentemente d'avorio, ed un dischetto piano-convesso forato di piombo dal focolare adiacente la soglia alla camera (q.500, 60). Sotto il lastricato si trovano tegami di grandi dimensioni, un'ansa di tegame rozzo e mal cotto ancora con i perni da incastro, una ciotolina miniaturistica a corpo arrotondato, uno scodellone carenato, eccetera" (Lo Schiavo - Vagnetti 1993, 133). Another wall fragment was found in the central tower A (q 500, 40) "di fronte alla nicchia a destra dell'ingresso, al di sotto del Battuto 2 e mescolato tra le pietre del vespaio che in quel punto colmavano un dislivello di roccia naturale" (Lo Schiavo - Vagnetti 1993, 133). Two other fragments were found in the central courtyard B, namely layer 1, consisting of a loose reddish-black

ground with bones, several pottery fragments and some residual collapse stone remains. Finally, two fragments came to light "dal taglio inferiore dello strato di base, al livello del vespaio pavimentale torre C" (Cossu 2003, 34). The Arrubiu alabastron is one of the few well documented findings and therefore it can provide reliable data and, although its discovery does not answer all posed questions, it offers some very interesting hints. Almost entirely rebuilt, it is typical in terms of clay colours and decorations. Its outer surface displays a light beige engobe, the same as Munsell 10 YR 3/8.3, and its decorations consist of several alternating thin horizontal lines and other thicker vertical lines on the body, matching the three loops on the shoulder, ranging from dark brown to orange red (Munsell 10.R 2.5 / 1, 10 R 5/5.8, 2.5 YR/4.8). The shoulder of the vase is different from the straight wall, slightly concave with a sharp edge. No neck nor mouth remain, but the base is decorated and slightly convex. Several comparisons have been proposed between the findings identified by L. Vagnetti with the FT 94 shape. Its decoration is similar to “esemplari provenienti da Troia, da Müskebi e da Budur in Anatolia, da Cipro, da Tell Atchana –Alalak, da Ras Shamra-Ugarit da Tekk Abu Hawam in area siro –palestinese” (Lo Schiavo - Vagnetti 1993, 137)[186].

The date proposed by Lucia Vagnetti, by shape and decorative association, would place the findings in the LH IIIA: 2 period.

The hypothesis is that "l’*alabastron* sia giunto sul sito del nuraghe Arrubiu quando ancora la costruzione del monumento, o almeno certamente della torre centrale e del pentalobato, non era completata, per cui la frattura è avvenuta per caduta sulle pietre del lastricato dell’andito, con la maggioranza dei frammenti rimossi dal movimento della terra e delle persone entro un raggio limitato e pochi trasportati accidentalmente più lontano e finiti inglobati nelle opere di costruzione e di assestamento. Ne consegue che la costruzione della torre e del cortile centrale - e dunque del pentalobato - è avvenuta contemporaneamente” (Lo Schiavo - Sanges 1994, 69).

Historical issues and information generated by the discovery of the alabastron are great in number and are especially connected with the discovery of "slate gray" pottery, its genesis and history

[186] Bibliographical references to Fulvia Lo Schiavo's and Lucia Vagnetti's 1993 article is hereby reported on the comparisons with the Orroli piece.In this regard, see CW Blegen, J.L. Caskey, M. Rawson, Troy III. The Sixth Settlement, Cincinnati 1953, fig. 415:1-4; Y. Boysal, Katalog der Vasen im Museum in Bodrum, I, Mykenisch-Protogeometrisch, Ankara 1969, tab. 24:6-7, 25:2, 4, 5-6, 9; C.Özgünel, “Belleten” 47 (1983), pp.741 fl., tab. 32-33; Id., “Belleten” 51 (1987), pp.535-547. A.H Smith, CVA British Museum, I, London 1925, tab.4:1, 5, 9-10 (from Enkomi); V. Karageorghis, CV A, Cyprus Museum, I, Nicosia 1963, tab. 24:6 (from Hala Sultan Tekké), tab. 25:1, 7 (unknown origin and Enkomi, tumb 78); V. Karageorghis, CV A, Cyprus, 2,1, Private Collections, Nicosia 1965, tab. 11:1, (Pierides Collection), 41:6 (Gaffiero Collection). A. Leonard Jr., An index to the Mycenaean Pottery from the South-Eastern Mediterranean Littoral, Tucson s.d., pp. 18-19. Woolley, Alalakah, An Account of the Excavation at Tell Atchana in the Hatay, 1937-1949, Oxford 1955, p371, tab. 128 c; C.F.A. Schaeffer, Les Fouilles de Ras Shamra-Ugarit, Syria 17 (1936), p. 140, fig. 13; T.R.W. Hamilton, Excavation at Tell Abu Hawan, “Quarterly of the Departement of the Antiquites of Palestine 4 (1935), pp. 46 fl. 283; J. Balensi, Les Fouilles de R. W. Hamilton à Tell Abu Hawam effetueés en 1932-33 pour le compte du Dpt. Des Antiquités de la Palestine sous Mandat Britannique, Niveaux IV e V, Doctorat de 3ème Cycle, Strasbourg 1980, p. 423, tab. 38:14-21, 25.

during the Late Bronze in Southern Sardinia (Cossu et alii 2003, 38-51) and fully developed in the following chapters.

3.12 Corti Beccia (Sanluri)

The Corti Beccia site emerged thanks to the irrigation works carried out in 1979. The trenches divided the vast Nuragic settlement into sections. Occupancy continued until the Punic and the Roman ages and damaged the Nuraghe, of which only three rows of sandstone blocks remain. In addition to this, unauthorized diggers filled the trenched with the residual soil for their illegal excavation activities[187].

Layers	Materials	Description	Dept
1	sterile	Humus mixed with stone, with lightly coloured clay inclusions,	0.00 -0.5 m
2	A few Punic shards	Yellow-beige soil with several stone and clay inclusions	-0.36/- 0.66 m
3	Nuragic fragments and food remains	Pale yellow ashen soil	-0.67/-0.78 m
4		Irregularly cut flat floor stones	-0.79/-0.93 m
5	Abundant Nuragic pottery	Ashen soil, dark, with charcoal and food remains	-0.94/-1.08 m
6	A few Nuragic shards	Hard compact soil, yellowish, clayey, perhaps beaten earth floor	-1.09/-1.31 m

Table 15 Corti Beccia. Synoptic table on the findings, their layers and other archaeological information.

The publication did not include any connection between stratigraphy and the findings, therefore, it is not possible to identify the correct site of origin of the "il frammento di coppa, estraneo alla tradizione figulina nuragica" (Ugas 1982, 39-40). The fragment (ID 186), which may only be appreciated in a drawing, has an open shape, of which an flared brim remains on the wall, carrying an horizontal loop and a circular section. The description of the finding, characterized by "superfici giallo beige, a tratti nocciola. Pasta gialla figulina ben cotta, pareti sottili" does not provide any information on the findings' being or not local imitations (Ugas 1982, 41). As a matter of fact, the impossibility to review the finding and the lack of any kind of analysis on the origin of the clays are essential elements which affect the determination of the origin and the production processes of the fragment. As regards the shape, Ugas suggests that it is a FT 284 bell-shaped bowl or a FT 285. The fragment is expected to be monochrome and free from any decoration.

[187] Ugas shows that some of the fragments found in the illegal sites matched pottery from layers 3 and 4 (Ugas1982, 39)

Several Nuragic potsherds: single-handled careened cups, hemispherical and spherical bowls, pots, gray pottery shards. There is also a hemispherical large-lipped bowl belonging to the same class of slate-gray bowls found at Nuraghe Antigori (Ugas 1982, 41).

3.13 San Cosimo (Gonnosfanadiga)

In 1981, the 1st St. Cosimo's megalithic tomb was presented as a "un monumento del Bronzo Medio con la più antica attestazione micenea in Sardegna" (Ugas 1981, 8).

The tomb, excavated in 1981, consists of rows of granite blocks with a southern passage, with two curved wings which generate the exedra and enclose the entrance to a rectangular burial chamber (16.50 m long), covered lintel slabs and granite floor (medium-sized levelled stones), similar to the Tombs of the Giants. It is not provided with an arched pillar, but it displays an architectural solution which looks like the arched pillar of the orthostatic tombs or a simple door entry. There are two lintels at its entrance: one is "on site", the other is broken. The "on site" one is embedded on the side jambs so as to create the bottom of a door. Above this lintel there is another door, covered with medium-sized jutting slabs, possibly originally surmounted by a cover plate. Two windows are therefore created, which seem to be an imitation of the empty space of the arched pillar. During the excavation, a six-meter-long stratigraphy was discovered inside the aisle, that had not been destroyed by illegal excavations.

Layers	**Materials**	**Description**	**Dept**
1	a few modern findings	dark gray soil with plant humus, roots and	0,00/ -0,42 m
2	Sterile	lightly beige-coloured soil, with sand, river pebbles and small stones, resulted from the collapse of the side walls and the upper surface	-043/- 1.14 m
3	Modern age shards	Carbonaceous lens	-1.15/-1.17 m
4	Nuragic pottery and glass paste and glass necklace elements	Beige-brown	-1.18/-1.47 m
5	Abundant pottery Nuragic obsidian shards and necklace elements of the same type from the previous level	Dark-light brown. Layer affected by the burials, though bone remains may be appreciated	-1.48/-1.86 m
6	A few Nuragic shards	Pavement layer with granite medium and small stones and river pebbles	-1.87/-2.15 m
7		Natural granite stone bench	

Table 16. San Cosimo. Synoptic table on the findings, their layers and other archaeological information.

The rest of the corridor, scourged by the illegal excavation, only left piles of soil which reserved several significant cultural elements. Indeed, "le perle di collana e i vaghi, provenienti sia dal recupero fortuito che dal tratto sconvolto della camera e da quello non perturbato compongono un quadro omogeneo e sono significativi per l'inquadramento cronologico e culturale dl monumento" (Ugas 1981, 9). Among the retrieved Nuragic items, the large two-handled jar with brimmed inner lip, single-handled careened cups found inside the jars, a single-handled glass, low bowls with hollow tongue handle. The significant Nuragic element is the internal brimmed jar[188] . This vascular form is always decorated on the shoulder either with plastic string-course motifs and ashlars engraved lines (also comb-link), or with zigzag ribs and vertical segments, according to triangle or metope patterns; it is regarded as a guide fossil for the II Middle Bronze age of Nuragic Sardinia (Depalmas 2009, 124, 127).

Figure 58. Giant's Tomb of S. Cosimo (Gonnosfanadiga-Cagliari). Photo by *http://www.sardegnacultura.it/j/v/253?s=21291&v=2&c=2488&c1=2127&t=1*

During the 1982 "Magna Grecia e Mondo Miceneo" exhibition, 27 out of the 67 grains found between layers 4, 5 and the piles of illicit excavation, were published in detail (Ugas 1982, 181). "*Sette perline a dischetto, di cui tre di color verde acqua, quasi turchese (1, 11,19), due verde chiaro (2, 12) e due crema (3,13); tre perline segmentate a indiretto, tipo 'segmented beads', color verde acqua (8, 22, 23); una rotellina dentata verde chiara (18), una perlina sferico-schiacciata, anch'essa verde chiara (14). I grani in vetro sono quasi tutti di forma sferico-schiacciata o sferico-appiattita: cinque color blu (4, 9, 15, 24, 25); due nocciola (7,16); uno nero con riga bianca (17); uno variegato bianco e blu (21). Un solo esemplare, in vetro verde (quasi turchese), fungente da pendaglio centrale, ha una forma cruciforme con foro cilindrico e quattro globuletti, legati al corpo centrale quadrangolare con pasta giallina (10). Fra i grani di collana [...] sono degni di considerazione due perle sferico-schiacchiate in vetro giallino e una in vetro nero*" (Ugas 1982,

[188] It is often referred to as a 'pyx' (Campus and Leonelli 2000, pp. 455-463)

183).

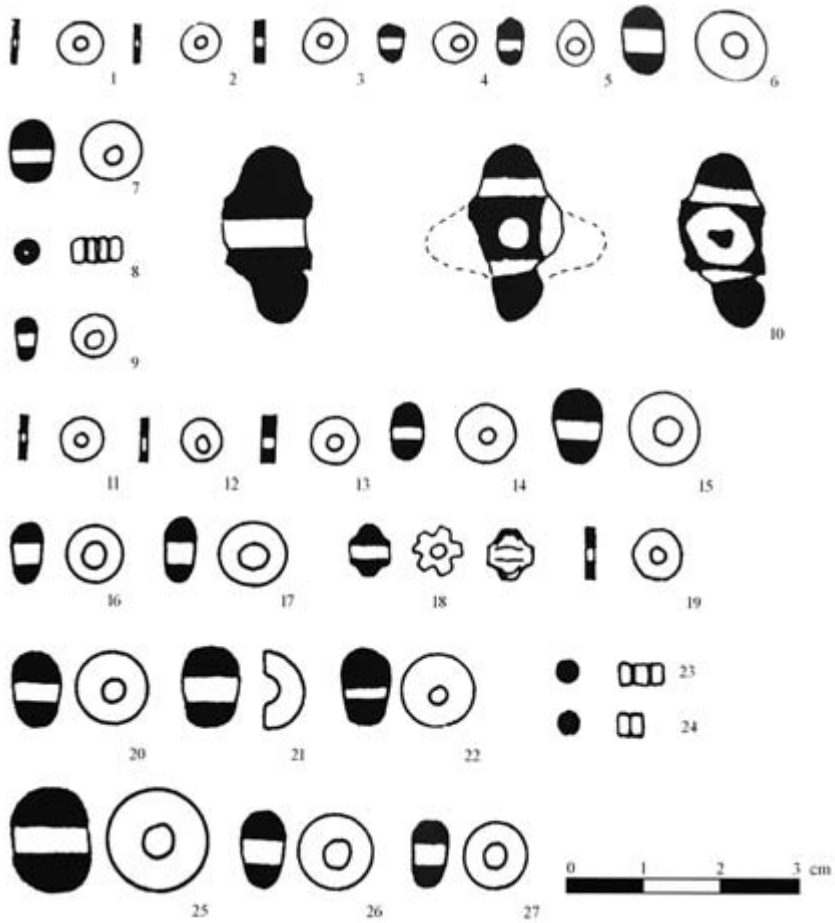

Figure 59. faïence beads founded in S. Cosimo (Ugas 1982, 183).

Ugas offers several comparisons especially with items found in Lipari and Sicily, and in places such as Thapsos and Milazzese, which would confirm the BM chronology and that imports may be referred to the LHIIIA: 2 period (Peroni 1996, Depalmas 2009, 128). Similarly he believes that, with reference to the findings from San Cosimo, the history of all its blue glass beads should be considered, which were found in various Nuragic contexts, often considered as Punic or Phoenician, and, with reference to it, he mentions findings such as those from Nuraghe Albucciu in Arzachena, Nuraghe Peppe Gallu in Uri and Nuraghe Nastasi in Tertenia (Ugas 1982, 181-183).

Lucia Vagnetti pointed out the discovery of the necklace decorations, arguing that it was necessary to draw a distinction between the faïence and glass paste[189], emphasizing the absence of typical elements that would allow meaningful comparisons and, thus, also a chronology (Vagnetti 1982, 365-366).

[189] Faience is a ceramic non-clay material consisting mainly of silica (SiO2), calcium oxide (CaO) and alkali. The discovery of glass came after that of the *faience*[1] in Egypt, that was known since 3000 BC. It was used by the Egyptians to produce artefacts which where similar to glass beads. The technique consisted of covering beads and other small stone objects with a blue-green vitrified amalgam (or glassy coating).

The current unavailability of San Cosimo beads prevents their re-examination that might help us assess both their material and their classification to encourage further comparison.

3.14 Muru Mannu-Tharros (Cabras)

The Nuragic village on the Muru Mannu hill was investigated several times, with increased interest since the 1981 discovery of "Cypriot pottery typical con the Mycenaean production" (Acquaro et al. 1982 37-52; Acquaro et al.1983, 49-89).

Near the Phoenician Tophet, where the Nuragic huts were brought to life, three fragments were found, which could not be described as Nuragic nor Phoenician.

The finding, attributed to the Aegean area (Bernardini, 1989, 285), is the fragment of a wall of a closed-shape vase, made of red clay, light brown slip outer surface decorated with two black horizontal stripes and a spiral pattern, falling within the FM 46/54 period.

This type of decoration may also suggest that the exhibit may be referred to the LH IIIA: 2 period, and therefore ascribe it among the most ancient findings of the island (Lo Schiavo - Vagnetti 1993, 137). As far as decorations are concerned, the fragment seems to be compatible (although richer) with the imports found near Broglio di Trebisacce in Calabria, which was attributed to the LH IIIA: 2 and with a similar pattern found on a three-handled amphora from Scoglio del Tonno in Taranto (Bernardini, 1989, 286).

A fragment of an Cypriot call III dichromate amphora[190] and another Cypriot fragment relevant to the Cypro-geometric phase, with a complex decoration, comes from the same site. These findings suggest an uninterrupted attendance of the site since the fourteenth century BC until the Phoenician urban settlement, indicating the Muru Mannu promontory as a first possible place of settlement (Bernardini 1989, 287-288). Similarly, however, the finding does not seem to be provided with any element which might facilitate a clear definition of its chronology. In order to cope with this issue, the following excavations in the Nuragic village identified a fully-fledged ceramic facies (Santoni 1985, 33-140). The "Muru Mannu facies" is an indicator of this pottery, is precisely the category of "ceramica nera, lustrata su entrambe le facce, che ricorre in diverse forme aperte come scodelle emisferiche con presine ellittiche, talora a labbro distinto internamente, scodelle troncoconiche, ciotole e tazze carenate con anse ad anello a margini concavi. Cominciano a comparire anche le conche troncoconiche con orlo ricurvo ingrossato in ceramiche rosate o beige con i segni della stecca sulla parete esterna e si diffondono le anfore (meno propriamente olle) a basso collo svasato,

[190] Identification numbers THT 82/4/13, THT 81/25/69, Cagliari Museum inventory number 87651.

le grandi olle panciute a labbro ingrossato con anse ad anello a margini concavi” (Ugas Lugliè Sebis 2000, 401-402). (ID 187)

3.15 Su Fraigu (San Sperate)

Between 1985 and 1986, during the construction of the km 16 overpass in trunk road 131, it was necessary to start an excavation campaign that brought to light a Nuragic tomb marked with T6, a sequence number of the necropolis of Su Fraigu, that is known today as "the tomb of the three hundred". The tomb is part of the in the hypogeal tradition as the tumulus seems to suggest, but its construction also reminds the megalithic rooms of the Nuragic tradition.

Figure 60. Tomb of Su Fraigu (Ugas 1993, 125, fig. LV.a).

It consists of a rectangular apse isle room with a median entasis, it is exedra-less and was dug in white limestone marl and covered with stones of the same material. The apse is characterized by the triangular slab placed as an orthostat. The tomb turned out to be of great interest because of the amount of osteological findings: the number of the buried, on the basis of the number of skulls found, amounted to 292, 158 or which were buried alone, while 134 accompanied their skeleton.

“Ci troviamo di fronte a una serie di episodi di mortalità collettiva, avvenuti nell'arco di 50 anni al massimo, determinati da cause che non sono molto chiare e che vanno spiegate. Tuttavia, la presenza di ben 58 adulti ed anziani contro 11 giovani, 10 adolescenti, 23 bimbi e 1 feto su 103 inumati, classificati per fasce d'età, secondo una prima stima, individua tassi di mortalità fisiologica

in contraddizione con eventi di morte collettiva per ragioni eccezionali quali, ad esempio, le cause belliche" (Ugas 1993, 111).

Layers	Materials	Description	Dept
I		Vegetal humus;	-0.00/-0.77
II	Unidentified vessels; fragment of a bronze plate with two holes	Cultural soil above and around the apse, and stones removed from the wall structure while sowing, various rock types (marl, basalt, sandstone)	-0.78/-1.04
III	Cup, thicker lipped jar and triang. section; bronze foil fragment	evidence of buried items with few cultural elements;	-1.05/-1.36
IV	Big bowl. Enlarged and rounded brim. Glass paste necklace decorations; bronze circular armlet	depositions of buried;	-1.37/-1.62
IV A	Unidentified vessels	depositions of the buried;	-1.63/-1.74
IV B	Unidentified vessels, shouldered cups and pointed brim.	depositions of the buried with frequent cultural elements;	-1.75/-1.80
IV C	Unidentified vessels, large bowl (?) Part of the circular handle; glass paste necklace decoration	depositions of the buried	-1.81/-1.90
IV D	Dome large bowl, cup; olivine seal; knife point fragment with flat blade, necklace with 93 beads; bronze foil frag.	Id.	-1.91/-2.00
IV E	Careened mug, jar, cup, neck vase, bronze foil fragment;	Id.	-2.01-2.10
V	Bowl, cup, amphora, all of which probably slate-gray; necklace with 43 beads plus glass paste decorations; bronze foil fragment; bronze armlet	Id.	-2.11/-2.20
VA	Bowl, neck vase, 3 necklaces, one with 50 beads, several decorations still to be classified	Id.	-2.21/-2.30
VI	Necklace with 588 beads, 505 of which unbroken and 83 fragmented, 10 amber elements (barrel decorations and fragmented pearls)	Id.	-2.30/-2.40

Table 17. Su Fraigu. Synoptic table on the findings, their layers and other archaeological information.

The tomb is a remarkable example of Nuragic burial practice, useful to understand the social features of Nuragic communities. This one displays an important element of great interest for this

research: the olivine seal[191] . Indeed, the necklace or faïence decorations seem to be common in the graves[192], although the green and blue globular glass beads, the rollers and the typical St. Cosimo's segmented beads are not found here. On the other hand, smaller black, white and green lenticular and disc beads (1.5 mm in diameter) are mainly used here (Ugas 1993, 114); what has been regarded as an olivine seal remains, so far, a unicum. Its shape is cylindrical, with a 2.9 cm longitudinal hole (1.1 cm in diameter), where a faded, unclear image is engraved. Many open questions remain about the olivine's seal. The interpretation of the scene is very difficult, but Ugas wrote that the positive impression reflects two human figures one in front of the other. He identifies a sacred representation of the birth of a child with the mother, and another figure kneeling besides.

Figure 61. Olivine seal (Ugas 1993, 127, fig. LIX.c)

He hypothesizes an eastern import and the following comparison: "Sigilli cilindrici in steatite, materiale apparentemente simile all' olivina, ritenuti di produzione mitannica, vicini al nostro esemplare sul piano tipologico-dimensionale e qualche affinità sul piano stilistico, sono stati rinvenuti ad Ebla e a Ugarit e datati tra il 1450 e il 1300 a.c. […] File di globetti come quelli del cilindro di Su Fraigu, appaiono in sigilli di Nuzi, attribuiti anch'essi ad ambito mitannico-hurrita e riferiti alla 2° metà del XV secolo […] risentono del gusto figurativo miceneo e cretese del XV-XIII secolo. Soprattutto colpisce la "vita sottile" delle due figure viste di profilo. Verrebbe da pensare che il sigillo sia stato prodotto a Creta, dove in questo periodo troviamo sigilli cilindrici in calcedonio" (Ugas 1987b, 113). Its uniqueness was confirmed by a subsequent analysis by

[191] There are not informations about analysis of the seal's material.

[192] Not all vague necklace can be with a sure Aegean provenence. Nor we have certainty about their material (glass paste, faïence, semiprecious stones?). The absence of more detailed analysis after the first publications and the frequent lack of access to materials not help to gain more information on the few published excavation data.

Dominique Collon who regarded the piece as a seal, similar to others from the Near East and Cyprus, even if no precise comparison was available, but, because of its fading, it is very difficult to understand which images are represented (Lo Schiavo 2005, 21). The finding is the westernmost discovery of this kind of remains and, if it were to be confirmed as being from Cyprus, it would imply a number of interesting elements, also in additions to the wishbone handle found near the village of St. Sperate, between via San Sebastiano and via Giardino, where traces of a settlement were found (Ugas 1993, 38, Xd; Lo Schiavo 2005, 15).

3.16 Perda ‘e Accuzzai (Villa San Pietro)

The megalithic tomb is located in the municipality of Villa San Pietro, on the border of the Sarroch territory, in the Perda 'e Accuzzai area, after which it is named. The latest list of Sardinian sites where Mycenaean-Aegean pieces were found does not include or mention this site among those where Mycenaean remains have been found (Lo Schiavo 2009), but it is referred to several times in the collection of glass decorations, which, just like in San Cosimo di Gonnosfanadiga, were compared to Aegean elements. In an attempt to provide a comprehensive scientific framework, it seems fair to report the analysis of the site and its findings, since glass elements are not regarded as being peculiar in the Nuragic tradition and, in this case, they are not provided with much more information than the rest of the contexts which are known to include Mycenaean remains.

The tomb hosted two excavation campaigns between 1982 and 1983. Again, clandestine excavations scourged and destroyed the site, fortunately limiting the damage to a three-meter-long break in the eight-meter-long tomb chamber. The tomb, while similar in its structural features to the traditional Tombs of the Giants, it differs on several points, such as the lack of an exedra and its almost complete hypogeum.

Two occupational phases were identified inside the tomb: “uno strato di terreno sciolto, frammisto a pietre di crollo di struttura [...] dove erano frequenti i materiali di età storica, sempre frammentari; un secondo strato di terreno rossiccio, compatto che occupava lo spessore residuo fino al pavimento, dove si sono, invece, rinvenuti materiali di età preistorica. In particolare, presso la parte destra della tomba, si sono rinvenuti due grossi vasi d’impasto, schiacciati sulle lastre pavimentali. Questo secondo strato ha restituito, inoltre, numerosi vaghi di collana in pasta vitrea, vetro e ambra” (Cocco – Usai 1992, 187).

The necklace decorations were compared with those found in San Cosimo's tomb, and also with those found in the XIV century Su Fraigu's tomb - San Sperate (Ugas 1987, 85; 123; Ugas 1987a, 118-119) and others found at Nuraghe Beppe Gallu in Uri, inside the Motrox 'e Bois grave in Usellus, and at Sa Sedda 'e sos Carros in Oliena (Cocco - Usai 1992, 191). As far as a large blue

spherical shape pearl is concerned, a blue cylindrical decoration and a necklace decoration consisting of light vertical lines, comparisons with findings "outside the island territory" are suggested, in particular with “la collana rinvenuta in associazione a materiali ceramici del Miceneo III A 2 nel villaggio della Portella di Salina che il Bernabò Brea e il Tusa considerano di importazione micenea, nonché nelle collane della necropoli di Plemmirion, considerate ugualmente di origine orientale” (Cocco Usai 1992, 191).

The elements of Perda 'e Accuzzai are also to be taken into account, with reference to the water-green "rosette" perforated element, characterized by a plano-convex section and radial grooves which radiate from a central hole (similar to the ID 141 piece found in Tower F at Nuraghe Antigori), and also with reference to the Nuragic pottery found in the tomb, which may facilitate its dating: thickened rim jars which are similar to the pottery found at Nuraghe Antigori (Coco - Usai 1992, 192, tab. III, 198, tab. IV.2, 199).

3.17 Orosei

The findings retrieved in Orosei d not seem to have a context of discovery. Their origin from the area of Orosei was announced after several surveys carried out by the Archaeological Superintendence of the Provinces of Sassari and Nuoro, but not much information could be confirmed about them. Most probably, the fragments were the remains of illegal excavations in an area near Orosei, known as "Sos Muros". However, surveys did not provide useful information. Sos Muros includes a basaltic plateau of about two hectares where the ruins of a basalt-block Nuragic village could be found. The man-made damage, the use of that particular field as grazing land, the use of heavy machinery to break into the village, resulted in the removal of a large amount of stones from the village, making it impossible to assess its original size, "perciò non esiste il benché minimo indizio che consenta di affermare né di negare la provenienza di frammenti micenei da questo sito. Si può invece escludere senz’altro la possibilità di localizzare il punto esatto del rinvenimento senza che esso venga indicato con precisione dagli stessi autori dello scavo clandestino” (Lo Schiavo 1979, 3). Six fragments were studied and analysed (Lo Schiavo 1979, 5).

The ID 180 is a fragment of the crater (FT 281 or FT 282) with a thickened and everted rim. It has a cream-coloured engobe coating and brown paint decoration. The decoration consists of a band that runs along the hem, both on the outside of the vessel and on the inside surface. Also a pattern of concentric semicircles and a stylised iris flower (FM 10.A 6) were used during the LH IIIA: 2 and LH IIIB; taking into account both decorations, Fulvia Lo Schiavo offers a comparison with a vase found in the Acropolis of Mycenae (Lo Schiavo 1979, 6). The fragment of a vertical rod-shaped oval-section loop may be connected to that piece. The ID 181 is a small fragment of an open vessel.

The pictorial decoration consists of a horizontal band on the outer surface and two thinner stripes similar to the semi-circle decorations, of the same colour of the entire inner surface. The ID 182 is a small fragment of well purified clay wall, yellowish in colour, with a curved decoration on the outer surface. The ID 183 is a fragment of a vase of unclear shape, brown on both the inner and outer surface, made of well purified clay, very light in colour, almost yellow. Finally, the ID 184 is the fragment of a flattened oval-section loop made of very purified clay. Along with the above-mentioned six fragments, also achromatic polished figulini fragments were delivered, which may be of Mycenaean origin. Nonetheless, without a proper context and other useful elements, their history may not be reconstructed, and have therefore a very low historic value.

Archaeometry proved to be very important for their analysis but not enough to make up for the absence of contextual information. Thirteen fragments were analysed; they were proved to be of Helladic origin (Jones – Day 1987, 267), and in particular, they "should be assigned to the north-eastern Pelopponnese, owing to the similarity of their compositions with a reference group of LH IIIB decorated pottery from Mycenae" (Jones – Day 1987, 258).

3.18 Sulky (Sant'Antioco)

The first Mycenaean fragments were officially displayed in Sant'Antioco in 2006, when Piero Bartoloni published the fragments of a small closed container found during the 2005 excavations and that "si può collocare nel Miceneo III C2, oggi sappiamo che il sito nuragico di Sulky era frequentato da navigatori stranieri anche in epoca precedente all'arrivo dei Fenici" (Bartoloni 2006, 1601). The three tiny fragments (ID 193) belong to the same vessel and Bartoloni suggests that there is a chance that they are of Philistine origin, and therefore, that they belong to a cylindrical bottle, or a horn-shaped vessel or a gourd-shaped jar, commonly used during the XI century B.C. (Bartoloni 2006, 1601). The context of discovery is not useful to reconstruct the history of the fragments; it is indeed difficult to do so, due to the presence of fragments dating back to the imperial age. All three fragments may indeed be of Mycenaean origin, although their Helladic importation could only be proved through the analysis of their clay materials. They presence could be the proof that the Aegean peoples might have reached the region before the Phoenician colonization, of which Sulky is the most ancient urban example, not only in Sardinia, but in the whole Western Mediterranean Sea. The discovery of different Nuragic pieces of pottery at the Sulky site, confirms a prior significant Nuragic presence, that was crucial for the following Phoenician colonization. Just like in the sites of Nora and Tharros, there may have been an

encounter between the Aegean and the Nuragic cultures[193]. This seems to be confirmed by a new acquisition: the discovery of a carenated wall fragment (inventory excavation number RS 372), found during the 2008 excavation campaign in Sector IV of the Sulky long-stay hospital.

The piece (ID 179) is a tiny figulina clay fragment, belonging to a closed shape vessel, displaying a residual 90° shoulder fragment. On the inner surface, lathe marks may be found; on the outside a very light, whitish engobe coating is decorate with parallel horizontal stripes. Closed shape fragment. On the inside surface, turning marks may be found; on the outside surface, a whitish shiny coating may be appreciated (10YR 8/3 *very pale brown*), characterised by some uneven strokes of paintbrush, ranging from reddish to brown (2.5 YR 3/4 *dark reddish brown*, 2.5 YR 3/6 *dark red*, 2.5 YR 5/8 *red*). Highly purified dough, with tiny mica inclusions; very fine and compact clay, of homogeneous colour (5 YR 6/6 *reddish yellow*). The outer surface paint is partly scraped off, especially on the lower part. The extremely small size made it difficult to understand the orientation of the fragment, but it seems to belong to an angular alabastron. The fragment immediately reminds of the jar fragment found at the Forum of Nora (ID 170). The US where it was found (No. 3280) also included remains of the Roman Republican age and it is still difficult to fully interpret, due to the number of later modifications, making it impossible to clearly frame its context, apart from a small store where an accumulation of ceramic material could be found, with a yellow-gray coloured matrix (Pompianu 2012, cds.; Pompianu-Soro 2012, cds.). The RS 372 item is the forth Mycenaean alabastron fragment found in Sardinia, after the alabastron found at Orroli's Nuraghe Arrubiu, the fragment retrieved at the Forum of Nora and probably the fragment found in the Is Lais a Tratalias fields[194].

The *alabastron* is a common pottery item in Mycenaean exportation. From the early stages of the Late Helladic age, at Greek continental level, it is considered one of the most common Mycenaean vessels, both in household and funerary contexts[195]. From the LH IIA period on, it became very common. Between LH IIIB and LH IIIC, although its presence was confirmed only in the middle of the LH IIB period, it became less and less common; in LH IIIC, it ended up acquiring the shape and size of an *amphoriskoi*[196].

[193] Archaeological investigations have shown that the former Nuragic settlement was located on the hill currently towered by the Sardinian-Piedmontese fort, upstream on the same hill where the long-stay hospital site now stands (Pompianu Soro 2012, 38)

[194] Probability, all the above-mentioned fragments , apart from the Nuraghe Arrubiu finding that may be fully reconstructed, belonged to angular alabastron vessels.

[195] For a statistical framework at continental level, among the settlements and the burial grounds, see Poduzweit 2007, page 178.

[196] Alberti 1999, 172, but above all, Poduzweit 2007, 177-178.

For example, within the Eastern imports, it seems to have been a very common household vessel[197], but there are also examples in funerary contexts[198]. In Cyprus, it could be found both in funerary and household contexts[199], while in Crete, where it arrived only after the vessel appeared on the continental areas, it seemed so be connected to the use of Mycenaean funerary habits, starting from the LMII period on (Alberti 1999, 174). Interestingly, with reference to the Central-Western Mediterranean, in mainland Italy and Sicily, several alabastra fragments have been found in both domestic and funerary contexts. Examples of the 94 FT type were found in some Apulian sites: one in Santa Maria del Buonconsiglio (Bari), two in Scoglio del Tonno (Taranto) and one – most likely – in Coppa Nevigata near Manfredonia, in province of Foggia (Bettelli 2002**,** 56). Two other fragments were found in Calabria: one in Broglio di Trebisacce and probably one in Torre Mordillo, in the province of Cosenza (Bettelli 2002**,** 56). Some fragments come from funerary contexts, such as a shard from a burial mound in Torre S. Sabina near Carovigno (Bari) and the necropolis of Thapsos (Taylour 1958, 19 , nr. 15-18) and Floridia in Sicily (Taylour 1958, 61; Lo Schiavo - Vagnetti 1993, 138). Other examples of alabastron, of different shapes (FT 81/82), come from, for example, Capo Graziano 2 at the Acropolis of Lipari, from the site of Punta d'Alaca near Vivara, and a "eckiges alabastron" from Rocavecchia in Apulia (Jung 2006, 62; 90; 96).

To better understand the nature of this type of importation to Sardinia, the context of discovery does not seem to play a fundamental role, since it has always been secondary, except in the case of Orroli's Nuraghe Arrubiu. An alabastron-type vessel is regarded as a special small specimen, that over the years, has been the studied thoroughly in terms of use and function. As far as Sardinia is concerned, the Sulcis small fragment seems to belong to a type of imported alabastron dating back to the same period. Such result raises an incredible number of questions in relation to the potential and actual content of this particular type of pottery. As far as the exchange and use of pottery items are concerned, the content thereof is an essential piece of information.[200]

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[197] For example, two *alabastra* (FT94) were found inside the *Maison C* of the *Centre Ville* of Ugarit Ivi., page 47, Ibidem, p. 59; one inside the House 6225 of the C area of Hazor, Ibidem, page 90. Hazor also wrote that "only stright sided *alabastra*, a type frequent in settlement contexts as well, are present in more than one funerary context" (Van Wijngaarden 2002, 93).

[198] The Tomb 912, found in the south-east of Megiddo, hosted a Mycenaean pottery set consisting of five stirrup jars, a transport stirrup jar and a straight-walled alabastron, all dating back to LHIIIA-LHIIIB, (Van Wijngaarden 2002, 123).

[199] For Cypriot funerary contexts, see, for example, the angular alabastra found at the Kition Grave 4/5, 9 (VAN WIJNGAARDEN 2002, 184), but above all the pieces of Tomb 6 of the Kalavassos-Agios Dhimitrios site (South Russell Schuster Keswani 1989, 111, note 59 k-AD 248; K-AD 249) which seemed to be very similar to the Sulcis piece. For reference to the Cypriot houses, see a fragment found in Area III, Room I, IIB foundation level, regarded a "fragment of jar" by Dikaios (Dikaios 1971, 51 and 567, Nr. 2762/3 Tav. 67,10), that through graphic reconstruction, Reinhard Jung classified as a LE IIIB FT 94 angular *alabastron* (R. Jung's personal communication).

[200] Poduzweit speculates that it's logical to assume that their content is the key to understand exportation, especially due to the presence of containers throughout the Mediterranean and that perhaps their small number in several Mycenae complexes depends on the need to export their contents. As a result, he wonders whether it might be interesting to investigate if the Mycenaean centers were specialised in long-distance trade (PODUZWEIT 2007, page 179)

For example, should the hypothesis of an intentional breaking of the alabastron vessel at Nuraghe Arrubiu during the setting up of the Nuragic structure[201] be confirmed, it might be useful to assess whether such breaking was functional to, i.e. the shedding of its content and which importance it had.

Knowing the connection between the content (or the contents) of a particular type of vessel, the perspective of the relations between the local Nuragic and the Mycenaean cultures would change. Similarly, it might be useful to understand whether the discovery of alabastron fragments or other types of vessel, in some areas of the island, was linked to some kinds of ritual, possibly connected to the presence of new Aegean peoples, or to a simple exchange of exotic products. It might finally be useful to recognize certain shapes of pottery as indicators of specific perishable goods. Knowing which goods the vessels carried could be fundamental to understand their exchange: for example, the trade of noble metals which the Aegean peoples regularly imported to Sardinia prove the island to be a preferential destination in the Western Mediterranean region.

[201] F. LO SCHIAVO – L. VAGNETTI 1993 quot., pages 139 ss.; T. COSSU, *Analisi della dispersione dei frammenti del recipiente: il caso dell'Alabastron miceneo*: T. COSSU *et alii*, La vita nel Nuraghe Arrubiu, Orroli 2003, page 34.

4 Outside Sardinia: Nuragic findings in Crete and in Cyprus

Evidence of mobility, contacts and exchanges during the Bronze Age has been confirmed in several locations of the Mediterranean basin, where Nuragic pottery has been found.

The findings of Nuragic pottery in Cannatello (Sicily) and in Lipari (Aeolian Islands) are isolated cases across the Italian peninsula, where proto-historic pottery has not been found yet. Therefore, exchange between Sardinia and the peninsula does not seem to have occurred. On the other hand, the discovery and recognition of "slate gray" Nuragic pottery at the Kommos site is an irrefutable piece of evidence of the mutual exchange between Nuragic Sardinia and the Aegean-Mycenaean world. It also serves as the basis for new hypotheses on the directional models that governed trade and exchange. Similarly, the latest discovery of pottery at the Nuragic Pila Kokkinokremos site (Cyprus) is a significant proof of the interaction between the Western and Eastern Mediterranean region (Karagheorghis 2011, 87-94).

In 1989, V. Watrous published a preliminary paper on the analysis of the materials found at the site of Kommos in Crete to inform the scientific community of the possible discovery of Italian pottery. However, in 1985, there had already been a report on the discovery of two pieces of Italian pottery that could be dated back to the LMIIIA:1 period, "the first is a wheel-made grey ware whose fabric is usually quite fine, light grey in colour and burnished. The second is brown impasto ware which is always coarse and usually black or dark grey, although it can be various shades of brown or even red" (Watrous 1985).

4.1 Kommos

Kommos is a coastal site on a low hill overlooking the shores of the Libyan Sea: to the west, it borders the Mesara plain, the largest of the island of Crete, that includes some of the most important centres of Minoan Crete, such as Phaistosmynian. Archaeological excavations on the western borders of Mesara were sporadic and less extensive. Kommos, together with the late Minoan Aghia Triada complex, is however an exception (Shaw -Shaw 1995, 3).

The first surveys in the area southwest of Geropotamos were carried out by Antonio Taramelli, who had found fragments of Kamares pottery, dating back to the MM, south of Tymbaki. His discovery suggested that the most probable location of the Phaistos harbour would possibly be a bit south from there. Similarly, he suggested that the remains of Menelaus' ship could be located on the Cape Nisos cliffs, south of Kommos (Taramelli 1899, 296). In 1923, Taramelli's hypothesis drew Arthur

Evans' attention, who suggested that the so-called Bronze Age "Customs House" could be found there (Shaw - Shaw 1995, 8).

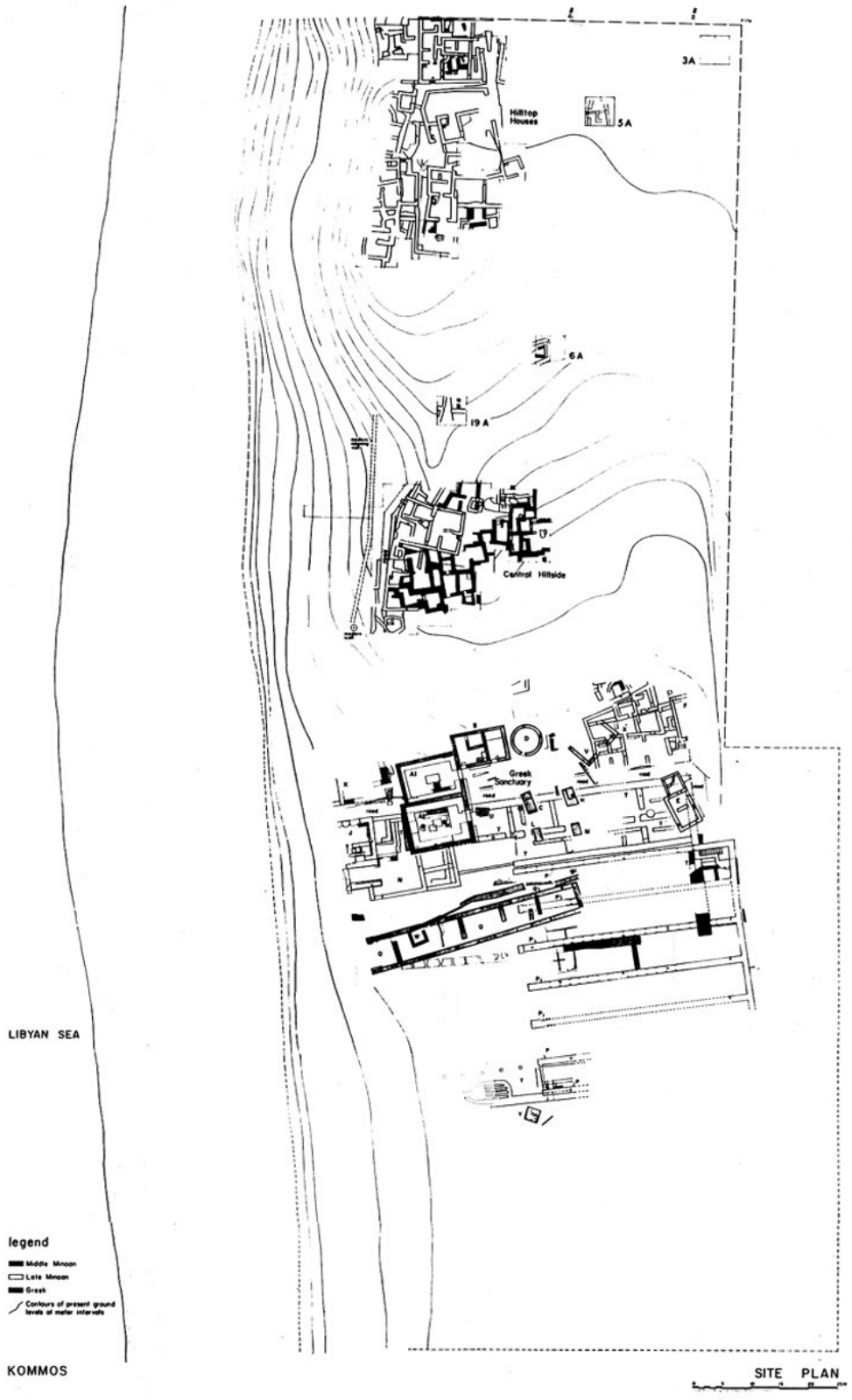

Figure 62. Plan of the Minoan Harbor in Kòmmos (http://www.fineart.utoronto.ca/kommos/graphics/kommosJPEGs/mapsSites/SIPLANM.jpg).

Later excavations followed those lines of action, indeed confirming the presence of a large port with monumental structures, huge storage buildings, a Minoan city and a Greek sanctuary, that would be used until the Roman period.

The remains of the Minoan city are scattered across the hill to the north and the hill to the south. The governmental main building of the Minoan urban sites is locate in the south, where the later Greek shrine was constructed on its ruins.

The town of Kommos was built in the early MM IB-II (Prototopalatial period) on top of the hill where the big AA governmental building used to stand, and was then destroyed, most probably, by an earthquake at the end of the same period. The houses built over the remains of MMIB-II date back to the MMIII period and were probably replaced with the LMI courtyard. On the southern slopes, the houses are two-storeyed and, precisely in room 48, the most ancient imported piece (a jug) was found, proving that trade had indeed occurred from Cyprus to Crete, similar to the Kamares-style rhyton.

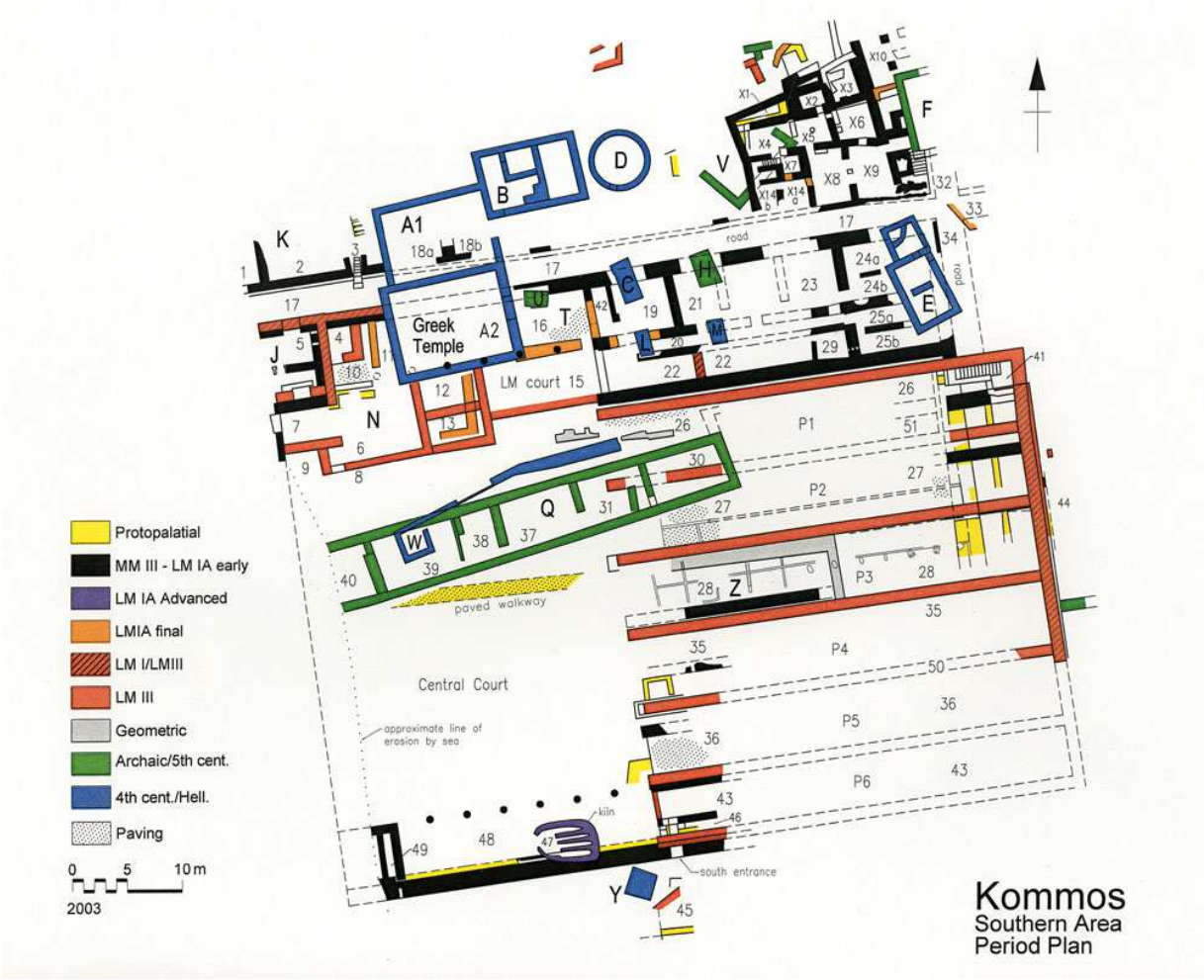

Figure 63. Kommos Southern Area Period Plan
http://www.fineart.utoronto.ca/kommos/graphics/kommosJPEGs/mapsSites/SOUTHAREAPLANM.jpg

Houses had all been occupied since their construction in the early MMIII, at the beginning of the LMI period until they were abandoned in the LMIIIB period, around 1200 a. C.

Houses were built in the central part of the hill. The biggest house is located here, on the ruins of the MM households and it dates back to the LM I period. It is known by the name of "House with the snake tube", because of a peculiar ceramic artefact found in room 4, that is typical of the period when the house was last used. It consists of a conical shape structure with wavy loops, which possibly had a religious value. Further south another equally important building may be found, known by the name of "House X", where the discovery of a well-stratified layer of pottery in combination with bronze finds allowed the confirmation of the chronology suggested for the Kommos site and divided into the following stages: LMI, II, IIIA1, IIIA2 and IIIB.

The largest settlement is located in the southern area, where monumental Minoan buildings are located, south of a road that cross the area East to West. This area is characterized by two opposing *stoà*, which overlook a central stone-paved courtyard, which are 39m (N-S) and 29m (E-W) long each, in the shape of a "T". The monumental building P is located here, characterized by ten long rectangular corridors (or galleries), which depart from the courtyard, a *unicum* in the palatial Minoan architecture, and the rectangular-shaped monumental building N with rooms attached to the East and the West.

4.2 Nuragic pottery at Kommos (Crete)

During the excavations between 1976 and 1983, about fifty vessels coming from the central Mediterranean area were found. Most of the vessels were slurry potsherds, "handmade, slipped and well burnished". Once examined, several similarities were found with the sherdsXIV discovered in Antigori and Sa Domo ‘e s’orku, especially with "*the collared jars, dolii, bowls*". Importantly, many of these vessels were found in very clear stratigraphic contexts, along with other Minoan and Mycenaean vessels, thus providing a fairly narrow chronological range (Watrous - Day – Jones 1998, 337). The macroscopic analysis of the pottery lead to the identification of two groups: “impasto and gray ware. Impasto ware vessels are handmade, lipped, and well-burnished [...].The colour of the clay is usually dark, with variety of shades of black, brown (10 YR 5/3), gray (10 YR 4/1) and occasionally red (2.5 YR 6/6). Inclusions are numerous, including sand, dark grit, and mica. […] Three vases at Kommos are of wheel-made gray ware. They are produced in a fine, light gray clay (5YR 5/1) which is well burnished” (Watrous 1992, 163-164). Some fragments were petrographically analysed and also examined through AAS (Atomic Absorption Spectrophotometry) by the Fitch Laboratory of Athens, in order to verify the origin of the clays and

to confirm the comparisons during the first analysis. Both analyses confirmed that "the majority of samples do not have their origin in Crete or the broader Aegean Area, but are likely to have been imported from the West Central Mediterranean, probably Sardinia, where there is good fit with geology and petrographic and chemical reference groups" (Watrous - Day – Jones 1998, 339).

The examination of the scientific literature on the Nuragic pottery found in Kommos shows that a minimal set of fragments coming from the top of the hill, from some of the rooms of the houses, while most of the finds come from Building N in the southern area. "There was a generous distribution of intact vessels on N's floors on the northwest, presumably left when the building was abandoned, consisting of LMIIIB cups, pithoi and pithoid jars, ladles, and basins scattered inside the building and outside in the court. Both here and in the dump south of the court, wares from Sardinia testify to the internationalism of the era"(Shaw 2006, 37). Among the Nuragic pottery finds discovered in Kommos, both closed and open vessels were found.

Among the closed ones:

- the *collared jars* or "vasi a collo/colletto" (8 pieces), along with larger containers, such as *dolii* or *pithoi* (2 pieces),
- the *jugs or "brocche"*, in small quantities though (2 pieces);

Among the open ones:

- the *bowls* and the *cups* (12 pieces)[202].

An analysis of the discovery of Kommos Nuragic pottery highlighted some issues of particular interest: the presence of slate-gray pottery outside the island, and the definition of the brief historical context that the Nuragic pottery found makes reference to (in addition to the Mycenaean and Minoan findings): Sardinia's Late Bronze Age . The presence of Nuragic pottery in Kommos seems to confirm the city's maritime vocation, although "*the duration of the trading relationship with Kommos limited to the LM IIIB period, that is, the thirteenth century B.C.*" (Rutter 2006, 860).

It is clear that the archaeological subject analysed here is very complex because of the different elements involved and that the pottery findings alone only testify exchange activities.

[202] These findings probably are *slate gray vessels*.

IDKommos	DEPOSIT	DESCRIPTION OF DEPOSIT	Excavation number	Bibliographic source: *Kommos* III, *L. V. Watrous* 1992	Bibliographic source: *Kommos* V, *J. B. Rutter* 2006	CHRON. Context
1	62	Rubble above deposit 62	C1520	1037 Bowl with thickened rim Pl. 53, Fig. 75 (P.164)		LM III A2
2	/		C3199	1339 Cup or Bowl. Pl.56., Fig. 73 (P.166)	60/35 Lipless bowl.Pl. 3.73 (P. 547)	LM III A2 - B
3	77	Southern Area, Court East of Building J, (Bulding N)	C2928	1338 Large Pithos, Pl. 51 (P.168)	59/21 Pithos (Dolium). Pl. 3.69 (P.543)	LM III A2 - B
4	78	Southern Area, Building J, Upper Floor	C6552	1363 Collared Jar (P.165)	59/22. Jar. Pl. 3.69 (P.543)	LM III A2 - B
5	78	Southern Area, Building J, Upper Floor	C6553	1364 Cup or bowl Pl.. 56 (P.165)	59/23. Lipless bowl. Pl. 3.69 (P. 543)	LM III A2 - B
6	83	Hilltop, Room 3	C157	1540 Collared Jar Pl.57 (P.165), Fig. 73 (P. 166)		LM III A2 - B
7	83	Hilltop, Room 3	C3310	1542 Dolium Fig.74 (P.165)		LM III A2 - B
8	98	Southern Area, Slope South of Building N	C6694	1753 Bowl Pl. 58, Fig. 74 (P.165)	78/33 Sloping lipped bowl. Pl. 3.86 (P. 575)	LM III A2 - B
9	98	Southern Area, Slope South of Building N	C6695	1754 Collared Jar Pl. 58 (P.165)	78/25 Collar necked Jar. Pl 3.86 (P.574)	LM III A2 - B
10	98	Southern Area, Slope South of Building N	C6696	1755 Large collared Jar Pl. 58 (P. 165-166)	78/27 Collar necked Jar. Pl 3.86 (P.574)	LM III A2 - B
11	98	Southern Area, Slope South of Building N	C6698	1756 Cup, Pl. 58, Fig.73 (P. 166)	78/30 Lipless bowl. Pl. 3.86 (P.575)	LM III A2 - B
12	98	Southern Area, Slope South of Building N	C6702	1757 Bowl. Pl 58 (P. 166)	78/35 Bowl. Pl.3.86 (P.575)	LM III A2 - B
13	98	Southern Area, Slope South of Building N	C6738	1758 Jug, lower Body frag. Pl. 58 (P.167)	78/34Bowl. Pl.3.86 (P.575)	LM III A2 -B
14	98	Southern Area, Slope South of Building N	C6715	1759 Collared Jar, Pl. 58 (P. 166)	78/26 Collar necked Jar. Pl 3.86 (P.574)	LM III A2 - B
15	98	Southern Area, Slope South of Building N	C6717	1760 Dolium, Pl. 58, Fig.73 (P. 166)	78/28 Swollen-lipped jar (dolio) Pl. 3.86 (P.575)	LM III A2 - B
16	98	Southern Area, Slope South of Building N	C6710	1761 Bowl, Pl. 58, fig 74 (P. 166)	78/32 Lipless bowl. Pl. 3.86 (P.575)	LM III A2 - B
17	/	Surface level in area of Room 3, House of the snake tube.	C469	1968 Bowl with thickened rim, Pl. 58, Fig. 73 (P. 166)		LM III A2 - B
18	/	Southern Area, South of the Classical temple	C4130	1969 Bowl with thickened rim, Pl. 58 (P. 166)	65/2. Sloping-lipped bowl. Pl. 3.75 (P.550)	LM III A2 - B
19	82	Hilltop, Court 2	C847	1423 Collared Jar, Pl. 53, Fig. 75 (P. 166)		LM III B
20	82	Hilltop, Court 2	C863	1424 Bowl with thickened rim, Pl. 57, fig.74 (P. 167)		LM III B
21	82	Hilltop, Court 2	C5348	1426 Large collared Jar, Pl. 57, fig. 76 (P. 167)		LM III B
22	84	Hilltop, Room 14 b	C731/ C10832	1561 Cup (?), Pl. 58, Fig. 75 (P.167)	40/38. Lipless bowl. Pl. 3.46 (P. 461)	LM III B
23		East of the North House	C5592	1970 Collared Jar Pl. 56 (P.167)		LM III B
24		Southern Area, South of Building N	C6718	1971 Jug Pl. 58, Fig. 75 (P. 167)	78/29 Round - mouthed jug. (P.575)	LM III B
25		Southern Area, South of Building N	C6904	1973 Bowl, Pl. 58, Fig. 74 (P. 168)	78/31 Lipless bowl. Pl.3.86 (P.575)	LM III B

Table 18. ***Synopsis of the Nuragic pottery found at Kommos***

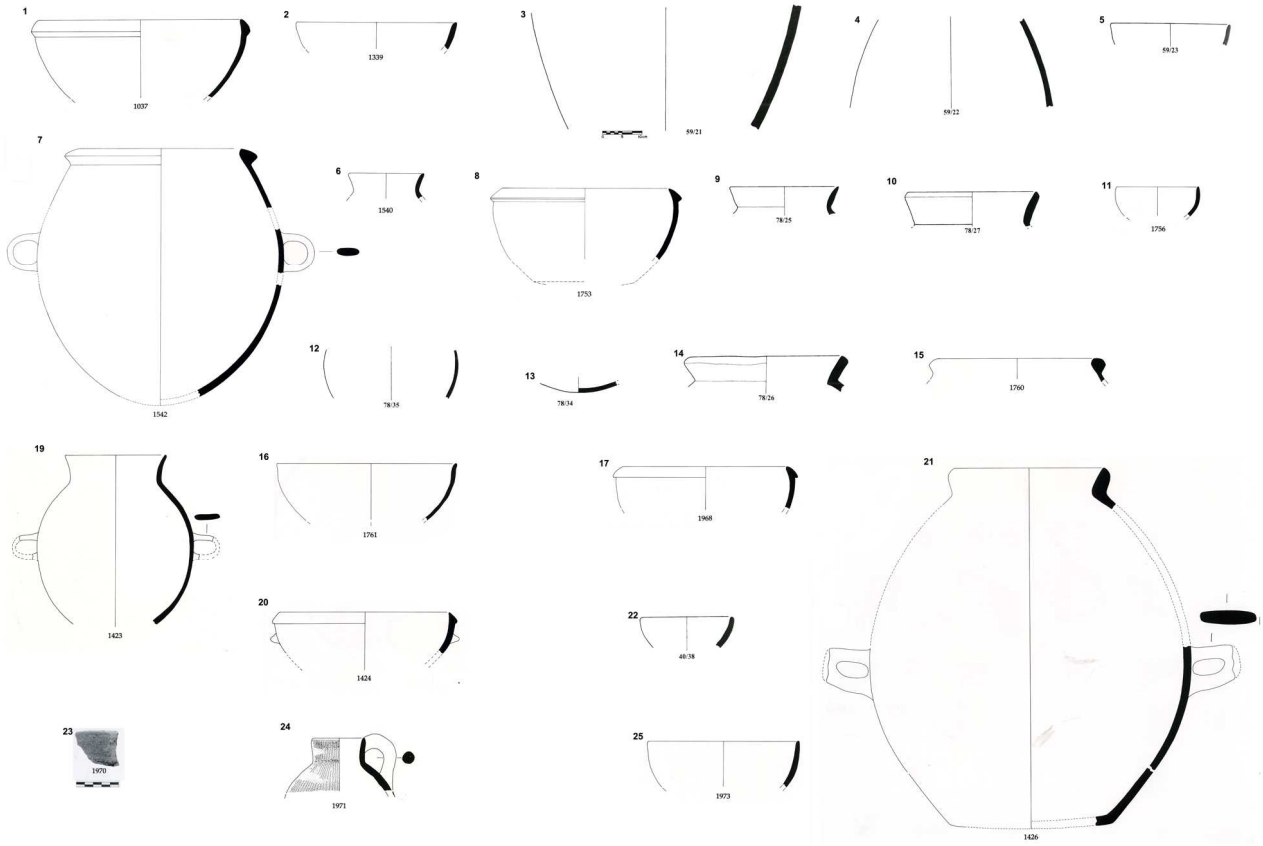

Figure 64. Nuragic Pottery from Kommos (the bibliographic references are in synoptic table)

4.3 Nuragic pottery at Pyla Kokkinokremos (Cyprus)

The international symposium "On coking pots, drinking cups, loomweights and ethnicity in Bronze Age Cyprus and neighbouring regions", held in Nicosia, on the 6th and 7th of November 2010, witnesses the presentation of one of the most important discoveries of recent times: a Nuragic vase found at the Pyla Kokkinokremos site in Cyprus.

The Pyla Kokkinokremos site lies on a rocky plateau at about 800 m from the coast, north of Larnaca Bay. Dating back to 1200 B.C., it did not last much and was identified by excavator Vassos Karageorghis as a new site founded by refugees from Cyprus and the Aegean Sea (also from Crete), during the period of turmoil and uncertainty between the island of Cyprus and the East Mediterranean Sea. It was first investigated during the 1952 excavation campaign, then in 1981 and 1982 (Karageorghis Demas 1984) and finally, during the spring of 2010, that brought to light the Nuragic findings. The site is characterized by the discovery of a large amount of painted food containers dating back to the Late Minoan IIIB period (amphor-shaped pithoi and stirrup jars) and cult tripods decorated with relief horns: this suggested that Karageorghis site has been occupied by a group of Minoan immigrants (Karageorghis 2011, 89).

Figure 65. Nuragic vase from Pyla Kokkinokemos (Hermon 2011, 98, fig.1 ; Id.,100, fig.5; Karagheorgis 2011, 94, fig. 2).

In a room of one of the houses, several vessels were found, including a LHIIIB three-handled jar (FS36) and a Cypriot imitation of this vessel, both decorated with abstract motifs. Along with these vessels “several fragments of large plain ware storage jars and fragments of a more or less complete vase of Handmade Burnished Ware” were found (Karageorghis 2011, 89).

The HBW fragments refer to a Nuragic vessel, the "surface [of which is] slightly mottled, grey to brown in colour; the clay is light brown inside and outside, with dark grey to black core. […] It has an ovoid body with short collar neck slightly widening upwards, two opposed handles on the shoulder and a flat to flattened base” (Karageorghis 2011, 89).

The neutron activation analysis conducted on the clays seemed to confirm that the vessels were manufactured in Sardinia, on the basis of the comparisons of the samples and the analyses performed on the pottery vessels found in Antigori and Kommos (Fragnoli Levi-2011, 101). The vessel, that had already been broken, had two lead fixing plaques on the outer and inner sides. The lead isotopes analysis, conducted through "thermal ionisation multicollector magnetic sector mass spectometry", confirmed that lead is of Sardinian origin and possibly came from a Cambrian deposit, probably located in the South West of Sardinia, in the territory of Iglesias (Gale 2011, 107). The shape of the vase seems to be compatible to an urn with reverse hairpin-shaped handles located on the major curve of its body. The vessel, albeit fragmentary, has been restored thanks to the contribution of a 3D-virtual application, that calculated that its size was approximately equal to 40 cm in height and between 16.5 and 17.5 cm in brim diameter (Hermon et al 2011, 97). Based on this reconstruction, Karageorghis compared it with the short cylindrical necked dolii found in the acropolis of Lipari (the dimensions of which are not available) and their hairpin-shaped handles. Similarly, a comparison with the bronze vase found in Mura Pizzinna near Bonorva was suggested (Karageorghis 2011, 89). The reverse hairpin-shaped handles are typical of the First Final Bronze Age, being used during that period for the first time (Depalmas 2009, 143), while continuing to be used throughout the Bronze Age and during the Early Iron Age. The three-dimensional reconstruction of the vase seems to provide an excessively rounded and bulging shape, making it difficult to perceive the roughness that is typical of the hand-made pottery findings, crafted without a lathe. This feature characterizes most of the Nuragic findings. The vessel seems to be more similar to a jar rather than a vase or a thin-necked jar. On the island, similarities are found, for example, with the thin-necked and reverse hairpin-shaped handled jars found near the Nuragic village of Palmavera (Moravetti 1992, p.109, fig. 103, No. 4-5), which date back to the Final Bronze Age. The bronze vase found in Bonorva, except the shape of its handles, does not seem to be very similar to the Pyla jar, due to the marked spreading neck; at the same time, similarities with the findings from the Acropolis of Lipari should be mentioned, as far as the shape of the handles is concerned. Indeed, on one hand, the body of the vase with its two handles reminds of the Eolian Acropolis samples and specimens in this wider section, such as the necked vase of hut 5 of the Adoni di Villanovatulo Nuragic village (Campus- Leonelli 2003, 150), or the Brunku Maduli of Gestingthorpe Nuraghe; the neck of the Pyla vase, less everted, is more similar to the jar found at the Nuraghe of Palmavera. A similar discovery reminds of the several Cypriot findings discovered in Sardinia and it paves the way for a new scientific discourse on the chronological phases around 1200 B.C.

4.4 The "Slate Grey" or "Nuragic Grey" pottery

As already mentioned in Chapter One, Ferrarese Ceruti identified the new and unique pottery class discovered during the excavations at the Nuraghe of Antigori, that was indeed named "slate grey"[203], or "grey ware pottery" (Lo Schiavo et al. 2000, 360); in order to avoid confusion with the grey pottery from the South of Italy, the "Nuragic Grey" label was used.

Several articles published by her students illustrated its main features that "consistono in un impasto di colore prevalentemente grigio, anche se non mancano esempi di impasti neri, bruni o addirittura nocciola, per lo più depurati o con inclusi di dimensioni minute, dall'ottima cottura che rende le pareti del recipiente tintinnanti alla percussione. Le superfici sono accuratamente lisciate e a volte lucidate, quasi sempre caratterizzate dal passaggio fitto della stecca, con colori che variano dal grigio monocromo al grigio bruno o bruno-nero, talvolta sfumanti nel nocciola; quando è presente, l'ingubbiatura non si distingue sempre con facilità" (Relli 1994, 41).

The book on Nuragic pottery reads: "Si annoverano in questo tipo di ceramica, forme aperte quali ad esempio le grandi conche, che hanno elementi peculiari sia nella forma, sia nelle dimensioni standardizzate: presentano un caratteristico orlo sagomato, più o meno rientrante, sottolineato all'esterno da risega più o meno accentuata e vasca emisferica; sono provvisti spesso di piccole anse verticali o di prese a lingua impostate sulla parete; hanno un diametro di 20 - 24 cm con un rapporto diametro-altezza di 2:1 costante. Altre caratteristiche importanti sono il tipo di impasto e il trattamento delle superfici: la ceramica è fine e depurata, prevalentemente di colore grigio, le superfici sono ben lisciate, a volte lucidate, alcuni esemplari sono fabbricati al tornio lento"(Campus - Leonelli 2000, 107). The collection also includes "scodelloni biansati con orlo ingrossato internamente con o senza anse ad anello schiacciato, ciotole carenate con pareti lievemente concave e piccola ansa ad imposte allargate, ciotole a corpo arrotondato con orlo ispessito a pollice all'interno e risega, olle ad orlo rientrante, ingrossato e sbiecato esternamente, vasi a colletto lievemente svasato, vasi a collo con corpo ovoidale biansato" (Depalmas 2009, 137).

The identification of this particular pottery class also contributed to the parcelization of the Sardinian Bronze Age into different *facies*. The peculiarity of their shapes and their context of discovery on the island suggested that they might be the first samples of wheel-made Nuragic pottery. This hypothesis stemmed form the observation of the technical features of the vessels, compared especially with other contemporary Nuragic pottery, being supported by the fact that they

[203] "Le prime sono caratterizzate da vasi aperti (ciotole e ciotoloni) con orlo ingrossato a cordone o con orlo distinto ed anse impostate superiormente sull'orlo, piccole ciotole emisferiche con una profonda incisione che a un centimetro circa dall'orlo, corre su tutta la circonferenza del recipientino. I fondi sono generalmente piatti ma è presente anche un frammento di ciotola con fondo a disco. Le anse, piuttosto piccole, sono assai allargate all'imposta: quasi totalmente assenti le ciotole carenate. I tipi ceramici mostrano superfici assai ben rifinite, lucenti, color grigio ardesia: gli impasti sono piuttosto fini, abbastanza ben depurati. La cottura è ottenuta in forni a elevata temperatura che ha reso assai solidi i fittili, con suono metallico e fratture nette" (Ferrarese Ceruti 1985, 430-431).

had been found where also Mycenaean pottery remains were discovered, such as in Antigori and Sa Domo 'e s'orku Nuraghes.

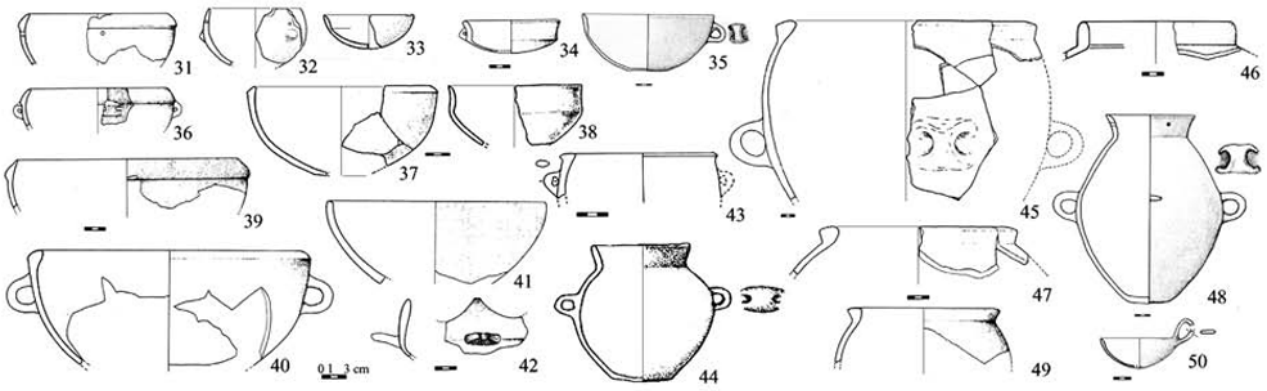

Figure 66. Nuragic Pottery of the Late bronze Age "Bronzo Recente" (Depalmas 2009, 152, fig. 5) [204]

Some suggested that the "Slate Gray" class had been produced as a result of the contacts with the Mycenaean populations and that it would be the reason why the low-speed lathe was implemented for the production of Nuragic pottery. The data obtained from archaeological excavations during the last ten years have allowed the identification of a "Slate Gray" pottery class, that was typical of southern Sardinia. Some suggested that it could be used as an indicator for the Antigori facies (Ugas - Lugliè - Sebis 2000, 402). In this regard, an archaeometric study on the slate grey pottery found in the Selargius Baccu Lau site (Lugliè 2005, 155-166) turned out to be fundamental, since it aimed at understanding whether these potsherds were wheel-made. "Un simile strumento appare infatti imprescindibile per una completa definizione dei caratteri tecnologici della manifattura e, nel caso specifico, per la comparazione dei records analitici ricavati dal materiale ceramico sardo di rinvenimento extrainsulare" (Lugliè 2005, 157).

The study was conducted on 20 specimens, by means of a thin-section diffractometric and textural analysis. For comparison purposes, a brown burnished pottery sample was tested to compare technological peculiarities. These studies have not allowed, however, to collect enough data on the possible use of the potter's hand-wheel as a tool for moulding purposes. Its features were recognized in the Final Bronze Age in some types of pottery of Baccu Lau origin which display "superfici interne avvolte a spirale da sottili creste ondulate sub-parallele (rilling), alternate ritmicamente a depressioni"(Lugliè 2005, 158).

This pottery class has contributed to a precise definition of a set of chronological stages for the Nuragic Age, especially for the Late Bronze Age. Today, the scientific community seems to have

[204] "LBA pottery. Southern facies typologic elements: 31, 34, 36, 40-42, 46, 49. Antigori-Sarroch; 32-33, 37-39, 45, 47. Su Mulinu-Villanovafranca; 35, 48. Adoni-Villanovatulo; 43. S.M. Maddalena- Guamaggiore; 44. Su Benatzu-Santadi; 50. Arrubiu-Orroli" (Depalmas 2009, 152, fig. 5).

accepted the Bronze Age - and therefore the Nuragic Age - structure, based on the mainland model[205].

Figure 67. "Grigio ardesia" pottery from Nuraghe Antigori (Soro 2011, 294, fig.17)

Over the last twenty years, the division of the Bronze Age into the Middle Bronze, Late Bronze and Early Bronze periods is commonly shared, including their subdivisions (BM1, BM2, etc..) and the identification of their *facies*. In 1987, Ferrarese Ceruti wrote "la ceramica grigio-ardesia non è nota là dove è presente la ceramica a pettine" and vice versa. Her statement stands valid even today and a clear cultural difference between the north and the south of the island is visible. Indeed, south of the border between the Gulf of Oristano and the Ogliastra area, during the BR2, Nuragic gray pottery was manufactured (Depalmas 2009, 134). This pottery class is commonly found in the stratigraphic sections of Nuraghe Antigori. For example, in the most ancient levels of Tower A of Nuraghe Arrubiu, very few slate gray pottery samples have been found; the same happens at the Adoni di Villanovatulo Nuraghe, where findings are similar to combed decorated pottery from the North. It may be found, at least in Nuraghe Antigori, also later on, during the initial stages of the Late Bronze Age[206] (Forci Relli 1995, 122). As for the identification of the Late Bronze Age, although for the Nuragic period there has not been a large number of carbon-dated findings, the discovery of pieces of foreign origin was considered a safe reference element for Sardinian findings and, of course, the discovery of Mycenaean pottery on the Island and of Nuragic Pottery in Kommos, especially the typical "slate gray" vessels, has served as an important historical reference point.

[205] See Chapter I, page 22.

[206] For the last update of Nuragic time-lines and the stages of the Bronze Age, see the works of the XLIV Scientific Meeting of the Italian Institute of Prehistory and Early History, on "The Prehistory and Early History of Sardinia" (Depalmas 2009, 123-160). Currently, the scientific community is focusing on the last stage of the Nuragic Age and timeline-related issues occurring between the Final Bronze Age and the Early Iron Age.

The pottery found at Kommos was regarded as an imported Italian Hand Burnished Ware, but, as already mentioned, the production of slate gray pottery has been connected with the gray pottery found within the Helladic and Southern Italian regions, in the sites where Mycenaean pottery have been found (Ugas-Lugliè-Sebis 2004, 402; Ugas, 1994, 138; Ugas 1987b, 86)

4.5 Hand Burnished Ware or Barbarian Ware, Gray Pottery or Pseudomynian ware.

The Handmade Burnished Ware (HBW) pottery class was identified by French in 1969 in Mycenae in a XII century BC context. This immediately drew the attention of Aegean experts: it was an unpolished impasto pottery, which differed in technological, shape and decoration terms from the Mycenaean production made of purified clay, shaped and baked in ovens at high temperatures (Pilides 1994, 1; Bettelli 2002, 117). In the early 70s, the scientific community started a discussion on the presence of HBW and its possible connections with the destruction of the buildings in LHIIIB:2.

Two parallel theories were developed on the introduction of this particular pottery class: on one hand, its introduction was thought to be the result of the immigration of foreign groups; on the other hand, it was seen as a peculiar production of a domestic development. The discussion does not seem to have come to a conclusion.

In 1921, Blegen recognized HBW fragments in Korakou and, in 1975, Rutter attributed them to a foreign production of probable Balkan origin (Rutter 1975, 30). In 1977, together with French, he argued that they had been manufactured by slave women who had entered the Helladic environment. In 1976, Walberg argued that HBW production was a rather local phenomenon, made by Mycenaean "hands" which had been inspired by earlier examples (Walberg 1976, 186-7). For the first time, in 1971, however, the hypothesis of a connection between the HBW found in Lefkandi and the Italian impasto pottery was suggested (Popham 1971). Deger Jalkotzy, based on the assumption that the HBW was not a Mycenaean product, described this type of pottery as a basic element to prove that the buildings were destroyed at the end of the LHIIIB: 2 period (Deger-Jalkotzy 1977, 10 and 1983, 161). In addition, she also connected this particular production of pottery with the products manufactured in the South of Italy and in Sicily, by maintaining that a there was a Adriatic *koine* connecting the elements of the "Urn fields" (Campi d'urne). Kilian, on the contrary, denied a connection with the Italian impasto pottery and any comparison with Tiryns HBW vessels; nonetheless he was the first to connect this kind of pottery with the Dorian invasion, by tagging it as "Dorian ware" (Kilian, 1978, 314). This idea, however, was proved to be wrong during Tiryns excavations, when HBW was brought to life in contexts which dated back before the destruction of the LHIIIB:2 period. Sandars, however, opted for the local production hypothesis,

that was not directly related to the invasion of the “Peoples of the Sea”, but was influenced by the North and West (Sandars 1978, 193-195). Likewise, S. Sherratt expressed doubts about the relationship between the presence of HBW and the LHIIIB:2 destructions, on the basis of the discovery of HBW fragments in Room 31 of the Citadel of Mycenae, in layers which were more ancient than the destruction of the citadel itself. She recognized a local ancestry in the HBW vessel shapes. She provided several examples of HBW which corresponded to a wheel-made shape, being widely used since the LHIIIB period (Sherratt, 1981, 593-594; Pilides 1994, 4).

In 1983, with the publication of the findings from Khania-Kastelli, B. Pallson Hallager claimed to have found similarities among the Khania findings and the sub-Apennine pottery of the XII-XIII century BC. To support her thesis, she added fibulae, daggers from Peschiera and amber necklaces (Pallson Hallager 1983a, 115). Similarly, she argued that the absence of Cretan pottery in Italy was due to the fact that trade was conducted by Cretan and Mycenaean traders, and that the Mycenaean style had prevailed: She wrote on "what is Mycenaean and what is Minoan during the Late Bronze Age?" (Pallson Hallager 1983a, 115).

Lucia Vagnetti rejected Hallager's idea and suggested a greater complexity of relations between Crete and Italy, and the need for a large publication that would include several HBW shapes and mixtures, before trying to find an answer as to their origin. Similarly, she recognized that the biggest problem with the Khania findings was the absence of a distinction between the HBW and the Grey Wheel-made Ware, that had been found in Khania in a wide LH IIIA sector and regarded as Aegean or Anatolian (Vagnetti 1985, 32). P. Mountjoy, while rejecting the Doric invasion hypothesis, suggested however a different timeline: he noted that the amount of HBW pieces was greater in LH IIIC contexts and much more common in this period, perhaps as a result of the depopulation of the palatial system, that had led to a minor production of figulina pottery (Mountjoy 1988, 30-31). Therefore, Vagnetti's wish to publish a global HBW collection is very appropriate. The approach of the scientific community is far from being harmonized, although faults may be found on both sides.

The supporters of Diffusionism have always been engaged in the search of a possible place of origin for HBW, that was indeed referred to as Barbarian ware. This has inevitably led to comparisons between the material found in Greece and other similar productions in other places of origin. The comparisons focused on specific features which may easily be found in several prehistoric and protohistoric productions, distant in time and space: criticisms against this approach may easily be shared. Similarly, it is undisputed that the HBW could be found, for example, in Tiryns, before the buildings were destroyed and therefore may not be connected with their destruction or even with the trade phenomenon, since clay analyses have confirmed the local origin,

at least in most of the cases (Jones 1986, 246; Whitebread 1992, 297). During the LH IIIC period, the production of fine wheel-thrown and painted pottery went on also with new shapes and ornamental styles; the hand-made type accounted for a small percentage of it and was therefore considered in lieu of the Mycenaean traditional production. Even if it is true that some HBW forms and decorations display generic features, as argued by the supporters of *non-diffusionism*, the presence of specific pottery types being retrieved in different sites - even far from each other, related to several outer productions - remains a mystery. The element that made the connection between the HBW and the pottery from the South of Italy possible is "*la presenza in diversi contesti egei di tazze e ciotole carenate, una delle forme più rappresentative della produzione ceramica protostorica peninsulare, e che in Grecia risulta essere presente a partire dal TE IIIC*[207] *nella versione in ceramica fine tornita e dipinta (FS240)*" (Bettelli 1999, 464), but it is worth mentioning that the protohistoric pottery produced on the Italian peninsula and the islands was an "impasto"; the potter's wheel was used before the end of the Late Bronze Age and the beginning of the Final Bronze Age, its use being restricted to a limited number of pottery types.
Similarly, the Nuragic vessel found in Pyla Kokkinokremos is regarded as HBW, since it is hand-made, not wheel-made.

The "Grey wheel-made ware", aka "Gray pottery", is in fact a wheel-thrown pottery class discovered by Kilian in Tiryns and referred to as "pseudo Mynian pottery", dating back to the LH IIIB and LH IIIC periods.
This particular pottery was also detected in other sites on the Gulf of Taranto and was regarded as an Aegean import, since it was always found together with Mycenaean potsherds. Investigations on the gray pottery found at the site of Broglio di Trebisacce in Calabria, however, showed that it was a local production of that area (Belardelli 1999, 451) and confirmed Taylour's intuition, who first suggested so (Taylour 1958, 126-152). "La ceramica grigia italiana, ma anche la maggior parte della ceramica 'micenea' con cui la ceramica grigia si trova in associazione, è risultata fabbricata localmente, questo spinge a ribaltare i termini dell'indagine e a guardare alle evidenze in pseudo minia alla luce di quanto noto in Italia, e non soltanto viceversa" (Belardelli 1999, 453, Bettelli 2000).
In some Greek sites (such as Chania and Tiryns), gray pottery has been found together with HBW and Mycenaean pottery; in several cases the HBW is an impasto pottery type, imported from Southern Italy (carinated, loops decorated with horned appendages, etc.). The surveys conducted on these particular classes of pottery at the sites of Chania and Tiryns served as a connection between

[207] LHIIIC

the Italic and the Greek productions. At the Chania site, the Mycenaean pieces found do not seem to display any connection with southern Italy, despite some represented forms[208] and the similarities with the Late Minoan production (Jung 2006, 218).

Clarissa Belardelli showed that four represented pottery classes in Broglio di Trebisacce were similar to those represented in Tiryns[209]and that similar features were detected in the Italian productions (Belardelli 1999, 453; Bettelli 2002.127). Gray pottery was also found in Tiryns in the LE IIIA period, especially during the LE IIIB and LH IIIC, as well as in Southern Italy. The relationship between the Broglio and Tiryns gray pottery types seems to be confirmed by the preponderance of open shapes and by the kind of decoration, the polished surface and the same shade of color, ranging from light to dark gray.

On the one hand, Hallager's opinion is that gray pottery was made by craftsmen of Italian origin; but; on the other hand, her cannot forget that the Italian grey ware had Aegean Origins: in fact, it recalls the Mynian ware of Middle Helladic period, which was still widespread in Greece at the beginning of the Late Helladic period. It was a great technological innovation for the potters of southern Italy: it is wheel made and fired in a new way. Apart from a general resemblance, the shards of gray ware from Chania look quite different from those found in southern Italy" (Bettelli - Belardelli 2007, 483). Clarissa Belardelli and Marco Bettelli's publication led to the identification of a Tiryns fragment "la cui forma appare estranea al repertorio miceneo classico, ma non appartiene neppure a quello dell'impasto dell'Italia meridionale [...] la decorazione incisa non trova riscontro in alcun contesto coevo miceneo o italiano" (Belardelli 1999, 457-458). The Tiryns finding is part of "a un vaso chiuso con orlo fortemente distinto, ingrossato e sagomato, decorato sul labbro con incisioni a zig-zag e meandriformi" (Bettelli 2000, 129). In the light of the presence of slate gray pottery, M. Bettelli himself suggested a comparison with Nuragic jars, both due the shape of the rim and their decoration, and came to the conclusion that "se in confronti [...]si rivelassero pertinenti, sarebbe questo il primo caso di un'imitazione di ceramica di tipo nuragico presente nella Grecia continentale" (Bettelli 2000, 129). Comparisons were made with jars featuring an "edged oblique rim": in particular, a jar from Nuraghe Cobulas, one from Sant'Anastasia and one from Sant'Imbenia; the decoration was also similar to the one found in the proto-nuraghe of Faurras Villamar[210].

[208] Layer I of Tower C

[209] There seems to be represented forms also in Southern Italy. One example is a gray pottery askos figulina found in Broglio, that due to the absence of information on its discovery may not be clearly dated, although it is very similar to a Gournia finding. This element may be regarded as the "trate-d'union tra forme askoidi di origine egea e gli askoi italiani delle successive età del bronzo finale e del primo ferro" (Bettelli 2000, 129)

[210] She performed a spatial survey of *Raum 127* of the *Unterburg* of Tiryns, emphasizing that the "ceramica pseudominia" and the HMB (aka Barbarian ware) found in the settlement came from inside the house or the areas next to it.

Should an examination be conducted, such careful comparisons might prove Battelli's idea, also a detailed analysis might prove them merely fortuitous, rather than actual material similarities[211]. First of all, the compared Nuragic rims are very similar to the fragment found in Tiryns, but the jars they belong to were not wheel-made, nor may be referred to as "slate gray pottery". In addition to that, a chronological discrepancy may be appreciated: the jars displaying that particular type of rim date back between the Late Bronze Age and Early Iron Age.

It is therefore crucial to understand how the materials affected each other, that is, if the fragment from Tiryns is an actual "pseudo minia" imitation of the Sardinia prototype, or if it is a Sardinian import. If it were an import, it would be a unique specimen, an *unicum*. It indeed would be necessary to explain why the wheel-made Sardinian gray pottery may not be found in the same contexts as the imported Mycenaean pottery (a unique finding, since the situation in the South of Italy is completely different) and why the Sardinian pottery displaying the same kind of rim and decoration were not wheel-made, nor gray. Similarly, an analysis on the origin of the clays may help understand whether it were an imported piece or produced locally.

Importantly, however, another class of *gray pottery* has been found in Sardinia, that is different from the *slate gray* type.

It is a new type of ceramic, ashen-gray in colour, rarely decorated, thin, slipped and burnished, sometimes abraded. It was found in the "Cuccuru is Arrius" well temple in Cabras and reported in several areas of the Oristano area (Sebis 1998, 114-115), dating back to the early Bronze Age, and mostly during the excavations conducted at Nuraghe Pidighi in Solarussa. “Le striature sulle superfici interne dei vasi chiusi evidenziano l’uso del tornio lento, mentre la colorazione chiara e uniforme indica una cottura in forni ad alta temperatura con aerazione costante” (Usai 2000, 7-8). This particular pottery class includes “ciotole carenate basse con netto solco interno all’incontro tra la parete e la vasca, scodelle emisferiche e a calotta, catini o bacili di forma indeterminata con orlo ispessito e appiattito svasato o rientrante, scodelloni con orlo rientrante e anse a maniglia, boccali con ansa a gomito rovescio, brocche con ansa a ponte a bastoncello, calefattoi con 8 appendici sull’orlo" (Usai 2000, 8).

There seems to be an overlapping designation of pottery classes that seems to make their correct identification difficult.

First of all, the terms "slate gray" and "gray pottery" have often been swapped and for this reason, slate gray pottery has been defined "Nuragic gray". This generated some confusion even in matters such as the use of the lathe during the Nuragic period (Atzori 1986, 82). The above does not appear

[211] For Bettelli's comparisons, see Campus - Leonelli 2000, tables 314, 8; see page 561 for the rim decoration of a sherd

to offer a well-grounded set of elements that would connect the "slate gray" or the Sardinian "gray" pottery with the Hand Burnished Ware or with the gray pottery discovered in Greece.

The reason why the Nuragic pottery found in Kommos and the pieces discovered in Pyla Kokkinokremos in Cyprus were thought to be HBW is that they were found in a context where all the pots were all wheel-made and the result of a standardized manufacturing process. The Nuragic pottery, as well as that manufactured on the Italian peninsula, was an hand-made impasto, not wheel-thrown and looking just like the HBW found in the Aegean region. The latter element may not however be regarded as an eligible criterion to establish a chronological comparison between the Nuragic pottery found in Kommos and that found in Pyla. Karagheorgis writes: “several of Sardinian vases found at Kommos are handmade burnished, slightly mottled jars with spreading or flaring necks, very similar to the jar from Pyla-Kokkinokremos” (Karageorghis 2011, 91).

Importantly, until a physical and chemical analysis proves otherwise, the Nuragic pottery was fully hand-made, that is. without using the potter’s wheel, at least up to the BF2, and there is no trace of wheel-made Nuragic vessels in Kommos.

Even if Nuragic pottery had featured wheel-made pieces, manufactured with a low-speed lathe, since the BF2 (Usai 2000, 8), we still would require confirmation by performing an analysis; otherwise, it would remain an assumption, just like when it was believed that the slate gray pottery was wheel-made with a low-speed lathe, which Baccu Lau's analysis proved wrong (Lugliè 2005, 155-166). Or most likely, the lathe was first used in Sardinia as a result of the interaction of Nuragic and Phoenician groups during the Early Iron Age, as the findings in Sant'Imbenia show (Depalmas-Fundoni-Luongo 2011, 233).

Today, two classes of "gray" pottery may be acknowledged:

- a type of pottery called "Nuragic gray", that was widespread especially in the south of the island and labelled by Ferrarese Ceruti as "slate gray", and that, despite being of excellent workmanship, was hand-made, not wheel-made, that was found also outside the island (Kommos) and may be dated back to the Late Bronze Age;
- a type of pottery made of a gray-colored impasto, same colour on the outer surface, widespread especially in the area of Oristano and Sinis, different in its forms from the slate gray type, probably made with a low-speed lathe and possibly dating back to the Late Bronze Age.

On the basis of the results of the data analysis, the interaction with the Mycenaean, the Minoan and the Cypriot groups seems to have affected the use of the lathe among the Nuragic communities and shows the great contribution of this exchange to the Nuragic material culture.

The review of the contexts, the bibliographical reassessment and data reevaluation require a further analysis and a better understanding of the cross-cultural elements that the Mycenaean finds in Sardinia and Sardinian findings in the Aegean region have provided.

5 Questions and answers

As the title suggests, this chapter includes the main objective of this research, that is, it seeks to explore the relations between the Mycenaeans and Sardinia during the II millennium B.C.
During the II millennium B.C., the Sardinians started their relations with the Aegean world, but, especially during the last years, several studies on the Nuragic age have shown that those relations continued during the Bronze Age, in a sort of a Golden Age that continued during the early stages of the Iron Age (Usai 2011b).
After analysing the information, the publications and the materials available, this last chapter will provide answer to some of the questions posed on "the Mycenaeans and Sardinia". It will help better understand the cross-cultural aspects of the Nuragic and Aegean Mycenaean worlds during the II millennium B.C. Such understanding will not be full though, since the new data collected do not seem to be sufficient to answer all the questions posed by scientific research.

The elements described in the previous chapters have served as the basis for the scientific speculations that have arisen around chronology (partially analysed in the previous chapters), but also around the kind and nature of those contacts (i.e., the factors that prompted and affected the exchange) and especially the understanding of the peoples involved and how they were culturally affected by those relations.
It would be pointless to provide a single answer to such a complex set to questions, but, as already done with the reconstruction of road network during the Bronze Age, the newly acquired data may help analyse the reasons and development of the exchange.

5.1 WH questions

While untangling the thick fabric of information available, the current *loci argumentorum* will be the backbone of this speculation.
In this context, since the basic questions are intertwined, it is very difficult to find an answer to fully meet the researcher’s needs.
In detail:
- (What?)
The basic data of this research, that is the Mycenaean finds. "Information" is lacking: what goods were traded.

Some other important questions arise. Most of the remains of foreign origin are potsherds, but may it be assumed that the exchange was limited to the trade and it was related to the vessels only? What about their contents? How should the "imitation" (or rather, the local Sardinian production of Mycenaean pottery) be interpreted? May this peculiar pottery class be regarded as a sign of the *cross-culturalism* of the Mycenaean and Nuragic groups?

- (How many)

The type of the findings, i.e. the core of this research, is inevitably linked to the quantitative aspect. The number of pottery finds is known, but what if the main objects that prompted the exchange were in fact their contents? Will it then be possible to quantify them? If so, the amount of each type of products traded would highly depend on the value of each of them. How could have their amount affected their trade?

- (Where?)

The localization of the finds and their contexts are thoroughly examined in this work through minor experimentation and an original perspective.[212]

- (Who?)

The variety of human elements discovered in Sardinia that might be regarded as Mycenaean has already been analysed. The clear distinction between the Nuragic ones, on one hand, and the Mycenaean, Minoan and Cypriot ones on the other hand, is worth mentioning. But is it possible to tell one group of people from the other on the basis of the remains found? Based on the findings, the definition of "groups of people from abroad" does not seem to be clear. Therefore, it may not be possible to refer to those Bronze Age "multiethnic" findings as Mycenaean only.

- (How?)

This question is connected to the means of transports that were used to carry the Mycenaean goods found. A number of questions arise on the matter of trade. The methods of exchange and the quantities of goods are intertwined. How were the pottery vessels and their contents traded? Was it by reciprocity, redistribution or market exchange?

- (When?)

If the most ancient Mycenaean artefacts found in Sardinia indeed date back to the LH III A2 period and the most recent ones to the LH IIIC period, and if their general dating could be set between the Sardinian Middle and the Recent Bronze Age (Depalmas 2009, 125)[213] and the Final Bronze Age, it would be necessary to understand how the relations with the Aegean groups developed during that time.

[212] The second chapter of this work focuses of the "where" question.

[213] The chronological alignment of the LH IIIA:2 findings and the MBA-RBA transition seems to be currently accepted by most scholars.

Should the available data prove reciprocity, redistribution and market exchange, might it be possible to set them between the LH III A2 and the LH IIIC periods, and assume firstly their consistency, secondly their reciprocity, their exchange and, finally, their trade? Will it be possible to establish a chronology and consistency in terms of trade and contacts among groups of people, or will it be only possible to confirm a broad chronological range from the fourteenth to the eleventh century B.C. ca., when such relations may have been taking place? If the Mycenaean data only were to be taken into account, how could it be possible to correlate the issues to, for instance, the oxhide ingots? Did the Mycenaean finds arrive in Sardinia before the oxhide ingots or at the same time? What about the other Cypriot finds? Or perhaps, is it better to regard the relations with the Aegean-Mycenaean groups as a first stage of a centuries-long cross-cultural process, that reached its peak at the beginning of the Iron Age, when the Phoenician people arrived?

- (Why?)

Rather than studying the reasons why the Mycenaean vessels where taken to Sardinia since the LHIIIA:2, it might be more fruitful to wonder why and how they lasted so long. Also, this chapter will focus on the nature of the material (or materials) traded, that is the very core of this work.

5.2 Cross-cultural, intercultural, multicultural relations

A short introduction is necessary to explain what the term "cross-cultural" means and why it was chosen instead of the more common concepts of multiculturalism and inter-culturalism.

The term *multiculturalism* (and the resulting adjective *multicultural*) belongs to the sociological sphere. It refers to the simultaneous presence of peoples of different ethnos, language and cultural origin in the same area. It does not have any connotation, it merely indicates that different peoples live in the same place, without implying any confrontation, fight, exchange and gathering.

On the other hand, inter-culturalism indicates that there has been a commitment to finding the means and opportunities to develop a constructive and creative dialogue between cultures, assuming the ability to promote occasions to discuss ideas, values, different views, in search of common grounds. Great attention is paid to diversity and divergence, through dialectical interactions which are necessary for mutual recognition. The prefix *inter* indicates cultural reciprocity, proximity to the other, in a land where transactions and exchange occur, through the richness and productivity of dialogue. Based on these assumptions, it is possible to outline the idea of cross-culturalism as the ability to cross the boundaries of individual cultures.

Cross-culture may be intended as the ability to go beyond individual cultures. The term "cross-culture" is not new to researchers, but it stems from the concept of cross-culturation. It has been since used, especially in the field of anthropology, to describe a process of assimilation, through a

process of selection and inventive reworking of a dominant culture by a subordinate or marginal group (not necessarily a minority).

On the other hand, the concept of cross-culturalism puts the emphasis "sul carattere dialogico delle influenze culturali, tendendo a una concettualizzazione dell'interazione in cui niente è mai completamente "altro" (straniero ed estraneo)" (Brancato 2004, 14). Therefore, the purpose of this work is to assess whether and which cross-cultural elements could be identified in the relation between the Mycenaean world and Sardinia during the second millennium B.C.

5.3 Exchange, relations, trade

Due to the mediation of existing literature, the terms "relation" and "exchange" have been used arbitrarily, regardless of their correct use in archaeological literature. It is very difficult to try and reconstruct the system of trade, in particular without written sources; nonetheless, that does not prevent an analysis of the transactions carried out, in order to suggest an hypothesis.

The idea of insularity intended as a limitation, backwardness and isolation, although it is clear that maritime communication could not be as effective and steady as the terrestrial ones, has been rejected. At the same time, insularity was a reason of attraction, not in terms of passive attractiveness but in a reciprocal way. (Usai - Lo Schiavo 2009, 4 and following).

Along with the increase in the number of metal remains during the final Late Bronze Age and the Early Iron Age, the circulation of carp's tongue swords in "Monte Sa Idda", the widespread use of *oxhide* ingots, characterised by the use of Cypriot copper only (Lo Schiavo 2005), a major Nuragic Sardinian bronze production may have affected the understanding of the nature and reasons of the exchange, thus making is less appealing as a Mediterranean metalwork *beacon* [214].

The characterization of *oxhide* ingots made it possible to reassess the perception of exchange and one-sided contacts. Researchers highlighted that "*gli scambi includevano, quasi di necessità, costumi, idee, modelli, 'matrimoni' di sangue e di cultura, sole spiegazioni possibili per la capillare diffusione, nell'isola, degli elementi allogeni, e nella Penisola e nel Mediterraneo, dei materiali nuragici e di quelli da essi veicolati*" (Usai - Lo Schiavo 2009, 9).

On one hand, in the Middle East, exchange patterns have been studied (Gestoso Singer 2008, 16-45). As far as Sardinia is concerned, this seems extremely difficult due to the small number of

[214] In 1989, F. Lo Schiavo wrote: "Certa essendo ormai la rotta da Oriente verso Occidente, ameno per quanto attiene la Sardegna e la Penisola Iberica non vi può essere dubbio sul fatto che il motore primo sia stato l'approvvigionamento dei metalli: non solo e non tanto il rame, presente soprattutto a Cipro, né il piombo e l'argento disponibili al Laurion, ma forse il ferro della Sardegna e lo stagno dell'area atlantica" (Lo Schiavo –D'Oriano 1989, 103)

excavation data that may be correlated[215], the information available about the social structure of Nuragic Sardinia, and a lack of actual archaeological data that can plausibly reconstruct the Nuragic social system[216]. Moreover, there are no written sources of reference that may help understand the model followed during such a long-distance interaction. At the same time, even if there were an adequate amount of information, it might not be possible to apply a single model to all the exchanges occurred in all the areas.

Archaeological data prove that an exchange of goods[217] occurred between the Nuragic people and the Mycenaean-Aegean people[218] and that, up to now, is the only information we have.

5.4 Wrecks, trades and products during the Bronze Age: the data

First of all, one aspect should be analyses in order to clarify what might be described as a "multi-orientation" of trade, due to the types of goods, their amount transported in relation to the amount found, and the human actors involved.

F. Lo Schiavo defined the events connected to the east-west Mycenaean routes as nebulous ("nebulose"), just like the end of the Middle Bronze Age and the beginning of the Late Bronze Age. She believed that the Island played a crucial role ("cardine commerciale") in the economy immediately after the bronze goods reached the island, most likely together with a number of Cypriot craftsmen during the LC III. Their affiliation to the storehouses and the sanctuaries seems to connect western products to the "imitation of products manufactured by neighbouring people" ("imitazione prossima") and the free reinterpretation ("libera rielaborazione") of eastern and Cypriot products (Lo Schiavo - D'Oriano 1989, 132).

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[215] The amount of data available is considerable, but the data collection methodologies used often differ, especially when comparing data from archaeological excavations after 20 or 30 years. This means that it is more and more difficult to compare "stratigraphic data" processed without any knowledge of the archaeological methodology accepted nowadays.

[216] Ercole Contu writes: "Doveva essere una società piuttosto articolata e complessa quella nuragica, già nelle sue prime fasi attribuibili al Bronzo Medio, se ha potuto realizzare tali e tanti monumenti, come si è detto ed una così ampia messe di prodotti; ma non sappiamo se fosse, almeno negli ultimi tempi corrispondenti alla contemporanea presenza nell'Isola della Civiltà Fenicio-punica, una società divisa in classi" (Contu 2006, 464-465). This significantly highlights the difficulty to understand how exchanges were managed. Or rather, the study of the transition from a tribal society to the oligarchy of the Bronze Age and the Early Iron Age is a hot topic, but it does not provide a final perspective on the "tribal" shepherd warriors identified by Lilliu (Lilliu 2003, 667-672). In addition, several scholars have collated written sources from the Classical Age and archaeological data, in order to provide plausible models and, although diverging form the modern methodology, they do not provide any guideline on what the Nuragic society could have been like (Ugas 2005, 20-243).

[217] "Il concetto di scambio è un concetto centrale in archeologia, e quando si riferisce a beni materiali, a merci, assume lo stesso significato di «commercio»[...]. Se utilizziamo il termine «commercio» intendiamo generalmente indicare uno scambio esterno, che avviene cioè con il mondo di fuori" (Renfrew Bahn 2005, 312-313)

[218] I wish to speak about the Aegean people, as already done in the previous chapter, because the Mycenean remains were found together with the Minoan and Cypriot findings. That makes it impossible to consider them as isolated in the island, even if most of the finds are of Aegean origin.

The "nebulous" period of time lasted between the LHIIIA2 and the LHIIIB — between the end of the MBA3 and the RBA, that is between the XIV and the XIII centuries BC. (Lo Schiavo 2003, 17)[219]. One of the great Bronze Age shipwreck remains of the Mediterranean dates back to that time: the Uluburun wreck, near Kaş on the Turkish coast. In addition to it, two other important Bronze Age shipwrecks stand out: the Point Iria wreck (dating between the end of the XIII and the beginning of the XII century B.C.) and the Cape Gelidonya wreck.The discovery and excavation of those wrecks provided a major amount of information that has been very helpful to understand trade trends between the XIII and the XII century B.C., not only in relation to the Aegean Sea, where those ships sank, but more generally to trade through the entire Mediterranean basin.

- The Uluburun wreck includes a boat dating back to 1300 B.C. (XIV century B.C.) wrecked near the coast off the town of Kaş. It was a merchant ship of Levantine origin (probably Syria or Canaan), 15 m long and with a load capacity of 20 tons, built for long-distance coasting trade. Approximately 18,000 artefacts were found (Gestoso Singer 2007, 20). The dating of the wreck is based both on the dendrochronological investigations of some of the cargo wood planks and the dating of the Mycenaean pottery remains that the cargo was carrying. The Mycenaean pottery found in the load dates back to the LHIIIA2 period[220]. Along with the Mycenaean pottery, ten Cypriot pithoi were found, most probably used to store fine smaller potsherds, wheat and olives.

But the cargo did not carry pottery only: the materials found came from Syria, Mesopotamia, Cyprus, the Aegean area, Egypt, and probably also from the Italian peninsula. About ten tons of copper oxhide ingots have been found, 175 glass ingots, twelve bundles of ebony wood, ivory (both from elephants and hippos), Baltic amber, ostrich eggs, turtle shells and sea snails, scarabs (including a gold one with the effigy of Egyptian Queen Nefertiti), hardware, tools and weapons. The hardware might have belonged to the ship's carpenter, while as far as the weapons are concerned, six spearheads were found (two of which are of European origin - Italian or Alpine - Bouzek or A2 or B3 type) and also arrowheads, daggers and four swords, one of the Thapsos Pertosa type and others Mycenaean and Canaanite. The cargo also contained two wooden planks covered with wax, probably used to write, as a cargo daily log. But the new and most interesting part of the ship's cargo is perhaps the organic material found, relevant to scented oils and aromatic resins and spices , such as coriander, cumin, cardamom, saffron, mint, sage and sedge, in addition to

[219] The chronological comparison based on the relative chronology established with the discovery of the earliest Mycenaean finds on the island is widely accepted. That period seems to correspond to the Early Bronze Age in Sardinia.

[220] There are different positions concerning the time when the wreckage occurred. George Bass, an archaeologist involved in the wreck excavation, dated it between the end of LH IIIA and the beginning of LH IIIB (1320-1350 B.C.). The dendrochronological dating of the fresh wood transported during the trips, performed by S. Manning, suggested that the boat sank between 1316 and 1300 B.C. (Manning et. Al. 2001, 2532-2535), but M. Bietak, for example, argues that it is preferable to rely on the dating of the potsherds on the basis of relative chronology.

the remains of grain, wood, figs, olives, vines and oil. The approximately 150 Canaanite jars seem to have delivered terebinth resin weighing around a ton. (Gestoso Singer 2007, 20-32).

- The Point Iria wreck was discovered by the Greek Institute of Marine Archaeology in 1962, but its excavation could only start in 1990. Point Iria is located on the North coast of the Gulf of Argolis, near the Mycenaean site of Mases (to the East) and near to the sites of Asine and Tiryns (to the West). The ship's cargo is considered one of the most interesting ones, including a large amount of pottery. The 24 potsherds are worth mentioning, since they are all unbroken or completely mended. The pottery may be divided into several groups. The first group includes 9 Cypriot clay vases dating back to the LC IIC-IIIA periods, another consisting of 8 Cretan clay vases dating back to LM IIIB:2, and a third group of Helladic pottery, consisting of 9 Mycenaean vases dating back to LH IIIB:2. All the pottery is relevant to the pithoi, amphorae, amphora-like or, in general, cargo vessel categories.
- Cape Gelidonya is the southern cape of the Anatolian peninsula. The Cape Gelidonya wreck was discovered in 1954 and underwent a complicated and fruitful excavation in 1960; the excavation was carried out by the University Museum Expedition under the direction of George Bass, and it has been a focal point in the reconstruction of the trade routes during the late Bronze Age (ca. 1580-1100 B.C.). The collection of the copper ingots transported is unique and it includes three types of ingots: oxhide, flat-convex and flat. (Muhly Wheeler Maddin 1977, 353-362)[221]. Together with the ingots, several clay pots of Mycenaean origin were found, dated between the end of LH IIIB and the LHIIIC, despite their poor conditions and their limited number. LC II Cypriot pottery was also found inside the wreck. In general, Bass argues that “the evidence suggests that much of the pottery is of a type common in Palestine, Syria, and Cyprus during the thirteenth century B.C., but there is no piece which is exclusively of the Late Bronze Age as all could equally occur on the mainland in Early Iron Age I contexts or in Cyprus during Late Cypriot IIIA” (Bass 1967, 125). According to the study on the distribution of materials, the boat might have been about 10 m long and the few remains of organic material (food remains, such as olive pits, fish bones and meat), the astragalus, the few beetles, a lamp and some cylinder seals might have been stored inside a "cabin", since they were found in the same spot. They might be considered as personal items. It has been assumed that the ship was small, almost comparable to a modern caïques/kaïkis. Before the discovery of the Ulu Burun wreck (now dated to 1310 B.C. ca.), the Cape Gelidonya one enjoyed the status of *first ship ever excavated*. It remains an invaluable data source for the study of trade, metallurgy, and metrology during the late Bronze Age in the Eastern Mediterranean cosmopolitan world.

[221] The discovery of all three forms of ingots put in question the chronological dating carried out by Buchholz (Bucholz 1959)

The discovery and excavation of three wrecks, although dating back to different historical moments, provides several archaeological data and information and, in the framework of this research, it also provides some answers to the questions posed by this research, even though at a large-scale level.
Although the wrecks have been found only in the Eastern Mediterranean (namely two on the southern coasts of Asia Minor and one on the Aegean) and, therefore, refer to the Eastern Mediterranean sea routes, several data were acquired on:
-the type of cargo and goods transported;
- the data resulting from relative chronology, on the basis of the items found together (the wreck as a closed context);
- the data on the type of vessels;
- the resulting information about navigation and navigation capabilities;
- the understanding of patterns of cultural interaction between the actors involved in the commercial trade.
The aim of this work is to collect those data, even coming from the Eastern Mediterranean, which could help understand what may have happened in Sardinia. That is, assess whether the well-documented trade dynamics between the East Aegean, Cretan, Cypriot, Helladic and Egyptian worlds indeed influenced, to a certain extent, the Western Mediterranean and, therefore, Sardinia.
As the analysis of the wrecked cargo confirmed, the goods contained therein witness the multicultural and multiethnic character of the materials, confirming a number of exchange models. Nonetheless, those theoretical trade models, as already mentioned, may not be applied to the situation of Nuragic Sardinia.
The appearance of the variety of traded goods and coded models, especially with reference to the Near East and the Eastern Mediterranean, seems to be confirmed by documented sources, such as the so-called "Amarna Letters" (Knapp 1996), an exchange of letters between Pharaoh Akhenaten, the king of Alasia and some eastern cities[222]. They provide major information and a written confirmation of the importance of archaeological data, related to the goods carried in wrecked ships.

5.5 Oxhide ingots: open questions and insights

The archaeometallurgy of Bronze Age Sardinia would deserve a deeper analysis and, while this work takes several aspects into account, it does not provide a comprehensive interpretation on the matter. Similarly it was not possible to avoid metallurgy-related′ topics′ connected to the

[222] A number of scholars agree that the name of Alais, quoted by the Babylonian texts, refers to the island of Cyprus. This would mean that the Babylonian sources refer how Cypriot copper was exported to Mesopotamia from the beginning of the eighteenth century B.C. (Karageorghis 2002, 11)

Mycenaean items found on the island which are deeply linked to the ′economy′ of the Bronze Age, and therefore they may not be ignored.

As already pointed out in previous paragraphs, in the scientific literature on the Protohistory of the Mediterranean, Sardinia is linked to bronze production, especially to figurative bronze and boats[223]. This aspect seems to have inevitably influenced and conditioned all the publications about the connections between Sardinia and the rest of the Mediterranean[224].

For instance, by comparing the situation of Sardinia with the load of the three wrecks excavated, one interesting aspect arises: the discovery of oxhide ingots proves that the island played a pivotal role in the use and exchange of copper with Cyprus.

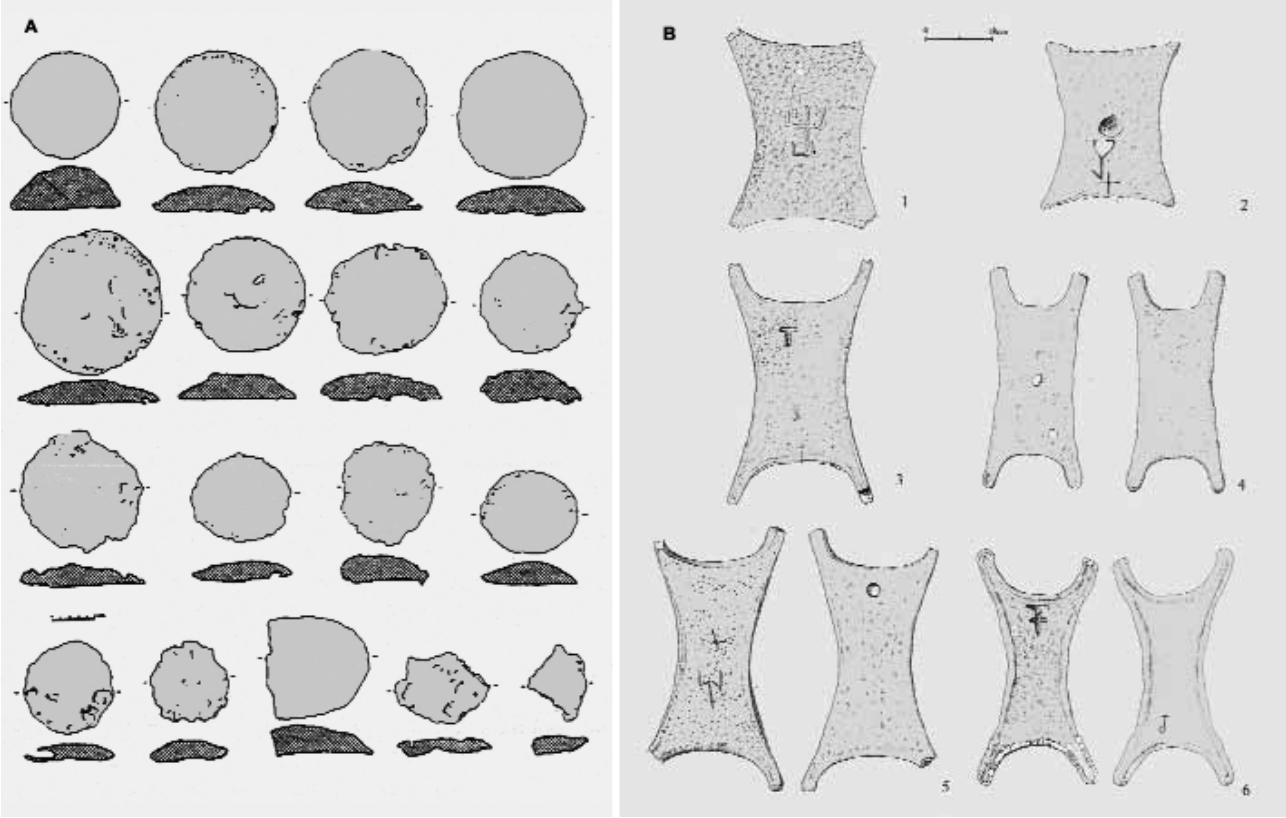

Figure 68. Samples of Bun ingots (A) (Bernardini 2011, 42, fig.31) and oxhide ingots (B) from Sardinia (Bernardini 2011, 42, fig.31).

Copper was indeed greatly demanded by the Pharaoh and the king of Alashiya, and excavations have shown that it was produced and/or processed in *Enkomi*, *Kalavassos*, *Agios Dhimitrios*,

[223] An article published by Paolo Bernardini should be mentioned. He provides a clear and shared view-point on the long-standing issue on the chronology of the Nuragic Bronze Age. “Non voglio ricordare il lungo dibattito, spesso acceso nei toni, sulla cronologia della bronzistica figurata nuragica o su alcune classi di ceramica nuragica, ancora legata a periodizzazioni che mi limito a definire problematiche e che un recente monumentale repertorio sulla ceramica nuragica non si cura di risolvere e chiarire; e però va almeno rammentato che le navicelle nuragiche, tutte del Bronzo Finale secondo la nomenclatura dei preistorici, si trovano nei sepolcri etruschi di pieno vii secolo (Figg. 27-28), così come i piccoli sostegni tripode di fabbricazione sarda e di ispirazione cipriota i quali, estinti intorno al 1000 a.C., riappaiono in contesti di piena età del Ferro”. (Bernardini 2007, 18)

[224] “According to most scholars, the acquisition of metals (both raw materials and finished objects) was the main goal of the Mycenanean sailing in the Mediterranean.” (Bietti Sestrieri 1988, 26)

Maroni, *Kition*, *Hala Sultan Tekke* and *Alassa Paliotaverna*. Studies seem to confirm that the island of Cyprus was indeed *Alashiya* (Karageorghis 2002, 14).

The processing of copper in Cyprus, but in particular the production of oxhide ingots, was and still is a subject of great scientific discussion, especially in order to understand the weight value that ingots may have had during the Bronze Age and, therefore, their importance tradewise[225]. In Sardinia, oxhide ingots had indeed a greater importance than Mycenaean pottery, both in quantitative terms (31 pieces have been found on the island so far)[226], and because they were not isolated copper items, but they appeared, through indirect stratigraphic association, together with tools and instruments related, either directly or indirectly, to metallurgical production. This has affected the "cross-cultural" role that Cyprus could have played in Sardinian metallurgy according to scientific literature[227].

Oddly, only three undamaged ingots were found in Cyprus: one during the excavations in Enkomi (Bucholz 1959, Catling 1964), and several fragments were found during the excavations in *Kalavassos-Agios Demetrios, Maroni-Vournes, Pyla Kokkinokremos* and *Maa Palaekastro* (Kassianidou 2001). Their greater concentration comes from the three Mediterranean islands: Cyprus, Crete and Sardinia. Their dating is based on the items found in Crete and Sardinia, since the most ancient one was found in Crete, while the most recent was found in Sardinia (Kassianidou, 2001, 334).

Archaeologist Fulvia Lo Schiavo published several articles related to the impact of Cypriot metallurgy on the Nuragic one. Since the mid Eighties, she has brought forth a line of research seeking to explain how Cypriot merchants brought to Sardinia not only "attrezzature per la lavorazione dei metalli, ma il complesso della tecnologia metallurgica" and other items of prestige connected to metalworking, such as double-blade tools, tripods and metal bowls, with their handles and necks (Lo Schiavo 1985, 30-51; Ead. 2005, 294; 313-315; Ead. 2012, 29). This element shows an exclusive relation between Cyprus and Sardinia, especially in comparison with the rest of the Italian peninsula, where no Cypriot influences have been found, or Sicily, that, compared to Sardinia, played a totally different role for Cyprus (Lo Schiavo 2012, 29; Ead. 2009c, 401-420). She backs up the theory of Cypriot cultural supremacy, meaning that the Nuragic people welcomed copper as a valuable good: before getting in contact with the Cypriot people, Sardinia had not enjoyed the wonders of metals, that were in fact widespread in Europe during the Bronze Age, even

[225] The literature on the topic is one of the largest. The latest publications, edited by F. Lo Schiavo, provide an excellent summary on the topic. (Lo Schiavo et al 2009; Lo Schiavo 2005)

[226] See the distribution map and the list of sites of discovery in Lo Schiavo et al. 2009, page 228

[227] The bibliography on the subject is extensive. See Lo Schiavo - Macnamara - Vagnetti 1985; Lo Schiavo et al. 2005; Lo Schiavo et al. 2009; and most recently, Lo Schiavo 2011, 14-40).

"Together" does not mean on the same stratigraphic layer, but in contexts documented by researchers and, therefore, highly debated.

though, since the end of the Neolithic Age, they had known lead and silver-working. The poor metalworking, extraction and processing knowledge of Nuragic people, that increased between the Late Bronze and Early Iron Ages, and improved during the Phoenician colonization during the Early Iron Age, may be explained with the appearance of oxhide ingots at a later stage. Therefore, the contact with Cypriot metalworkers might have favoured the acquisition of useful skills and explain such a rapid development. It is now clear that the ingots and ingot fragments found in Sardinia were imported and smelted with Cypriot copper (Kassianidou 2001, 308; Gale 2006, 32), but there is no explanation as to how trade was carried out between Cyprus and Sardinia, and between Mycenae and Sardinia. At the same time, it is difficult to date the first Cypriot copper imports in Sardinia and to understand whether the Nuragic pottery found in *Pyla Kokkinokremos* came before or after copper importation.

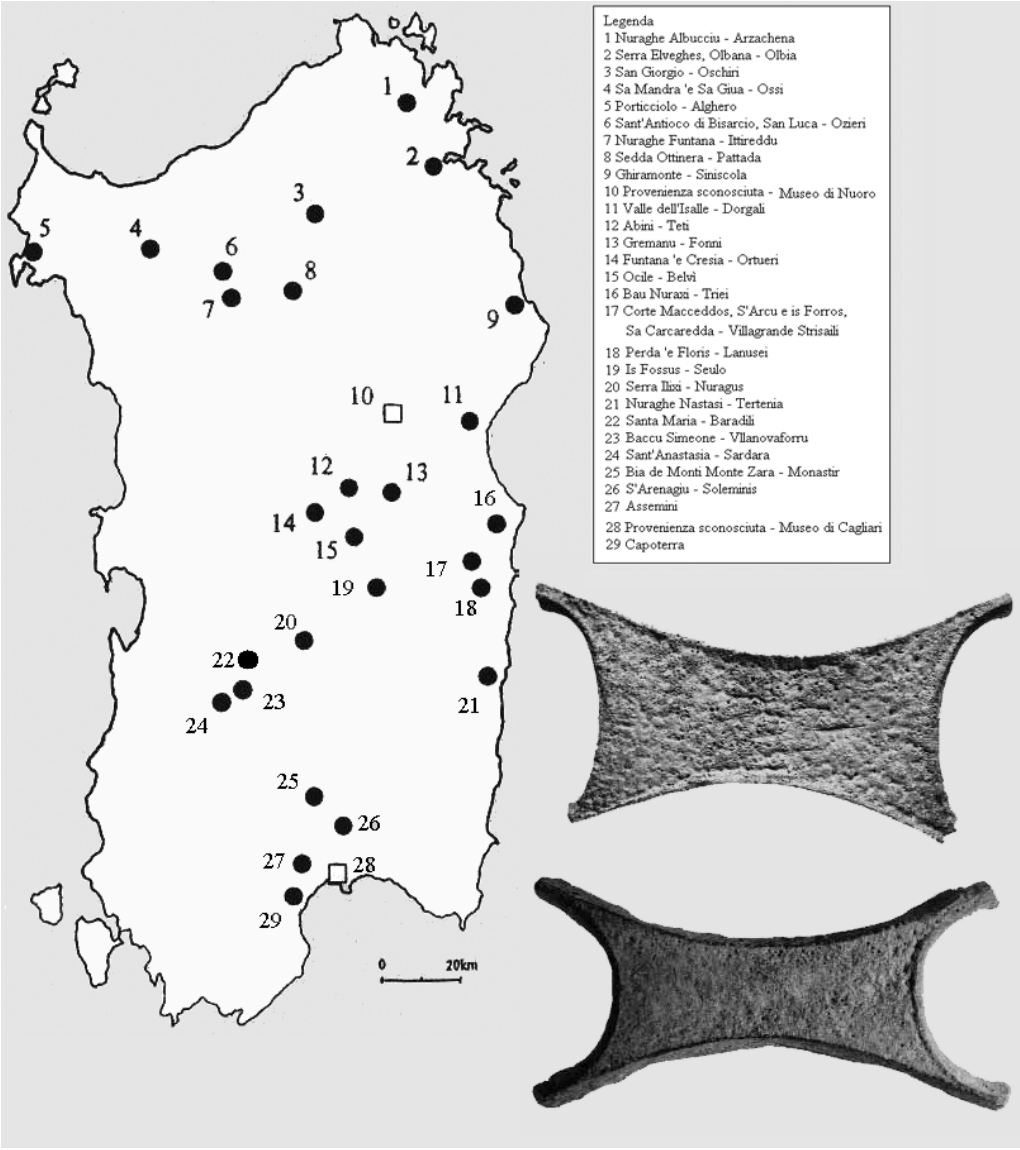

Figure 69. Distribution's map of the ox-hide ingots in Sardinia (rielaboration of the image, in Serchisu 2011, 175, fig. 3).

As explained in the previous chapters, it is clear that a connection between the Mycenaean pottery found in Sardinia and in Cyprus may be confirmed, at least for those fragments dating back to the LH IIIB period, and obviously with the Cypriot pottery found in Sardinia and, probably, with the Nuragic pottery found in Cyprus. Nonetheless, the full understanding of the trades, the time when Cypriot merchants arrived in Sardinia and whether they were autonomous in their trades with Sardinia may be discussed at an hypothetical level only[228]. Archaeological data do not show when the oxhide ingots were carried for the first time to Sardinia compared to the Mycenaean pottery: did they arrive at the same time, or later on? Based on the items found in the wrecks, it is perhaps more plausible that the oxhide ingots and the pottery found were taken to Sardinia at the same time. Likewise, Cypriot cargo-boats played an important role on the routes between Sardinia and the Aegean, during the late stages of the second Millennium B.C., as the discovery of oxhide ingots in contexts which might be dated back to the Early Iron Age seems to suggest, despite the heated scientific discussions on the matter. Was part of the oxhide ingots hoarded up for a number of centuries, and therefore, kept away from the normal trading circuit, just like the bun ingots[229]? This is one of the most plausible hypotheses, based on the recent discovery of ingot fragments found in ′treasure chests′ in contexts dating back to the Early Iron Age.

[228] Bernardini rejected the idea that Sardinia had an exclusive trade with specific areas, through ethnically and culturally identified merchants; he ruled out the hypothesis that the circulation of Cypriot bronze items implied the presence of Cypriot merchants (2008 Bernardini, 180)

[229] On the hoarding up during the Italian protohistory, see Peroni 1994, 249-254. There are many different hypotheses on the reasons why oxhide and bun ingots were hoarded up. However, some observations may be mentioned. For example, some hypotheses are worth mentioning. E. Pernicka maintains that the fact that ingots were not used for the production of manufactured goods could be explained with a metallurgical incompatibility (Lo Schiavo 1998, 57). Another hypothesis based on the complexity of the study of Sardinia metallurgy make reference to "due fenomeni antitetici ma ugualmente fuorvianti, che sono da un lato la lunga persistenza di modelli formali e tecniche di lavorazione accreditati di un particolare prestigio, dall'altro la lunga tesaurizzazione di singoli manufatti e la loro sottrazione al normale circuito d'uso o di scambio" (Usai 2007,40).

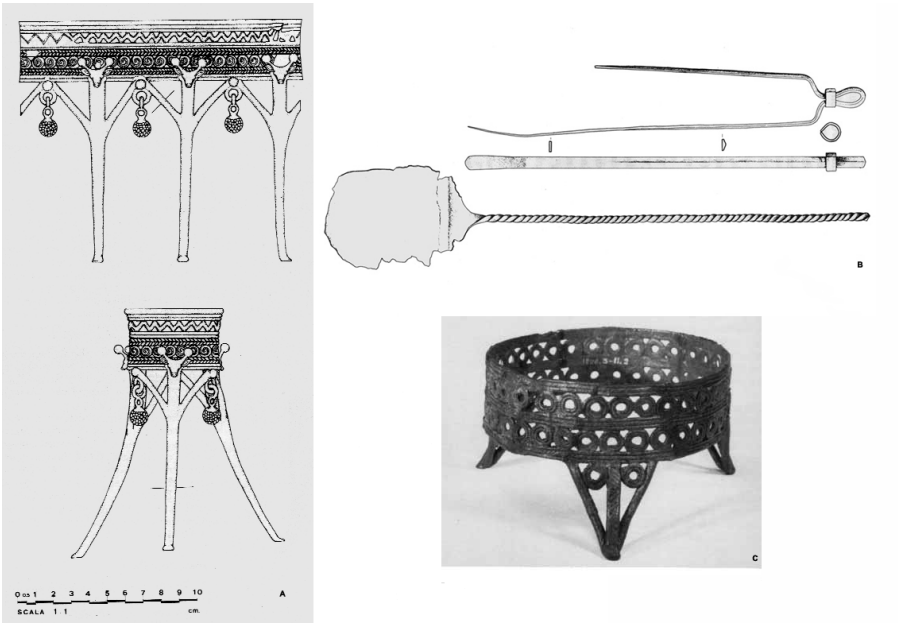

Figure 70. Cypriots artefacts. A) Tripod from Su Benatzu cave (Santadi); B) Cypriot smelter's tools (private collection in Oristano); C)tripod of Santa Maria in Paulis (Bernardini 2011, 19, fig. 13.)

The range of hypotheses is wide: the first vectors associated with Mycenaean pottery might have not been connected with oxhide ingots, since in other situations (e.g. in the Italian peninsula) the presence of Mycenaean pottery is not connected to Cypriot artefacts, but at the same time, Sardinia is the only region where those two elements seemed to coexist. In any case, the stratigraphic-archaeological uncertainties on the discovery of ingots are still major and, therefore, the classification of the places of discovery might be affected by them: the ingots are rarely connected through associations which can provide useful chronological information[230].

With reference to Sardinia, although all possibly dating back to the Late Bronze Age, since they were all found in contexts such as the storeroom of Funtana Coberta in Ballao, where fragments of ingots and votive swords were found inside a Kommòs-style jar (Lo Schiavo 2011, 35), which were used until the Late Bronze Age (Manunza 2008, 4-5), and such hypothesis is backed up by two discoveries of clearly dated oxhide ingot, as in the case of Nuraghe Albucciu in Arzachena and Nuraghe Funtana in Ittireddu (Campus - Leonelli 1998, 515), it does not seem plausible that the ingots may have been produced before the Late Bronze Age.

[230] F. Lo Schiavo provides the following classification: "Dei 31 rinvenimenti di lingotti oxhide registrati, 15 sono stati trovati dentro o vicini a nuraghi o a villaggi nuragici. Di questi, 4 sono ripostigli sicuri, 4 probabili. La distinzione fra Nuraghe e villaggio nuragico non è facile, quando la scoperta viene fatta i una struttura costruita sulla sommità del terrazzo di un nuraghe, o entro l'antemurale di un nuraghe. Inoltre una scoperta vicino ad una torre nuragica che non sia stata scavata non esclude la possibilità che vi fosse un villaggio all'intorno. [...] Di 31 casi di rinvenimenti di lingotti oxhide, 13 sono stati effettuati in luoghi sacri: 4 in santuari, 6 in templi e 3 in sacelli nuragici. [...]La distinzione fra tempio, santuario e sacello nuragico non è semplice, [...] che i siti archeologici non sono integralmente esplorati, per cui le funzioni del monumento, se struttura templare isolata oppure ampio e complesso santuario, non sempre sono conosciute" (Lo Schiavo 2012, 20-21).

F. Lo Schiavo maintains that the oxhide ingots might have arrived in Sardinia even before the Late Bronze Age and that their importation might have ended during the XI century B.C. (Lo Schiavo 2011, 14-40)[231]. The idea that the ingot found in Sant'Antioco of Bisarcio came from the foundation of a nuraghe seems quite far-fetched in the absence of well-grounded archaeological documentation. Similarly, the association of the oxhide ingot to the fragment of Mycenaean pottery dating back to the LH IIIC period, coming from Nuraghe Nastasi of Tertenia, is doubtful (Lo Schiavo 2011, 23), regardless of the stratigraphic position[232].

Rather than providing information on the beginning or the end of the importation activities, collected data prove that the goods were generally used until the end of the Final Bronze Age and during the early stages of the Iron Age, based on the discovery of ingots in storerooms dating back to the Iron Age (Lo Schiavo 2011, 23-24), thus showing a circulation of ingots during later stages. See, for example, the twelve pieces of copper ingots found in Sant'Anastasia in Sardara dating back to a stage later than the 10th century B.C. and stored in a bowl buried under the floor of a hut dated between the 9th and 8th century B.C. (Ugas-Usai 1987, 175; Bernardini 2010, 46). This seems to back up the hypothesis of a probable hoarding of copper ingots for several centuries and it could therefore justify their finding in much more recent contexts. For example, at the site of Sant'Anastasia, a second storeroom was found under the floor of a hut, storing a pyriform quadrangular-brimmed jar containing bronze tools, including a Cypriot-type fuser spring and two bronze two-handled Cypriot basins (Ugas-Usai 1987, 174-191). A recent study published by F. Serchisu seems to support the hypothesis of a later dating, maintaining that those kinds of goods

[231] The idea that, during the 12th century B.C., the oxhide ingot production ended on the island of Cyprus is the result of an observation. Kassianidou supports this hypothesis since the wreck of Point Iria, dating back to the 12th century B.C., did not include any oxhide ingot in its cargo. According to him, during the production of oxhide ingots had already ended in the 11th century B.C. and, as early as the 12th century B.C., large-scale exports had stopped (Kassianidou 2001, 99; 2005, 334). With regard to a similar perspective, archaeological data from Sardinia would be more than simple observations. They would even move the chronology of the oxhide ingots back in time. Clearly, in order to advance any hypothesis, clearer archaeological data are needed. Similarly, the hypothesis that ingots arrived in Sardinia during the 14th century B.C. is hardly acceptable, if the finds of Sant'Antioco di Bisarcio only are taken into account, since they had never been found at the foundations of a nuraghe (Lo Schiavo 2005, 319, describes the conditions of the discovery of the ingots in Sant'Antioco di Bisarcio, and Lo Schiavo 2012, 26, describes the hypothesis of the importation of ingots).

[232] As already mentioned in previous chapters on the association of the figulina pottery fragment found in Tertenia to the LH IIIC period, one can only trust such hypothesis, being unable to raise any objection. Indeed, there may be no evidence on the matter, because no photo or drawing of the fragment has ever been published, nor has it been possible to examine them. As in this case, it would seem that the Mycenaean pottery found in Sardinia, associated with the oxhide ingots, was sometimes used as an excuse to bolster or weaken the chronological hypotheses concerning the so-called "end of the Nuragic age". Likewise, the comparison between the large bowl containing the fragments of oxhide ingots at the Sant'Anastasia of Sardara site and the large bowl found inside Nuraghe Nastasi of Tertenia are worth mentioning (Ugas-Usai 1987, 183).

were stored in containers that, at that time, were already worn-out or broken, like in the case of Sant'Anastasia, and were no longer used for their original purpose (Serchisu 2009, 173)[233].

Oxhide ingots could be used as a mark for a chronological and cultural development of bronze-working, especially for the figurative production of Nuragic Sardinia. Therefore, the chronological and cultural issues connected with their appearance and circulation across the island are fully intertwined and may not be studied separately[234].

They may not be regarded as an *unicum* though, but a sign of the beginning or of an ongoing process that would develop during the following centuries, when bronze figurative production thrived, characterizing the Nuragic civilization.

Unfortunately, in the absence of stratigraphic-archaeological data proving such cross-cultural character, it is also true that all other hypotheses may not be excluded. Paolo Bernardini indeed points out that "sino ad ora in Sardegna mancano associazioni tra ceramiche cipriote, pani di rame, strumentario metallurgico e supporti tripode; eppure non va escluso che, in futuro, una linea mercantile cipriota, collegata alle ceramiche, ai lingotti e ai manufatti bronzei possa essere sostenuta sulla base di dati più ampi e organici" (Bernardini 2010, 44). Available data therefore do not support the hypothesis of an exclusive "Cypriot" trade, and, above all, it is clear that the relation between Sardinia and the Aegean and Eastern region developed throughout the 2nd millennium. Indeed, they do not prove the circulation of copper bun ingots during the time when the first Cypriot or Mycenaean pottery was carried to Sardinia. Nor can it be possible to maintain, as already pointed out, that they in fact coexisted, if the shiploads of the mentioned wrecks are taken into account. Similarly, the reverse-handled vessel, found in Pyla Kokkinokremos, does not prove that the relations with Cyprus depended on the exploitation of metals only, or that such exchange was the only reason. If the context of discovery of the vase were to be dated back to the XII century B.C., further questions would arise, as to whether the vase is a sign of the beginning or the end of the trade with Cyprus, since the production of ingots is expected to stop during the XII century B.C., especially based on the fact that the type of pot found in Sardinia until Late Bronze Age was

[233] According to the same article, none of the containers used to store ingots has been found associated with, for example, slate-grey pottery, that is a typical finding of the facies of Antigori, that is, the Late Bronze Age 2; also none of those containers had ear-shaped loops, which are the distinguishing feature of Late Bronze Age vessels. While, as the author reminds, all containers have simple loop handles, typical con the Final Bronza Age. Therefore, based on their containers, ingot fragments may be dated back to a time that may not be later than the Late Bronze Age (Campus, Leonelli 1998, pages 512-516; Ugas *et alii* 2004, pages 399-404).

[234] I personally believe that F. Lo Schiavo reads too much into the available data when she frames Sardinia as part of the interest of Iberian populations peninsula for the Aegean region. In addition, if the similarities between the swords found in Sant'Iroxi and the Argaric models is to be taken into account, it may not be possible to accept the hypothesis of a Cypriot cultural conquest (Lo Schiavo 2010, 278), especially if such similarities are only circumstantial, as recent studies seem to prove that those swords were manufactured locally.

also found during the Early Iron Age[235]. A recent analysis comparing radiocarbon dating data with cultural sequences of pottery series (Rubinos, Ruiz Galvez 2003, pages 16-21) seems to show that the circulation of those goods started during the Late Bronze Age and continued also during the Iron Age. It would seem that Sardinia, an island rich in copper, constantly received copper from Cyprus, while the latter, that did not enjoy rich deposits, seems to have been very keen in new technologies; some scholars even argued that the Philistines might have been the first iron prospectors of the Western world (Bernardini 2008, 180). Likewise, several recent archaeo-metallurgical studies, conducted through lead isotope analysis, pose major problems, much greater than one could expect 10 years ago.

The following paragraphs provide the list of possible interpretations:

- The circulation of ingots and other contemporary Cypriot goods began as early as the 14th century B.C., together with the Mycenaean and Minoan pottery (LH IIIA:2; LHIIIB), but in the framework of an exclusive trade relation, as argued by F. Lo Schiavo. In this case, either "Cypriot" ships sailed to Sardinia (as opposed to the multi-ethnicity demonstrated by the shiploads of the oldest wrecks), or Cypriot crews or groups of people did, conducting private trade activities on "multiethnic" ships.
- The arrival and circulation of Mycenaean pottery occurred at the same time as the ingots' and began as early as the XIV century B.C., based on the similarities with the shiploads of Ulu Burun and Cape Gelidonya wrecks, characterized by multi-ethnic crews, independent trade or exclusive trade of a limited kind of goods for limited groups of people.
- The arrival of Minoan and Mycenaean pottery before the oxhide ingots. They arrived on the island, along with other Cypriot goods, at a later stage, at the end of the XII century B.C., that may be set between the Final Bronze Age and the Early Iron Age.
- The arrival of oxhide ingots partly occurs at the same time as the Minoan and Mycenaean pottery, but their valorisation, the beginning of the hoarding process, and their use took place at a later stage when the contacts with the Cypriots and other Levantine peoples became more frequent, during the slow and stretched transition process between *pre-colonization* and *colonization*, that is the Late Bronze Age and the Early Iron Age, as argued by Paolo Bernardini.

Based of further associations, bun and oxhide ingots seem to have coexisted, since they were found together inside the of Uluburun and Cape Gelidonya wrecks. Bun and oxhide ingots also seem to have shared the same assumptions in terms of circulation, but with some important specifications. The origin of the copper bun ingots found on the Aegean wrecks is not clear, but as long as Sardinia

[235] I wish to express my doubts on the recovery of the vessel in Cyprus in a 12th century B.C. context. The fact that the vessel was found in a room where Mycenaean elements dating back to the 12th century B.C. were stored, does not provide information on the stratigraphy of the storeroom. Therefore, until the stratigraphic data of the storage room in Pyla where the Nuragic vessel was found are published, the data published by Karagheorgis in 2011 will be taken into account, still bearing in mind that similar vessels were found in later contexts.

is concerned, a recent lead isotopes analysis conducted by Gale on 54 bun ingots showed that 46 of them were made with Sardinian copper, while the remaining 9 were made with copper coming from Apliki in Cyprus. Also "Current evidence, embracing both lead isotope analyses and silver contents, does not support the suggestion (Kassianidou 2001;2005) that some Nuragic bronze artefacts were made of oxhide ingot copper to which Sardinian Pb- bearing cassiterite was added" (Gale 2006, 32). The evidence has also shown, with reference to some bronze Nuragic statuettes[236], that the copper used was not the same as the oxhide ingots'; it was in fact of Sardinian origin. In addition to it, the same bun ingots were found in contexts that could be dated more precisely back to the Early Iron Age at the Sant'Imbenia site, one of the North Sardinian sites with the clearest connection and cross-cultural character between the end of the Bronze Age and the Early Iron Age (Bernardini 2008; Depalmas –Fundoni – Luongo 2011)

5.6 Chronological issues

Although it may seem irrelevant for the subject at stake, it is important to take into consideration the historical issues that have emerged in recent years and have split the world of research on Nuragic Sardinia. They also seem to muddle the matter for all scholars who are not directly involved in research activities on the Nuragic period.

The time when the trade with the Aegean an Cypriot peoples started, seems to be clear - XIV century B.C. (when the MB3, or the MB3B may be set[237] and to which the most ancient LHIIIA:2 Mycenaean imports seem to refer to). It is nonetheless difficult to understand how they evolved throughout the second millennium and what impact they had until the first centuries of the first millennium, when the Phoenicians arrived on the island. It is therefore hard to detect any cross-cultural character that certainly may not be restricted to a single act of contact.

A long-standing chronological issue that kindles the two different schools of thought on the so-called "end" of Nuragic civilization, affects current research, preventing a fruitful comparative study and, therefore, affecting the full understanding of what happened during the last few centuries of the second millennium B.C. Two conflicting approaches on Nuragic chronology clash with each other: the "rialzista" and "ribassista" approaches almost seem the expressions of two schools of thought, which share the same time of reference, but have two completely different methodological approaches[238].

[236] Gale N.H. reviewed the LIA conducted on bronze pieces found in Santa Maria of Paulis (Macnamara – Ridgway - Ridgway 1984)

[237] Perra 2009, 267-269

[238] P. Bernardini maintains that "l'approccio 'rialzista' alla tematica in argomento deve naturalmente rimuovere la qualificazione di 'contesto' per le associazioni di manufatti indigeni con manufatti fenici, valorizzando da un lato il dato

The "rialzista" trend has resulted in the conviction that the Nuragic civilization ended at the end of the Bronze Age; on such basis, the Late Bronze Age would have included some of the most important events that, so far, have been connected to the first phase of the Iron Age, regarding the rest of them as "post-Nuragic reuse"[239]. Such perspective inevitably affects the chronological distribution of a wide range of findings and the hypothesis that the Nuragic age could overlap the Bronze Age and end at the end of the second millennium (Campus – Leonelli - Lo Schiavo 2008, 62).

After the major occupation, exploitation, land reclamation and monumental construction activity, that had its peak during the Recent Bronze Age, after a great territorial planning project (Usai 2009, 271-272), the Nuragic civilization ended during the Late Bronze Age. As Alessandro Usai explains, "le comunità nuragiche hanno cominciato a considerare che il costo economico e umano della costruzione dei nuraghi fosse sproporzionato al beneficio derivante in termini tanto utilitari quanto simbolici e abbiano progressivamente orientato gli sforzi verso una maggiore strutturazione degli insediamenti e degli edifici di culto" (Usai 2009, 272). This decrease, "decay" and abandonment was confirmed, according to the "rialzisti", by the small number of burials, but it is probable that it was not a decrease *per se*, but only a change in architecture and funerary rituals (Usai 2007, 53). That is, the idea that nuraghi were no longer built during the second phase of the Final Bronze Age because of the end of the Nuragic civilization, a kind of decadence of the Nuragic age, is a mere supposition that clashes with historical data; "post-Nuragic" may be rightly regarded as an elegant understatement to say that something is 'not Nuragic' ("un elegante eufemismo per non dire 'non nuragico'") (Usai 2007, 53)[240]. The clash of the two schools of thought is even greater when considering the development of metallurgy and, therefore, bronze figurative art. The "rialzista" school maintains that the Sardinia metalworking had its peak between the Late Bronze Age and the Final Bronze Age, that is, when the Nuragic people learnt different techniques through their contacts with the Cypriots and applied them to goods production (Campus - Leonelli - Lo Schiavo 2010, 91). The concentration of all the products of metallurgical activities between the XIV and XI century B.C. seems to confirm that the lack of nuraghi construction is the result of their systematic abandonment (evidence is provided by the collapse of their roofs) and of a "crisis" generated by a series of so-called "eco-facts" (Campus - Leonelli 2009, 273; Campus - Leonelli - Lo Schiavo 2010, 67). Although recognized by the "rialzista" school, despite the lack of any stratigraphic data that

della discontinuità rispetto alla continuità nel divenire dei rapporti tra le due culture e dall'altro tentando di mettere in crisi la esistenza stessa di associazioni degne di questo nome" (Bernardini 2007, 15)

[239] Santoni 2005, 64-66; Lo Schiavo et alii 2010, use the term"post-Nuragic". The term has a rather negative meaning towards everything that cannot be defined as Nuragic, underlying "una cultura la cui esistenza viene tollerata più che studiata", P. Bernardini explains (Bernardini 2007, 17).

[240] I consider it very important that during the conference held in Villanovaforru the methodological question on the meaning of the term "Nuragic" and "Nuragic civilization" was raised (Sirigu 2011, 307-316).

could prove their destruction, abandonment and internal/external aggressions, the crisis does not seem to match the visible architectural changes of well shrines and temples, and does not explain the large number of storerooms where bronze items were stored, that were unknown to Nuragic people and are so well documented in contexts dating back to the beginning of the Early Iron Age. In addition to the afore-mentioned storerooms of Sant'Anastasia, a storerooms for copper and bronze items was found at the Sant'Imbenia Nuragic site (Alghero - SS), dating back to the Iron Age, where bun ingots[241], raised edged axes and the fragments of a "Monte Sa Idda" type sword were also found (Depalmas-Fundoni - Luongo 2011).

On the issued addressed in this work, this clash affects the understanding of cross-cultural processes generated by the contacts with the Aegean people. Therefore, it may not be disregarded.

No fruitful discussion may follow if the relations with the Mycenaean people are taken into account simply as an element of the Bronze Age, the end of which seems to be widely accepted and connected to a clear chronological framework, being recognized in different material forms. The core historical question of this work would seem to be dodged, though this work is not intended to provide a comprehensive answer to it (at least not now, due to the current low level of knowledge)[242]. Regarding the XIV-XI century B.C. as a time of great development that deeply affected the following progress of bronze figurative production, although unfruitful and limited in time to the "mythical" Nuragic Bronze Age, prevents scientific research to explore other issues relating to trade on the Aegean sea, which may not be considered as closed, determined and resolved aspects, as they seem to be.

When starting an historical research on a topic like this, it is unacceptable to regard the contacts with the Mycenaean world merely as a chapter of what was to referred to as "pre-colonization"[243], without studying it in depth, even if it seemed to play a more important role in the development of cultural processes, rather than in their contemporary material production.

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[241] Plano convex ingots (or bun ingots) were found inside the Cape Gelidonya wreck, but they have a much greater circulation than oxhide ingots, both geographically and chronologically (Jones 2007, 81).

[242] An analysis of available literature shows that much has been written and mentioned on the event possibly occurred between the XIV and XI century B.C. This gives an idea of how the message of the great number of Mycenaean potsherds dating backed to the LH IIIC period (see ch. 1) was spread, probably passing off local productions as LH IIIC Mycenaean pottery. For example, the Tratalias discovery was mentioned, with a chronological attribution to the LH IIIC period and the attribution of Antigori pottery to a generic LH IIIB-IIIC timespan (Bernardini 2008, 172 - 173); or, in order to justify the presence of the Sardinians on merchant ships, reference is made to "vasi d'uso nuragici in contesti cretesi, siciliani e liparoti", although those findings probabily have 300 years of difference (Zucca 2012, 210).
Another proof of how easy it was to write about it, is the number of speeches focusing on the matter during the 2007 conference at the Museum of Villanovaforru. The gathering of scholars was supposed to be a moment of dialogue for the two schools of thought ("rialzista" and "ribassista"), but only a few speakers seemed to be interested in taking into consideration the first contacts between Sardinia and the Eastern population (for instance, Bondi 2012, 42)

[243] The term "pre-colonization" is the result of a long scientific tradition (initiated by S. Moscati in 1980 for Sardinia) including a wide bibliography about it and it is used to refer to a fairly long period of time that includes the latest stages of the Bronze Age and the Early Iron Age in the Atlantic and Mediterranean area, i.e. the period of time between the end of the 15th century B.C. and the 9th century B.C. (Bernardini 2008, 169-177)

Scientific literature has often condensed nearly 300 years of relations between the peoples of Sardinia and "Mycenae" and it is perhaps due to this that some generalizations result in a lack of clarity. On the other hand, finally the hypothesis according to which trade between Sardinia and the Aegean peoples was limited to the exploitation of mineral resources has now been rejected. Or rather, it has become clear that the hypothesis did not provide a comprehensive answer to the questions around their trade. Newly acquired data showed that the hypothesis only tried to provide an "easy" explanation, rather than an educated guess.

A very wide range of hypotheses is now available.

For instance, the questions "why are the Sardinians importing a metal which is available in their country?" (Kassianidou 2001, 333) and "what was sought by the voyagers from the east in exchange for tin or copper"? (Gale 2006, 8) are left without a proper answer, or even without any answer at all[244].

5.7 New hypotheses and possible interpretation to explain the relations between Sardinia and the Aegean peoples during the II millennium B.C.

"*Precolonizzazione, frequentazione, espansione, colonizzazione sono i concetti, gli strumenti e gli approcci metodologici con i quali, in modo insoddisfacente e spesso artificioso il reale sviluppo storico di queste vicende viene incasellato, settorializzato, sovente frantumato*" Bernardini wrote in 2008.

The collection of archaeological data provide evidence on the "relations" that occurred between Sardinia and the Aegean world during the XIV-XI century B.C., and continued until the Iron Age, in a way that is not clear, but manifest. As already mentioned, there is no evidence of an exclusive trade relation between Cyprus and Sardinia or between the Mycenaeans and Sardinia, or between Crete and Sardinia, but it is clear that they had complex routes and people's involvement. In any case, the Mycenaean and Cretan elements, at least as far as the few and weak stratigraphic reference elements are concerned, are thought to be more ancient than the Cypriot ones. Indeed, the first Mycenaean finds in Sardinia date back to LHIIIA:2, the most ancient foreign items found in Antigori's stratigraphic layers are of Mynoan and Mycenaean origin and date back to the LH IIIB period (that corresponds to the Sardinian Late Bronze Age). Most of the potsherds found on the island also date back to the LH IIIB period. As already mentioned in the previous paragraphs, even

[244] "Tra il XII e il IX sec. a. C. le acque del Mediterraneo occidentale e dell'occidente atlantico sono attraversate da equipaggi indecifrabili, sono percorse da economie cifrate; [...]i meccanismi e le strategie economiche del rapporto attivato con i popoli dell'Occidente permangono in gran parte oscuri"

if they have never been found in direct association with the Mycenaean pottery of LH IIIB period[245] or with a few fragments of Cypriot pottery found in Antigori, oxhide ingots might have arrived in Sardinia at the same time as the potsherds and used also during the later stages. But it is necessary to study again the circulation and use of oxhide ingots during much later periods. That is, if it may be assumed that their production completely stopped during the XII century B.C., it may be plausible to suggest that a greater circulation occurred at the end of the 2nd millennium B.C. (at least in the western Mediterranean). Nonetheless, there is currently no clear material evidence that may suggest the development of metallurgy or the production of metal items, of Mycenaean origin or characterization (Lo Schiavo 2008, 419-420).

As already mentioned on the matter, F. Lo Schiavo claims that, although they did visit the Tyrrhenian island during the same period of time, the Mycenaeans and the Cypriots traded goods of different kind and had different technological resources.

If this hypothesis turns out to be correct, the "preferential" Cypriot cargo ships must have been more recent than the Mycenaean importations, since, as already mentioned, the data on the ingots found in Sardinia seem to suggest that they date back to a later period of time. From this point of view, the chronological issues described in the previous section may affect the subject matter at stake. Indeed, the "rialzista" school believes that the casting and metal-working abilities, the production of metal tools or religious items reach their peak during the Recent and Final Bronze Age thanks to the first contact with the Aegean peoples. That means that the contact with these groups were dictated by the exchange of metallurgical products. Although data confirm that the bronze production in Sardinia reaches its height at later stages, also with magnificent examples during the Early Iron Age, a “metallurgical” hypothesis could not be one-sided in terms of exchange of products with the Aegean people.

If traders belonged to different ethnic groups and managed trade autonomously, they might have had a different scope of action. This means that, if the Mycenaeans, the Minoans and the Cypriots did come on the island during the same period of time, could they have been focusing on the same type of products? For instance, could they all be trading resources such as copper, tin, lead and silver, without treading on each other’s toes? Or did they have any interest in "metallurgical" products? And why think of Sardinia as "metallurgical lighthouse" only?

To date, archaeological data have not provided clear evidence that the exchange of metals or the exploitation of Sardinian mines were indeed carried out in Sardinia to supply the Aegean populations, after depleting their own resources, or due to possible changes that might have

[245] Chapter 2, footnote 8; 9.

occurred in the Palatine system, or to the series of events that affected the Aegean region between the LH IIIB:2 and the LH IIIC periods.

On the other hand, there is no evidence of Sardinia "metals" or metallurgical products in the Aegean region.

The Cypriot "metallurgical" tools found in Sardinia is not sufficient to confirm that the only interest of Cypriot people was the metallurgical resources of the island.

5.7.1 Wine, oil and other "humble" goods

Due to the many issues already mentioned, the study will focus on a deeper understanding and verification of the exchange of different products (not limited to metals) that do not seem to have drawn the researchers' attention so far and that, due to their perishability, have left no archaeological evidence whatsoever.

But inside the Ulu Burun and Cape Gelidonya wrecks, together with the nobler ingots and swords, an incredible amount of organic elements was found. This suggests that oil and wine were important products, in addition to a great variety of spices and a whole series of products that could be referred to as "humble", in comparison to metals or to the alleged "money god" of the ancient times.

Since the contacts with the Mycenaean people lasted for a long time, perhaps they could have facilitated the first and early attempts at cultivating vines and olive trees (Garibaldi 2004, 369; Lo Schiavo 2008, 419).

Or rather, the variety of imported clay materials is significant and leads to dwell on their content. And the contents of the potsherds could indeed provide an answer to the questions posed in the previous paragraph, that is yet to be properly studied by researchers.

Could Sardinia have been an ideal place to dock, restock perishable goods or acquire some specific products that were difficult to find in the rest of the Mediterranean? For example, the scientific debate on the introduction of wine and olive trees in the western Mediterranean area has been paramount, although not always supported by archaeological data.

- **Wine**

In the Mediterranean area, between the VIII and VI centuries B.C., an "internationalisation" of the consumption of wine took place, due to the use and ritual habits of self-representation of selected groups, holders of economic and political power in the different geopolitical realities of the time (including the Greek, the Etruscan and the Phoenician cities and principalities of the Near East).

During those centuries, Sardinia became the central hub of that process, as the rich production of askoid jars and their circulation inside and outside the island show (including Sicily, the Island of Mozia, Marsala and Dessueri-Monte Maio; the Island of Crete, the Tomb #2 of the Khaniale Tekke necropolis; Tunisia, Carthage; the Iberian Peninsula, Cadiz, the Andalusian village of Carambolo and the Atlantic coast; and the mouth of the Huelva river, i.e. the ancient Tartessos settlement). In addition, the production of transport wine amphorae found at the Nuragic site of Sant'Imbenia in Alghero seems to date back between the end of the second millennium and the beginning of the first millennium. They are referred to as "ZitA" (*Zentralitalische Anphoren*) and were characterized by a Phoenician style, made of local clay, being found in the whole Tyrrhenian area, in Central Italy, in Carthage and on the Iberian Peninsula, namely in Toscanos and inside the Castle of Dona Blanca on the Atlantic coast of Cadiz. (IX – VII cent. B.C.) (Perra 2011, 68-71).

Only during the past decade, archaeological data have shown that the vine domestication and the introduction of wine in the island culinary habits may have occurred, however, centuries before the arrival of the Phoenicians, especially based on the importance of wine consumption among the Mycenaeans (Perra 2011, 58). As a matter of fact, the Mycenaean clay sets show that wine production was connected to both biological and consumption needs, but it was also very important in the social scenario (Steel 2004, 281).

This supported the deep-rooted believe that the introduction of vine and wine in the western Mediterranean area is the result of an importation from the eastern Mediterranean region, through the mediation of Mycenaean merchants during the Bronze Age: a genuine cultural achievement.

Molecular biological studies and DNA analysis on wild grapes (*Vitis vinifera* L. spp. *sylvestris*) and cultivated vine (*Vitis vinifera* L. ssp. *sativa*), however, have challenged that diffusionist belief, especially based on the latest Sardinia findings (Lovicu et al. 2011, 249-250). The latest archaeometric results confirm that *vitis vinifera* has been cultivated since the end of the Middle Bronze Age.

The initial discovery of charred grape seeds coming from the site of Duos Nuraghes showed that remains of wild vine could be found in a final Middle Bronze Age context. The grape seeds were later proved to have been cultivated. Not just grape seeds, but also charred grapes, such as those found inside Hut #5 of the settlement around Nuraghe Adoni in Villanovatulo, dating back to the early stages of Final Bronze Age, around the XII century B.C. (Perra 2011, 65)[246].

However, the most interesting and important data come from the Sa Osa site (Oristano-Cabras)[247]. The three excavation campaigns conducted between 2008 and 2009, however, confirmed the

[246] French CNRS carpologist Philippe Marinval analysed the grape seeds found in Duos Nuraghes and he is currently engaged in the archaeometric analysis of the Sa Osa site.

presence of grape cultivation in Sardinia since the end of the Middle Bronze Age (Usai 2010). This Campidano site (in the central western part of Sardinia), due to its closed contexts, included extremely interesting findings which highlight the extraordinarily productive scenario of the Nuragic Age, resulting in a number of new perspectives.

One of the holes on the ground (well N) may be dated back to a later stage of the Bronze Age and the beginning of the Final Bronze Age. It contained not only an incredible number of intact or mended potsherds, some of which characterised by the so-called Antigori *facies*, but also a large amount of organic remains in excellent conditions (Usai 2011, 167-168).

Figure 71. Samples of seeds from the "well N" of Sa Osa site (photo courtesy by Superintendence of Soprintendenza per i Beni Archeologici *of the Provinces of Cagliari and Oristano).*

Most notably grape seeds were found and associated with fig seeds, hazelnuts, seeds of mastic tree and other plant species, animal and fish remains, wood and cork (Usai 2010, Serreli 2011, Sanna 2011, Lovicu et al. 2011). The analyses conducted so far on the seeds found at the Sa Osa site are the first step of a new chapter of research on vine cultivation during the Bronze Age.

Their state of conservation, thank to the moist microclimate, allowed DNA extraction, making it possible to better understand the genomic relations among Sardinian wild and cultivated vines.

[247] The site, located in the municipality of Cabras, a few kilometres from the city of Tharros, at few meters from the Tirso river and its mouth, is a monumental settlement (therefore, including no nuraghe) that was intended for productive purposes, testifying an clear continuity between the late Neolithic age to the Early Iron Age. In a one-hectare area, approximately 25 holes on the ground were found (wells and silos) dating back between the Middle Bronze Age and the Final Bronze Age. (See the Tharros Felix IV volume, the section devoted to excavations, and the articles currently being published by Usai et al., which are the results of the presentations held at the "XXIV Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria"). Most of the data presented in this work, reporting on the Sa Osa site, have never been published. Tribute must paid to the *Soprintendenza per i Beni Archeologici* of the Provinces of Cagliari and Oristano and coordinator Dr. A. Usai for granting my participation in in the 2008-2009 excavation campaigns and consent to publish some of the final results.

Figure 72. Samples of grape-wine seeds (photo courtesy of Soprintendenza per i Beni Archeologici of the Provinces of Cagliari and Oristano).

The amount of grape seeds found was so great that large statistical surveys could be carried out. For instance, in a sample of 100 seeds of cultivated vine many of the most famous modern Sardinia varieties were recognized (but also some peninsular vines), thus describing them as local Sardinia species (Orrù et al. 2012, Lovicu et. al. 2011 250, 251). If the cultivation of vines (and their varieties) was indeed part of a east-to-west process, evidence on their origin should be found through DNA analysis. As a matter of fact, the varieties cultivated in the Western Mediterranean region are much more similar to the wild vines of the same area, rather than to those on the eastern side. The Sa Osa findings could provide further confirmation (Lovicu 2011, 252). These extraordinary and fascinating aspects show that the Nuragic people living in the Campidano area had acquired a skilled and advanced vine domestication ability, already in the Late Bronze Age and probably also in the Middle Bronze Age[248]; nonetheless, this does not confirm that they were capable of producing wine and, therefore, it may not be possible to know whether the Nuragic people were instructed by the Mycenaean in the art of wine-making, or whether they already knew how to make it during the Nuragic age. The results of the analyses of the organic compounds found inside the "Well N" potsherds are yet to be published[249], but should they confirm the presence of tartaric acid, one of the biochemical wine markers, the historical perspective of Mediterranean wine culture would change drastically. Moreover, the presence of a large amount of fig seeds together with the grape seeds found in the vessels, suggest that this kind of sugar-rich fruit might have been

[248] The other two wells contained organic materials, especially large amounts of wood. The wood was analysed by the Wood Anatomy Laboratory of the Florence CNR-IVALSA centre in 2010 and by Verona DENDRODATA S.A.S. in 2011. They also contained some seeds, but the results of their analysis have not been made available yet.

[249] The gas-chromatography analysis performed on the organic residues found in the vessels were conducted by Dominique Frère and his team. Results are yet to be made available.

used to increase the sweetness of the grapes, promote the fermentation process and obtain more product[250].

Figure 73. Fig seeds with organic remains from the well N of Sa Osa site (photo by L. Soro; August 2009).

As already mentioned, if the production of askoid and askos jars did thrive at much later stages and they had been indeed used to store wine[251], some scholars maintain that the production of the first clay "Nuragic gray" jars as specialized containers to pour precious liquids such as wine, was started by the Mycenaeans (Lo Schiavo 2008, 419; Campus - Leonelli 2003, Perra 2011, 70). Those types are considered an innovation in Nuragic pottery. The discovery of the fragment found in Kommòs, in the *Southern Area, South of Building N* in a LH IIIA-IIIB context (Watrous 1980, p. 79; Campus - Leonelli 2000 p. 393) and its association with wine production does not seem accidental; the same applied to the fragment found in compartment 9 at the Nuraghe Antigori site (Ferrarese Ceruti, 1982 Tab. LXII, No. 7)[252].

[250] The idea of using figs to accelerate the wine-making process and avoid the transformation of wine into vinegar is the result of empirical experience. All the research team engaged in the excavations at the Sa Osa site share this hypothesis, based on the deep ethnographic fabric which characterises Sardinia. It also seems to be confirmed by the exchange of opinions that have been taking place with the researchers of the agricultural and biological fields involved.

[251] An askoid jug found inside Hut #7 of the Bau Nuraxi Nuragic village in Triei and another one found at the Nuraghe Funtana di Ittireddu site were studied through gas-chromatography to search organic compounds. Tartaric acid was found (Perra 2011, 70)

[252] See fig. 73. According to the volume on Nuragic pottery (Campus-Leonelli 2000,393), the fragment of Kommos dated back to the Recent Bronze Age, while the Nuraghe Antigori fragment dated back to the Final Bronze Age. There is no clear reason why the authors provided two different dates for the two fragments. Although slightly different in the shape of their rim and the loop joint, both jars are "Nuragic gray" and their particular context of discovery seems to confirm their dating back to the Recent Bronze Age.

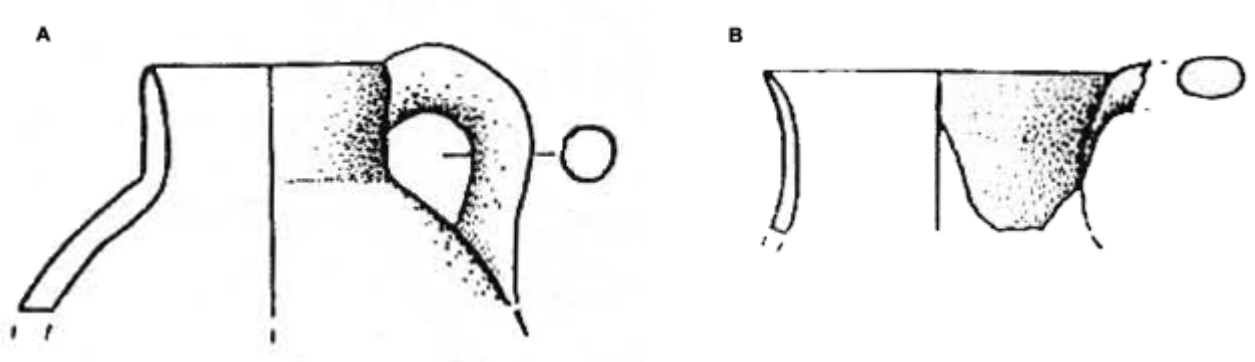

Figure 74. Nuragic jars in gray pottery: A) Kommos; B) Antigori (Campus - Leonelli 2000 p. 393).

Other "Nuragic grey" specimens were found at Nuraghe Arrubiu in Orroli, dated back to the Final Bronze Age though (Campus 2003, 59) and inside the Pirosu cave in Santadi. Today, pitchers are considered a typical Sardinia Recent Bronze Age vessels, although the few findings were limited to southern Sardinia (Leonelli 2003). To date, the study of the potsherds found at the Sa Osa site (that is still at an early stage) has not reported any discovery of jugs, but their presence may not be excluded and all the available data may provide an excellent opportunity to reflect upon the lively and specialized Nuragic Sardinian agricultural production.

- **Terebinth, mastic and other oils**

Another perishable good detected inside the Canaanite amphorae found in the above-mentioned wrecks is terebinth (or turpentine) oil or resin.

Terebinth is a shrubby spontaneous plant, typical of the Mediterranean flora. During the early stages of the Iron Age, it was considered a sacred plant in the Middle East and it played an important role in the sacred rituals of the Minoan people. It is also well represented in Mycenaean iconography (Beckmann 2012, 30), although it is not clear yet whether the term *ki-ta-no*, reported in the linear B tablets, does indeed refer to the terebinth (Privitera 2010).

Its use in the ancient times is also known thanks to several classical literary testimonies that mentioned it as an ingredient used in perfumes and ointments (Melena Jimenez 1983, 91), but it generated some "botanical" confusion in archaeological studies.

As a matter of fact, the term "terebinth" refers to a number of different botanical species. This shrub belongs to the Anacardiaceae family of the *pistacia* genus.

In the Mediterranean area, several different varieties are known: *Pistacia terebinthus* L. subsp. *Terebinthus*, *Pistacia Atlantica Desf.*, *Pistacia lentiscus* L. and *Pistacia lentiscus var. chia*, and finally *Pistacia vera L.* Unlike the latter, the other species are not that different as far as fruits

are concerned, but only the type of shrub is different[253]. The *pistacia terebinthus L. subsp. Terebinthus, pistacia lentiscus L.* and the *Chia varieties* grow as shrubs, while *Pistacia Atlantica Desf.* is a tree.

In the past, the *pistacia lentiscus L.* was also called "terebinth". Moreover, the similarities of their varieties in terms of taste of their products and their scent, may have led to confusion and to the attribution of the generic name of "turpentine" for terebinth resin[254]. The most ancient archaeological evidence that confirm its use was found at the Neolithic site of Hajji Firuz Tepe in Iran (5400-5000 B.C.), inside a wine amphora (Beckmann 2011, 32)[255]. The most interesting Bronze Age findings are the remains of resin found inside the amphorae discovered at the Uluburun Canaanite wreck site. As Beckmann explains in an 2011 article, the "terebinth resin" label is used in a generalization fashion; further analyses seemed to confirm that they are actually remains of *Pistacia terebinthus L.* subsp. *Terebinthus*, but most plausibly *Pistacia lentiscus* or *Pistacia lentiscus var. Chia* (Beckmann 2011, 33-34). As a matter of fact, *pistacia lentiscus*, also known as mastic, and the *terebinthus* species, are shrubs with fine fruits used during the Bronze Age.

Due to the "humble" character of its evidence, this may be sound trivial.

If the *pistacia* shrub in its *lentiscus chia* and *terebinthus* varieties is known for the production of precious and redolent resin, the more common and ordinary *pistacia lentiscus* was the source of oil supply until the Fifties for all those who were too poor to afford olive oil, the latter being an excellent good that was bought by the wealthier families.

[253] *Pistacia vera* is the plant that bears common pistachios. At Mediterranean level, a lively production may be appreciated in Sicily, where the plant seems to have been imported by the Arabs, as the word in local dialect designating pistachios seems to confirm. Today, Iran is the world's largest producer.

[254] Turpentine is an oleoresin that was very popular during the late 18th century. The island of Chios became one of the main trade centres of "turpentine". Today some villages on the island continue to produce "turpentine" or rather "mastika chiou", obtained from the shrubs of *pistacia lentiscus var. Chia*, that is now protected by the EU as a local product.
(http://ec.europa.eu/agriculture/quality/door/registeredName.html?denominationId=845).

[255] The example of the Iranian *tell* is also the most ancient testimony of wine production and the combination of wine and Terebinth resin may be explained with its taste (for instance, the Greek were fond of resinated wine, and it is now produced with Cretan retsina) and the way they were stored, in order to avoid the transformation of wine into vinegar (Perra 2011, 62). Excavations were conducted by the Iranian Penn Museum and the results may be found on the website http://www.penn.museum/sites/wine/wineneolithic.html

Figure 75.Experimental archaeology in south Sardinia :squeezing of lentisk through direct pressing (Loi 2010, 3 fig. 3).

So it might have been used during the Nuragic Age and, therefore, it could have been an interesting good for the Aegean groups in contact with Nuragic people. For example, in Corsica evidence seems to confirm that mastic oil was used (but also of Oleaster) as early as the Neolithic age (De Lanfranchi Bui Thi Mai 1995).

Sardinia flora includes all the varieties of the *pistacia* family[256] and its wide ethnographic repertoire includes mastic oil, that is still being used, both for culinary purposes, and as an excellent fuel for lighting[257]. To date there is no archaeological information about the Nuragic period that indicates its production, but it is also true that there are almost no archaeometric studies which analyse the organic compounds found inside Nuragic potsherds[258]. If we were to confirm that mastic-based products were exchanged with Aegean populations, or with elite groups, it would be necessary to take into account the results of the first lab analyses performed on some organic remains (seeds) found inside Well N at the Sa Osa site, which seem to be mastic drupes. It is also true that artefacts such as stone mills (that might have been used to press mastic drupes, olives or grapes and be

[256] The presence of Pistacia Vera shrubs has never been confirmed, nor has the harvesting of pistachios, which was instead confirmed in Sicily after the Arab conquest. Evidence is provided by the sound Arabic terminology with reference to pistachios.

[257] Until the Fifties-Sixties, mastic oil was connected to humble social groups, but now it is sought-after mostly by herbalists and refined cooks for its extraordinary aroma and recognized therapeutic properties.

[258] Historical archeometric data show that mastic oil was used together with olive oil. For instance, the analysis of the medieval amphorae of Tyrrhenian Tuscany show it

connected to the Nuragic Age)[259] have not been found, but experimental archaeological and ethnoarchaeological studies show that no mill was needed to produce mastic oil (Loi 2010)[260].

The fact that mastic oil was produced during the Nuragic Age seems to suggest that also olive trees were cultivated.

Mast oil and wine production has always been connected to the contacts with the Mycenaean world. But the Sa Osa site prompts several questions on the introduction of olive tree domestication. A fragment of olive tree wood has been found inside Well V of the Sa Osa site, dated on the basis of the analyses performed on the Sardinian Middle Bronze Age pottery (1600-1350 B.C.)[261]. The discovery of an olive branch does not prove, however, that Nuragic people produced olive oil, but it certainly provided evidence to support the hypothesis of the spread of agricultural production in the Mediterranean. Similarly, the yield should be evaluated in terms of agricultural gain for olive, wild olive and mastic oils.

Studies have shown that experimental archaeology with 18 kg of mastic drupes yield 3 litres of oil. With modern data relating to household productions, we know that the average yield of olive oil in Sardinia is a little higher. Therefore, we wonder whether massive cultivation of olive trees could have a good value, considering that local shrubs such as mastic grew, and still grow, spontaneously in Sardinia[262].

The great number of pottery vessels, such as Nuragic gray pottery bowls, another index fossil of the Recent Bronze Age in Sardinia, also found at the Kommos site, seem to connect their use with the processing and preparation of liquid substances. Indeed, they are large open vessels, with a smooth surface and, sometimes, polished to obtain a non-stick effect.

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[259] Lilliu believes that a calcareous marl tub found in Barumini was used to ret mastic. He indeed wrote an "ethnographic" description (surely the result of a personal experience of his) of an oil production process. (Lilliu 1955, 340-342).

[260] Mastic drupes were collected between November and January and were stored inside raw flax sacks. After a short period of time, they were processed and boiled in plenty of water. Later on, the product was trodden inside of a hollow cork tub. The juice was boiled again and the oil was separated from the aqueous part. The experimental archaeology trial indicated a yield of approximately 3 litres of oil every 18 kg of product.

[261] The data on the olive tree wood is confirmed by the studies conducted by Dr. N. Martinelli and Dr. O. Pignatelli of DENDRODATA S.A.S. of Verona in May 2011. Xilotechnological analyses were performed on the remains of wood found in Well V to identify their species. Along with the olive branch (*Olea europea L.*) fragments of evergreen oak were found, belonging to the *SUBER* section (*Quercus* sp. *SUBER* section) and to the fig tree variety (*Ficus carica* L.). Traces of processing were found. Pit V was dated back to the Middle Bronze Age as a result of the first examination performed on the pottery, but the in-depth study conducted for their publication is yet to be concluded.
Other taxonomic studies on other wooden artefacts found in Well N, Well U and Well V, were conducted in summer 2010 by researchers Dr. G. Giachi, N. Macchioni and C. Capretti, of the Laboratory of Analysis of the Ministry of Culture and the IVALSA CNR Laboratory of Wood Anatomy of Florence, in order to allow restoration. The following types of wood were found: fig tree (Ficus sp.), black alder (Alnus crf. Glutinosa), wild olive (Olea sp.), rowan tree/hawthorn (*Sorbus/Crategus*), heather (*Erica crf. Arborea*) and juniper (*Juniperus crf.oxicedrus*). Some of these woods show traces of processing and therefore, especially for different varieties of the same tree, it is assumed that their general use in wells/silos is the same as today, for the same species of the Mediterranean maquis.

[262] In modern age Sardinia, olive tree cultivation increased only in the Nineties and, historically, the island has never been played a crucial role at national level in the cultivation of olive trees.

- **Cork**

Cork oak is a naturalized and spontaneous evergreen plant of western Mediterranean origin, belonging to the *Quercus* genus. Palaeoecological studies show that it could be found in the Mediterranean already during the Miocene and that it was identical to the current tree species. Sardinia is a western Mediterranean region where the cork oak has spread virtually anywhere, thanks to its constitution and the environmental conditions. It now enjoys 90% of the Italian *Quercus suber* resources and it is the third most active producer in the world, after Portugal and Spain (Dettori et al. 2001). Linneo, who first described it, called it *suber*, to underline its main characteristic, the cork bark, a *unicum* in the plant world.

Cork is a vegetation cover of variable thickness that protects the trunk and the roots of the plant. Since it has a low specific weight, it is water-proof and impermeable to gases, elastic, insulating and it does not rot, it has been used massively for several different purposes since ancient times. With regard to cork production, its use is mentioned by Theophrastus in his *Historia Plantarum* (V, 4)[263], while Pliny in his *Naturalis Historia* (XVI, 34) provides a list of its several uses in fishing and as an excellent haemostatic device for wounds (16, 34). Also Julius Pollux in his Onomastikòn (i.4) mentioned cork as a useful material to catch murexes with the nets. Evidence confirms that its was used already during the Nuragic age. Archaeological evidence shows that it was used as an architectural element in some nuraghi and several huts. In sheet form, cork was found in one of the niches of Nuraghe Su Nuraxi in Barumini and probably used as a wall coating (Lilliu 2005, 183). It was found in a storeroom inside Tholos D at the Nuraghe Losa site in Abbasanta and at the Nuraghe Santu Antine site in Torralba (Taramelli 1936, 442). Several pieces of charred cork were found at the Nuraghe Brunku Madugui site in Gesturi (Badas 1992; Lilliu 1999, 14) and at the Nuraghe Nolza site in Meana Sardo. In the latter, it was used to seal a tower no longer in use (Perra 2011a, 124). Finally, several fragments were found inside Well N during the excavations at the Sa Osa site in Cabras, with several traces of processing on the surface (Usai 2010, 167; Sanna 2010, 243-244; Soro 2010, 317).

Although, as a material, it is very common in Sardinia, the harvesting and processing of cork requires a deep knowledge of the type of tree and its characteristics, since the decortication process may harm the plant. The first bark harvesting must be performed when the circumference of the plant is around 30-40 cm, at around 25-30 years of age. The cork harvested during the first decortication, called "male cork", is low quality: it is woody, difficult to process, virtually unusable.

[263] For example, some Roman amphorae found in a 14th century wreck leaving the harbour of Alghero, heading to the Balearic Islands, were sealed corks (Riccardi - Gavini 2011, 279)

The following decortications, maybe carried out every 10 years, based on the plant growth rate. They yield the "female cork" or "gentle cork": it is suitable for processing and it enjoys all the above-mentioned features (Dettori 2001, 34) .

Figure 76. Cork samples from the well N of Sa Osa site (photo courtesy by of Soprintendenza per i Beni Archeologici of the Provinces of Cagliari and Oristano).

The discovery of processed "gentle cork" in Nuragic contexts shows that the cork-processing capabilities were handed down to different generations, in particular as far as the decortication and material processing are concerned, most probably in addition to production of the tools used to carry out those activities. Evidence shows that the lack of knowledge of the strict biological principles regulating cork oak life cycle and the wrong implementation of the correct techniques to decorticate the tree, both result in the death of the plant (Dettori 2011)[264].

This material has great potential. During the Nuragic age, it was used for insulation: the discovery of smaller processed fragments inside Well N at the Sa Osa site and in Tower F at the Nuraghe Nolza site in Meana Sardo, suggest that the cork was also used for the production of containers and vessels, as Sardinian ethnographic studies seem to suggest.

After the discovery of the so-called "closet" found behind the huge walls of Nuraghe Losa in Abbasanta, Taramelli argues "*quella custodia armorum del fortilizio nuragico, dove le belle armi metalliche e forse anche le panelle di rame per fabbricarle erano tutelate e preservate dall'azione dell'umidità*" (Taramelli 1936, 442).

[264] In Sardinia, there are specific regional laws defending cork oak forests and regulating cork harvesting. Cork decortication has always been considered one of the hardest of rural activities, but highly appreciated since, just like an art, it is still performed manually. Even if recent regional laws allow the use of a specific mechanical saw, its use be supervised by an expert, in order to avoid causing any harm to the plant.

Before the introduction of metal containers, most of the containers used in Sardinia to store provisions, either for agricultural or stock raising purposes were, as a matter of fact, made of wood or cork. Clay containers have always been considered valuable and, therefore, they were used only in household contexts; they were also difficult to use, for instance, to milk a cow or sheep or to churn cheese (Campus 2003, 69)[265]. Even today throughout Sardinia, meat dishes are commonly served on cork trays. During the Nuragic Age, but also later on, during the Sixties, and nowadays in particular cases, ladles, pails, spoons and even clothes and furniture, are made of cork.

In mainland Greece and Crete, no evidence seems to confirm the use of cork, nor the presence of *Quercus suber*, except in limited areas and in small numbers. Aegean archaeological literature does not provide any example on the use of cork, nor do Mycenaean tablets.

This could indeed have been a reason of attraction, and cork (or cork products) might have been traded as high-quality goods. Although lacking any archaeological evidence in Aegean contexts, the material is so versatile, easy to process and transport, that during the last few centuries cork has been considered a resource of great economic value. This suggests that it might have been an excellent good of exchange or, at least, a suitable material to store perishable goods during very long journeys.

The long stretch of sea between the great Mediterranean islands and the Aegean sea is an important element to take into account when studying the relations between the East and the West. The distances and the constraints dictated by transport and distribution have too often been regarded as marginal aspect.

And during the long sea voyages, food and water played a primary role and could have even been discriminating factors.

Sardinia is still an island far away from the Italian peninsula (about 130 nautical miles) and from the coast of North Africa (about 120 nautical miles), visible only from the surrounding islands. It is close only to Corsica, but they are separated by a stretch of sea that is not always easy to cross.

From the point of view of those Mediterranean travellers who sailed the sea with sailboats following the coast, a few kilometres from it, it was nothing more than a large island in the far West, with so many kilometres of coastline that it must have looked like a continent, where the sea is both a bridge and a barrier.

[265] Indeed, old water jugs or fine china platters are often repaired with iron wire or lead clamps.

Conclusions

New questions have stemmed from the research carried out in the previous pages.

The major aporias of archaeological data and the limited resources available to carry out this study prompted an unconventional approach, different from the traditional synoptic archaeological research.

The study of material culture, with particular reference to pottery, played a key role in this archaeological study.

Due to the few archaeological contexts available and their diversity, it is indeed necessary to analyse material culture remains through, for instance, cutting-hedge chemical and physical analysis, looking for new data on the Mycenaean finds in Sardinia. Nonetheless, such a wide research requires the joint effort of a full multidisciplinary team and the availability of major resources[266]. I maintain that the relationship between the Mycenaeans and the Nuragic people could not be restricted to a simple exchange of goods, technologies, production methods and exploitation of resources. Limiting the scope of the relations of the Mycenaean, Minoan or Cypriot peoples with Sardinia to the productive sector would result in an exclusively trade-centric interpretation of one of the most important long-distance relations testified by archaeological findings. By embracing this approach, all relevant historical events would be interpreted through the eye of the modern and contemporary Man, who sees the evolution of human beings as a one-to-one consequence of economic growth.

These aspects have led to a less trodden research path rather than to the study of the findings themselves. As a matter of fact, the dynamics of movement have mainly been studied, both because of the fascinating "ability to move", and because this aspect had not been studied in depth by traditional archaeological research, despite its impact on the historical events which involved those peoples. The study of the dynamics of movement and the territorial and landscape outcomes seem to be closely related to the hypotheses proposed on the nature of their exchanges (Chapter 5).

A study of the distribution of materials ‘by land’ within the island boundaries has been carried out and new research perspectives may be prompted on the impact of variable "distance" in the trades carried out by sea. The distance is indeed a critical factor from the temporal point of view, that affects both the duration of the journey and the period of time when the journey started. In addition to the variable distance, also the "sea" factor has been taken into account.

[266] The Italian National Research Council took this burden by funding a study entitled the "Egeo e Italia: archeologia, archeometria e informatica". Through archeometric analysis, the study seeks to ascertain the origin of the Mycenaean pottery found in Italy, and to explain whether pottery workshops were indeed created there.

The journey to the West, seen through the eyes of both eastern and western men, was indeed much more that a functional action and was charged with a wider meaning (Kotsakis 2011, 271). Sailing such long distances implied a remarkable ability to coordinate people and means; it involved travelling for a long time, taking risks; it nourished hope and it equally required the knowledge and the sensitivity of a modern traveller. To those who are not used to sea journeys, not only is it unknown but also meaningless (Bartoloni 1991b, 9).

So far, researchers have offered an *Aegeocentric* approach to the sea travels crossing the Mediterranean from the East to the West, prompted by the Minoan (first) and Mycenaean (later) thalassocracy. As a result, research has developed and has eventually resulted in the formulation of the *seascape* concept (Berg 2007, 388), attaching it also to the Bronze Age Aegean world. Nonetheless, it has inevitably affected the 'maritime' approach for the rest the Mediterranean region. No scientific literature is available on the hypothesis that, during the Protohistoric Age, on the Western Mediterranean, ships also crossed the basin from the West to the East. For example, for several years, the hypothesis that Nuragic sailors and vessels could be involved in the trades between the eastern and western Mediterranean, had never - or rather marginally - been taken into account[267]. Researchers had focused on the interest of "others" in the Island, rather than the needs governing the Nuragic people, which led them to sail or to deliver their goods by sea, leaving their mark in Kommos, in Cyprus and - in the later centuries - in the acropolis of Lipari and in Khaniale Tekke.[268] For instance, the Nuragic world did not have any relation with the Italian peninsula between the sixteenth and fourteenth century B.C., while exchanges indeed took place with the Aegean world. It would be a remarkable subject to study, that would underline the ability to select both the goods to exchange and the trade routes to sail, and might indeed prompt an interesting discussion of how Mediterranean routes and the sailing skills of the groups involved developed.

In recent years, the new interest for the Early Iron Age has resulted into studies on Nuragic sailing. In 2004, Guerrero Ajuso wrote an article on the sailing skills of Nuragic people between 1200 and 600 B.C . Starting from the iconographic representation of bronze ships, he tried to explain how and why Nuragic people crossed the sea. Nuragic ships provide the largest number of representations of

[267] During the 2008 XVII Congress of Classical Archaeology, F. Lo Schiavo, F. Campus and V. Leonelli concluded their speeches by saying that the Nuragic people played an important role by introducing Aegean and Cypriot-type bronze artefacts in the Italian peninsula, in addition to Iberian vessels. Similarly, following the discovery of an oxhide ingot in Corsica, it was assumed that it had been transported there by a Nuragic boat (Lo Schiavo 2008, 424). Although their role may be accepted, it is difficult to also accept the "rialzista" chronology proposed by the group of scholars and a similar role could be acknowledged in Sardinia during the Early Iron Age.

[268] Only in recent years, new hypotheses on Nuragic travels or partnerships have been put forward, but too often has popular archaeological literature and the superficial reinterpretation of archaeological data dating back to the twelfth century BC, have tried to identify them as the legendary Shardana people, who were indeed a "People of the Sea". A similar hypothesis has been supported by some scholars, but its success is the result of Sardinian nationalist ideological propaganda, rather than a reinterpretation of historical and archaeological data, and no evidence has ever been provided about it by researchers.

hulls in Mediterranean prehistory, but "*todas ellas, salvo rara excepiòn, estàn concebidas para ser suspendidas en lugares sacros, santuarios, grutas y otros lugares de culto nuràgicos*" (Guerrero Ajuso 2004, 3). Their confirmed religious and worship value proves the importance of the vessels which the bronze reproductions represent. In an important paper published by Anna Depalmas in 2005, in addition to the accurate identification of 21 different types of bronze vessel models, the author underlines the difficulty to fully understand this particular class of materials. Their chronological attribution is controversial and lies at the very heart of a heated discussion between the two schools of Nuragic archaeology (Depalmas 2005, 221-226)[269]. Due to the absence of stratigraphic and chronological data in the island, typological studies, which have often been the only available means to analyse them, were used to merely explain the effect of the presence of Cypriot people in the development of Nuragic bronze production. The discovery of small ships in peninsular contexts (eg. the findings of Falda di Guardiola in Populonia, the '*Tomba del Duce'* and the '*Santuario delle tre navicelle*' in Vetulonia, Hera Lacinia's Sanctuary in Crotone), all dating back to around the mid-seventh century B.C., appears today as the only chronological reference provided in an archaeological context: a rather earlier chronological attribution. However, this does not mean that there were no Nuragic people in the Mediterranean before the appearance of bronze vessel iconography (Lo Schiavo 2000, 127). Perhaps such a large collection of ship representations in sacred contexts, although dating back to later centuries, proves the importance and the role played by cross-Mediterranean travels and travellers during the Late NuragicAge.

But the approaches to this *thalasso-poiesis*, that is, the sailing and the ability to make a living out of marine activities, typical of the Western Mediterranean, deserves further analysis.

While considering the active role of Nuragic people in the trade with the Mycenaean world, it is very difficult to understand how and to what extent Late Bronze Nuragic society intertwined relations with the Aegean world. Are there Mycenaean elements in Nuragic material production? Is there any trace of influence at social and productive level? It might indeed be possible, but at the moment, it seems difficult to provide proper answers.

[269] In this regard, please see, for example, the discovery of the ship in the cave of Su Benatzu of Santadi.
The site is an example of a room used to store worship materials and included 1498 pottery fragments and 109 metal items (Lo Schiavo-Usai 1995). The pottery elements may be dated back to the period of time between the Late Bronze Age and Early Bronze Age (XII-XIV cent. BC) and the metal elements between the Late Bronze Age and the Early Iron Age (XII-VIII cent. BC). Among the metal elements, considerable importance is attached to the Sardinian-type bronze tripod, of Cypriot influence though, and the Cypriot bronze mirror, both dating back to the "Tardo Cipriota III" period (XI cent. BC) and a gold foil. In addition, other bronze finds of Western inspiration are to be taken into account, such as the "Ronda-Sa Idda" type sword, a "Porto de Mos" type dagger and a " *à doble résorte*" fibula. None of the elements, however, was found in stratigraphic association, nor was there a chance to reconstruct their position. All materials were recovered during a speleological expedition in 1968. No regular excavation campaigns were carried out. The site is an outstanding example of a worship place used between the Eneolithic Age (*Cultura di Monte Claro*) and the Early Iron Age, that included a large amount of data, without any context information though.

Pottery findings are statistically more relevant and locally produced pottery are now the only proof of the presence of foreign products or producers on the Island. They may date back to the same period as (or immediately after) the first import of Mycenaean potsherds. The distribution of pottery in inner areas, which turned out to be manufactured locally and not imported, shows that a minimum level of cross-culturality was achieved between the Aegean world and the Nuragic world. But the number of pottery findings, although very important, is not the only element that should be taken into account. The non-pottery finds, mostly found in stratigraphic contexts which are difficult to frame, are sporadic and do not provide useful information to understand their impact on the Nuragic society. The presence of the ivory head of Mitza Purdia or the olivine seal or the necklace glass paste decorations found, suggest that cross-culturality had several different facets. They are considered goods of great value and, in exotic eastern areas, were exchanged among rich people. In the Nuragic world, between the XIV and the -XIII centuries B.C. (Late Bronze Age), archaeological data, however, suggest that there were no social elite groups. Several scholars agree that the Nuragic society, at least in the early stages of the RB Age and the FB Age, had an elite class. Therefore, it is not clear whether these materials were in fact "gifts". A 2009 publication by Mauro Perra shows how scientific literature had analyzed the Nuragic world between the end of the MB and the beginning of FB, on the basis of funerary rituals, which did not include a class-specific funerary set of items (Tombs of the Giants), and the uniformity of dwellings. Two possible socio-economic systems were suggested: a tribal-segmental one or chiefdom-based one (Perra 2009b, 361). The social complexity of Nuragic society, based on its division into classes and the emergence of social aristocracy and patronage favours, started between the Final Bronze Age and the Early Iron Age, rather than during the Late Bronze as the majority of researchers suggests. According to several researchers, it appears that, even during the long process of evolution of the complex Nuragic socio-political organizational system, the relations with the Mycenaean world played a rather marginal role (Perra 2009b, 360). Now it seems that those relations, in some way, did not result in any change, but they must have triggered something. This is perhaps one of the reasons why one could hardly say that Sardinia was a source of "slaves" for the Aegean world. This hypothesis is not supported by written evidence, but maintaining that the exchange of luxury goods between the Aegean and the Nuragic worlds could also lead to slave trafficking, implies a highly structured society, with aristocratic elites who could acquire both goods and people.

Since material evidence is minimal, it would be wise to look for the evidence of the cross-cultural process in the continuity of the contacts after the Late Bronze Age until the Early Iron Age.

So many questions remain unanswered. So many ideas prompted by this research. Easily can one imagine that the contacts between the Sardinian Nuragic people and the Mycenaean world marked

the beginning of an intense, continuous and peaceful exchange of relations, that at the beginning of the IX-VIII century BC, facilitated the arrival of the Phoenicians. Nonetheless, since the early centuries of the Iron Age, other trading centres were founded, such as the Sant'Imbenia site, and a clear cross-cultural environment was created there by indigenous people, that perhaps could not be defined as ‘Nuragic’ or ‘Eastern’.

During the Recent Bronze Age, despite their differences, the two social structures established good relations with each other, thus triggering rather positive dynamics. Sea travels developed during the following centuries. The knowledge of the sea and of trade routes, the possibility of be harboured in safe havens, certainly fostered the continuity of relations. The following Phoenician "colonization" was made easier by the established routes and ports, that is, it enjoyed the benefits of maritime experience and expertise, based on empirical grounds and well established relationships between the Nuragic world and the Levantine peoples (Chiai 2002, 128).

It has been shown that the Phoenicians sailed two different West Mediterranean routes (a northern one to sail to the West, and a southern one to sail back to their home land) and used to establish their colonies very close to the places where salt was produced (Sardinia and Sicily) (Bartoloni 1991b, 9-15; 1997,13). Salt mines were key sites for the ancient production systems, but they were also the result of the presence of tuna fisheries and of tunny-fishing nets. Tunny-fishing, one of the most profitable industries in the Mediterranean, especially in regions such as Sardinia and Sicily, well known and documented, provides an empirical evaluation basis of maritime knowledge and of the sea routes followed by tunas (Bartoloni 1991a, 9). It is interesting to note that several sites where Mycenaean, Levantine and Phoenician items have been found, are located along the so-called "tunny-fishing routes" near Sardinia, Sicily and the southern coast of Italy.

Because of the impact and importance of fisheries in the Mediterranean, which have greatly affected maritime economies, it would be useful to study how important following those routes was, under a maritime archaeological perspective, when studying trade dynamics between the West and the East of the Mediterranean during the Bronze Age. Indeed, due to an unknown natural mechanism, tuna fish have always followed the same routes: from the Strait of Boniface to the coasts of the Middle East, and back. That cyclical route followed by the fish, that might seem unimportant in cross-maritime terms to a "dry land" untrained eye, could be one of those empirical elements that directed the following routes and lead to the first Greek circumnavigations. Nonetheless, this is just one of the possible starting points for future research.

Much is still to be done to explain how such socially and structurally different societies met, possibly led by their atavistic need to cross natural borders. The exchange of products and the resulting structured market are hard to explain and the hypotheses put forward unfortunately do not

have much scientific evidence. The lack of information on the Nuragic society makes it hard to provide market distribution and organizational models, both internally (among nuraghi and networks of nuraghi) and externally. I believe that the hypotheses which propose a description of the market during the protohistoric age, fail to successfully apply comprehensive models, which do not seem to suit the Nuragic world in Sardinia. Trade seems to be just an aspect of a more inclusive and wider exchange dynamic.

In the Mediterranean, natural borders consist of water: That should be the core subject of future research. All aspects of maritime archaeology should be analysed, thus providing a comprehensive explanation of seascape.

The key elements are therefore to be found in the sea, in relationship with navigation, which have always played an important role in the relations among Mediterranean peoples, to understand one of the most fascinating social relations of the Protohistoric Age.

In order to provide a proper answer to all these questions, it might be necessary to set aside archaeological site and the geological boundaries of the island, and focus on sea travels to look for the marks left by the sailors and their ships crossing the basin from the East to the West and back, paving the way for what it is now regarded as the common Mediterranean culture of the Western world.

This might well be the next step of the research on cross-cultural contacts between the Nuragic and the Mycenaean worlds.

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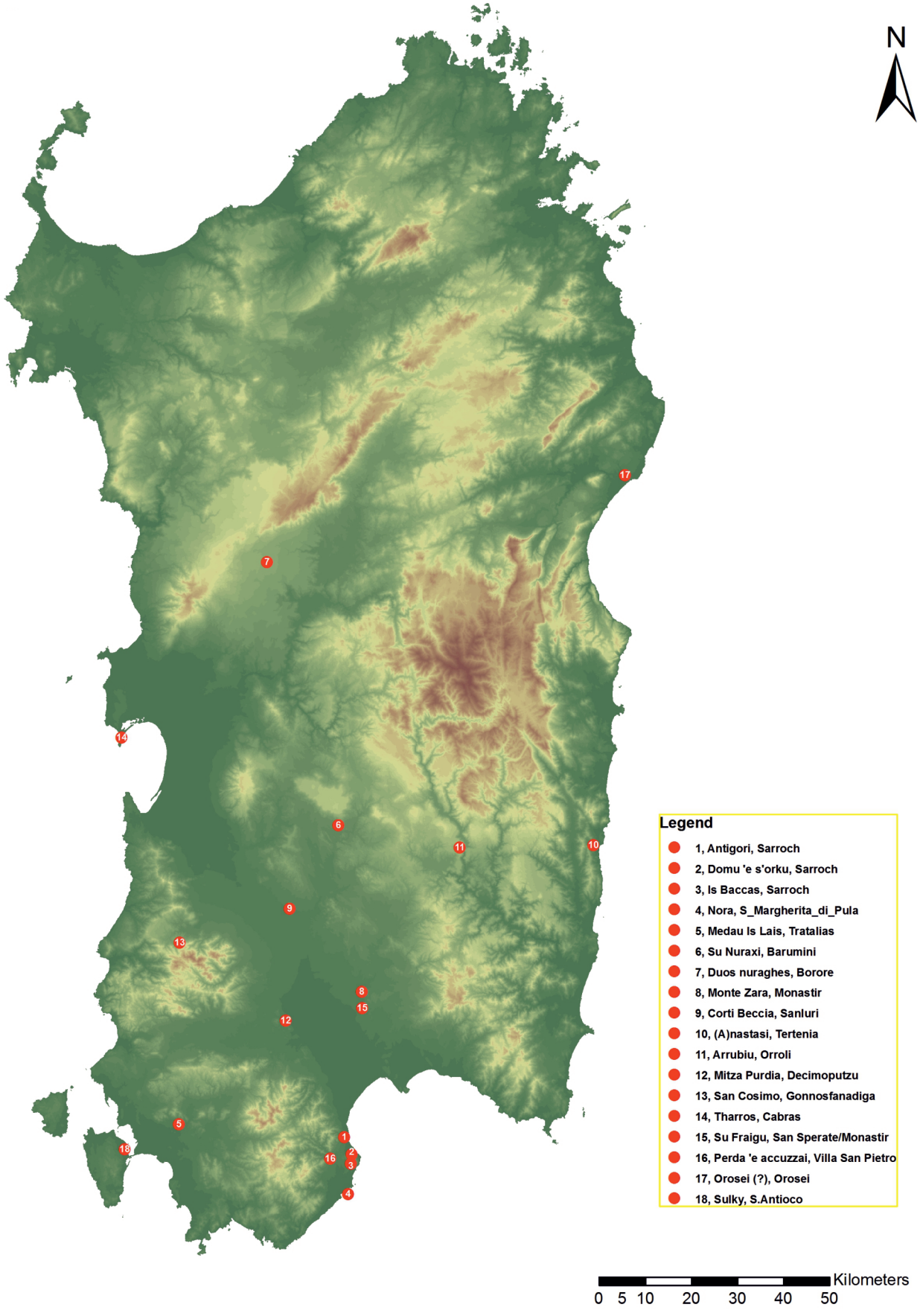
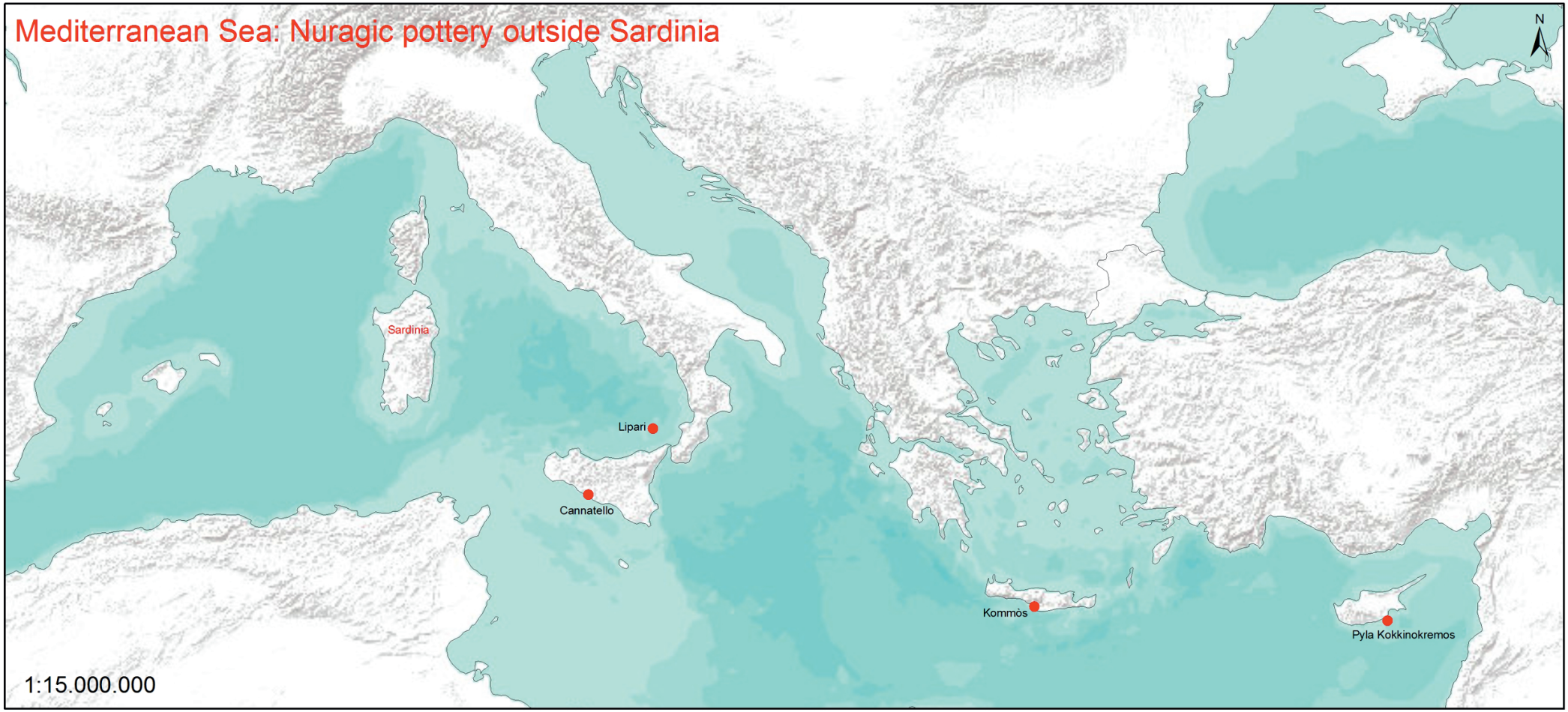
Maps

Mycenaean finds in Sardinia




Mediterranean Sea: Nuragic pottery outside Sardinia
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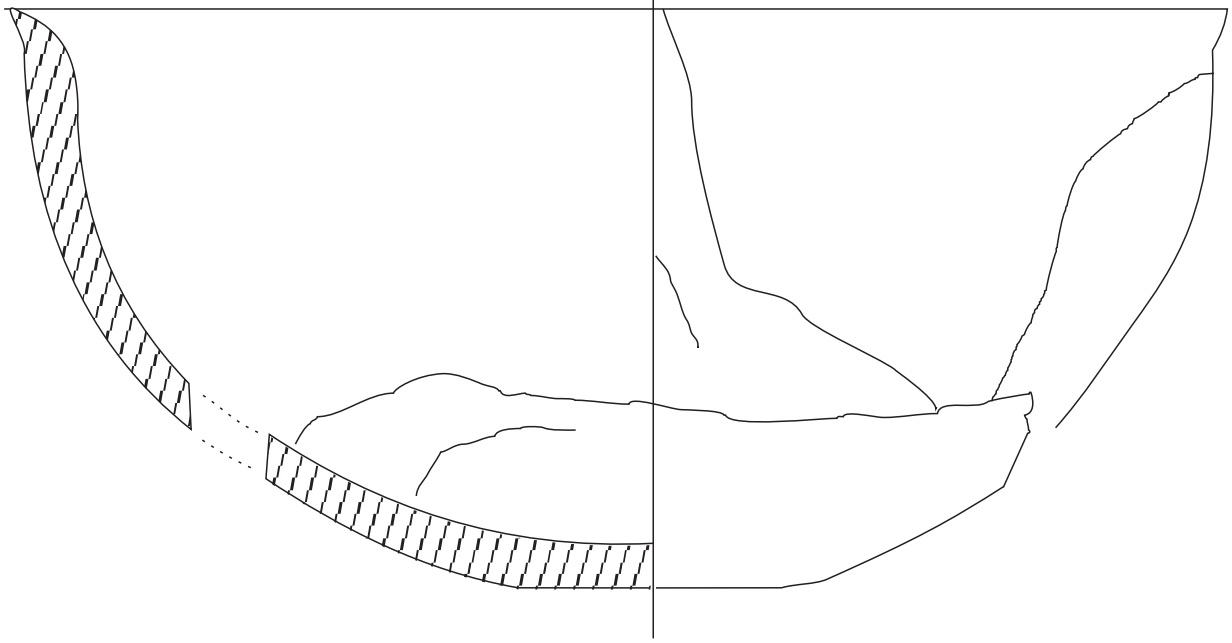

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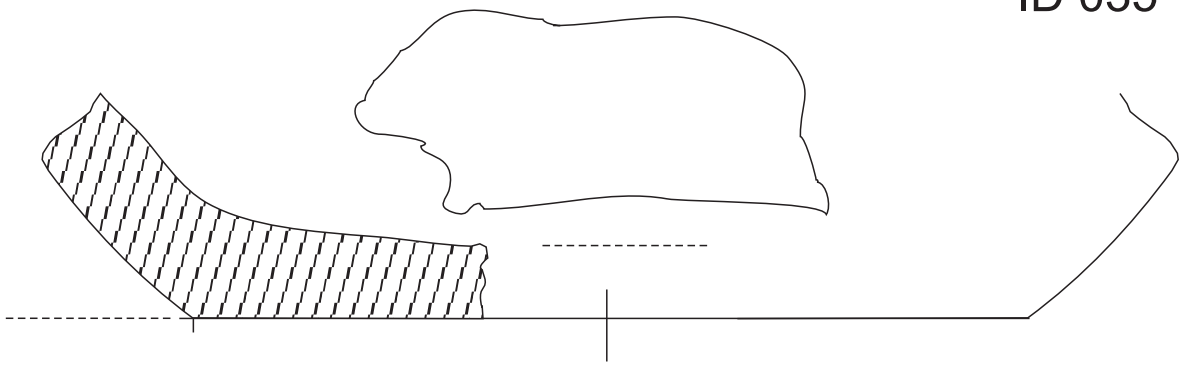

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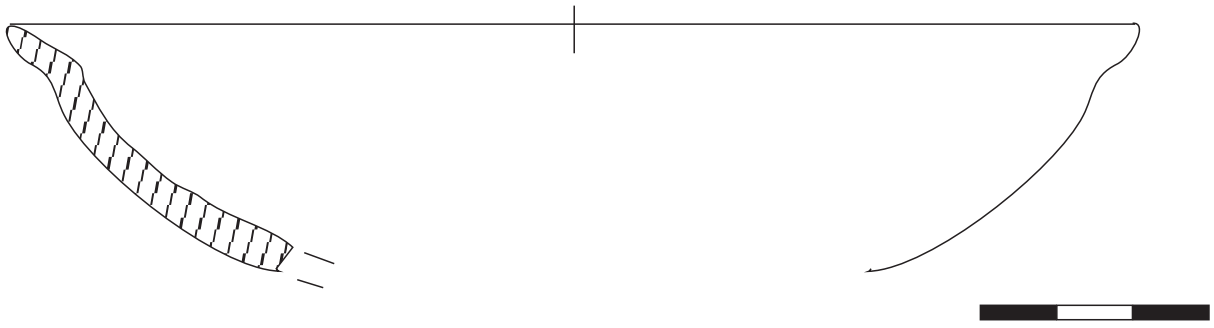

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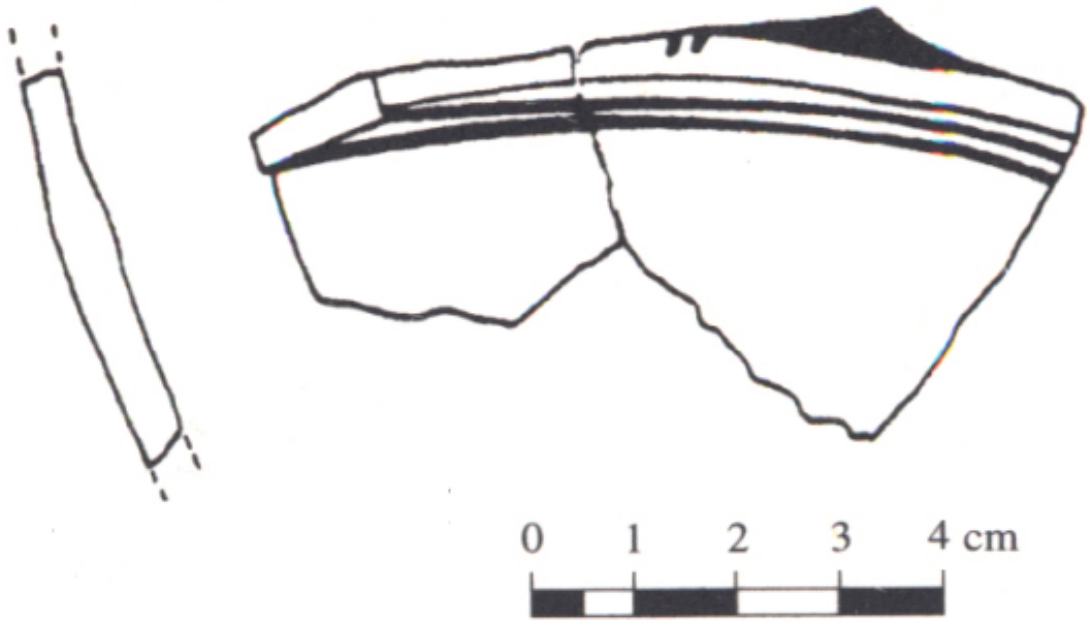

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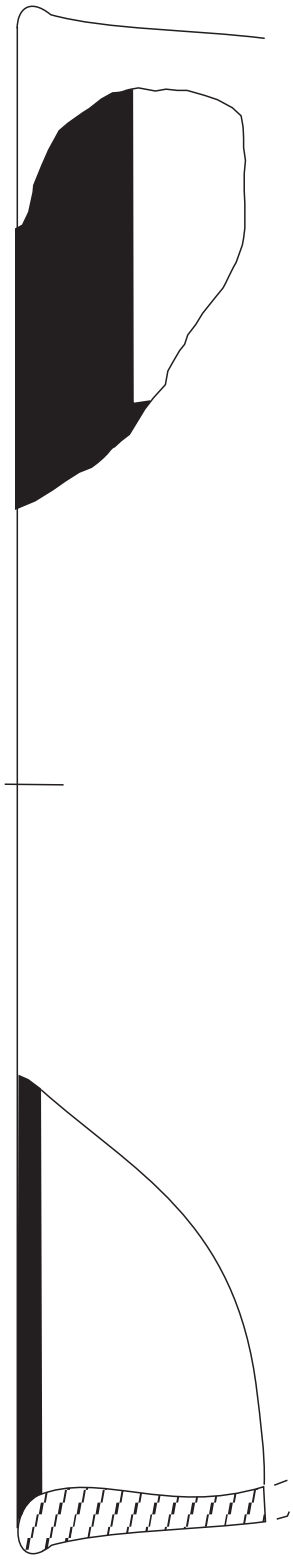

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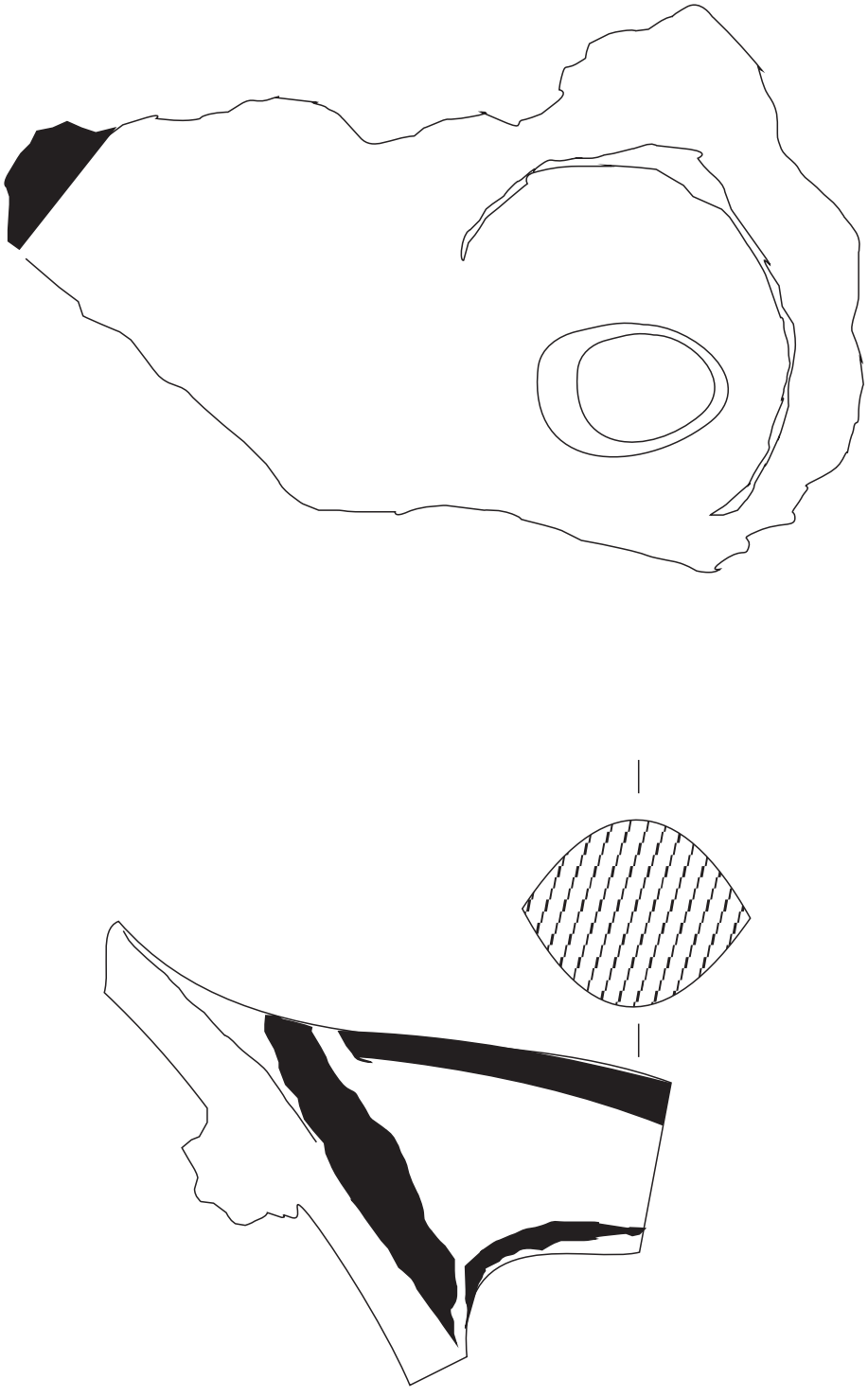

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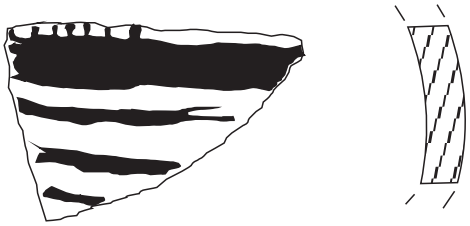

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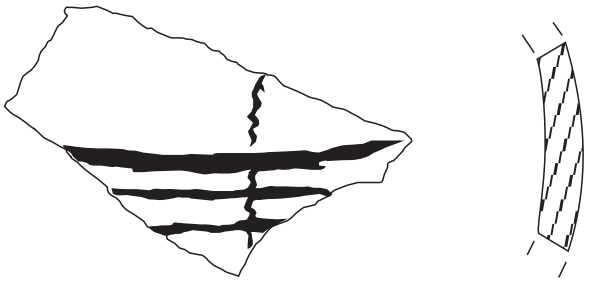

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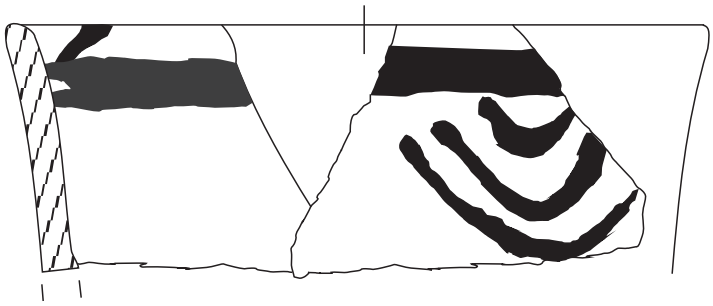

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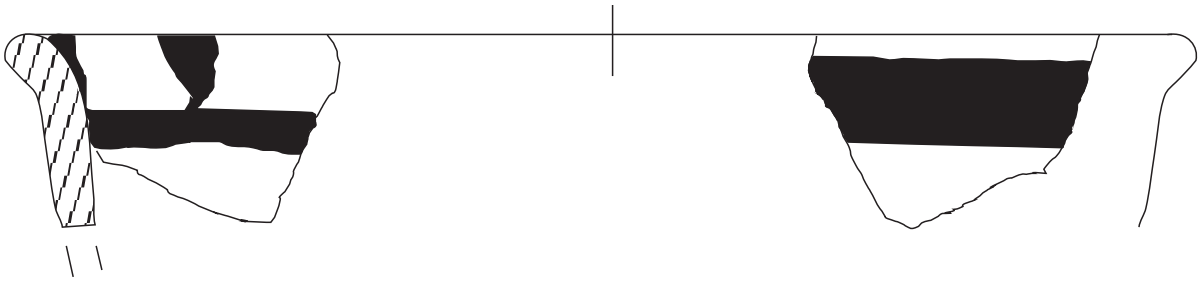

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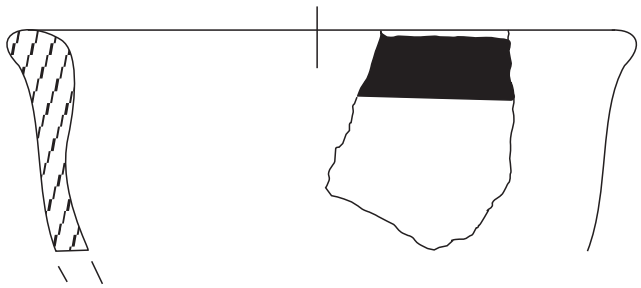

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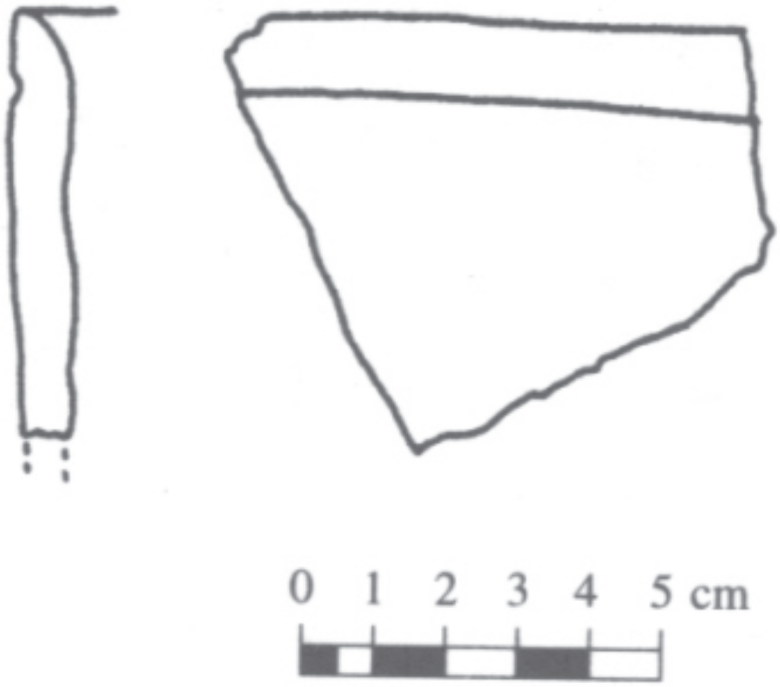

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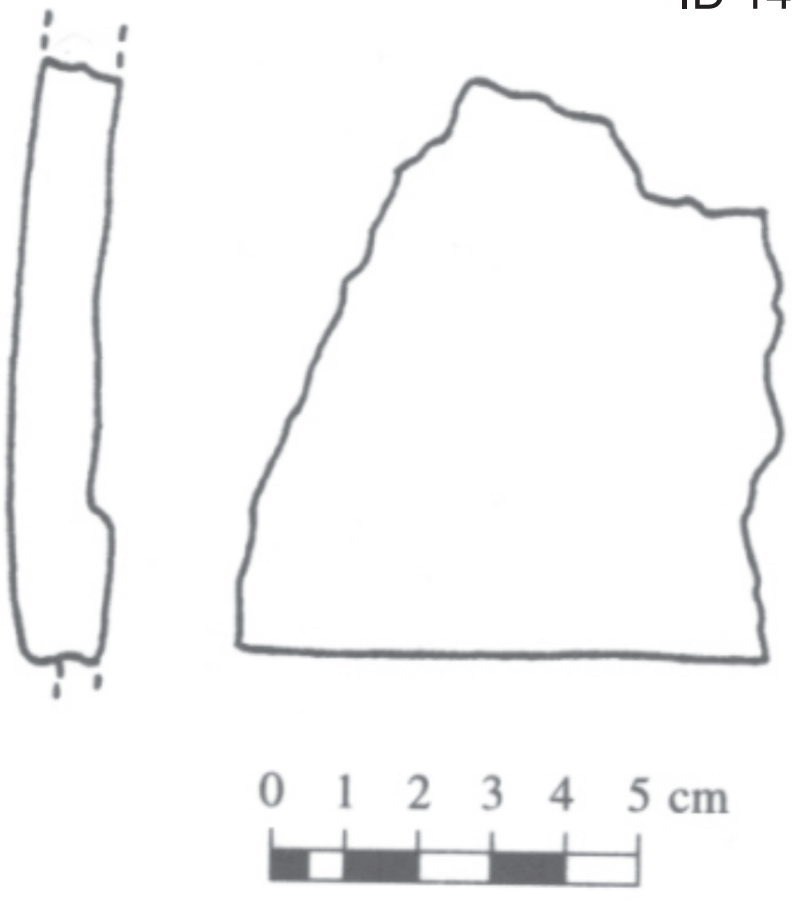

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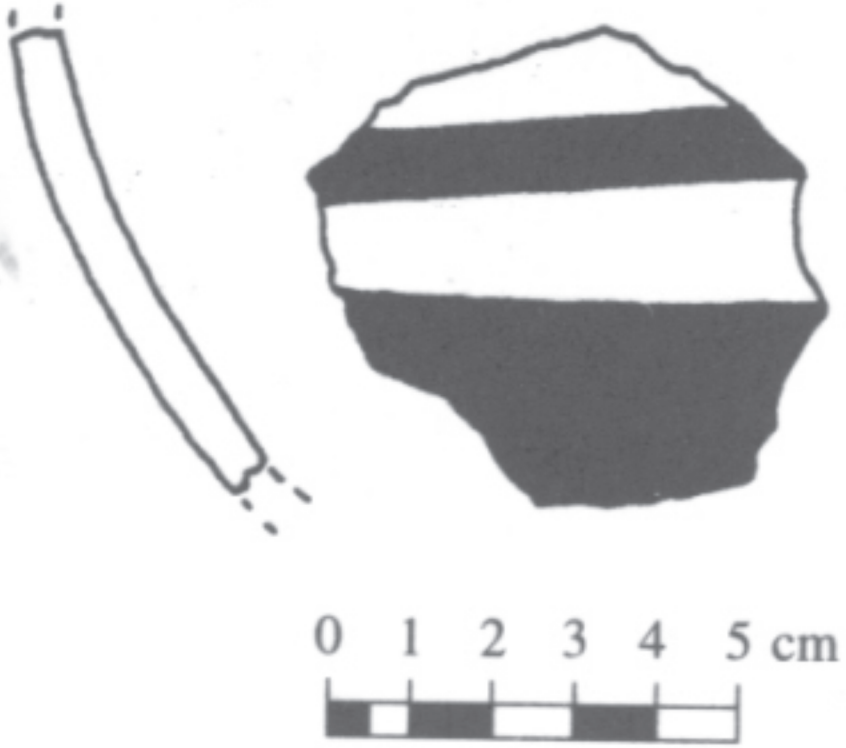

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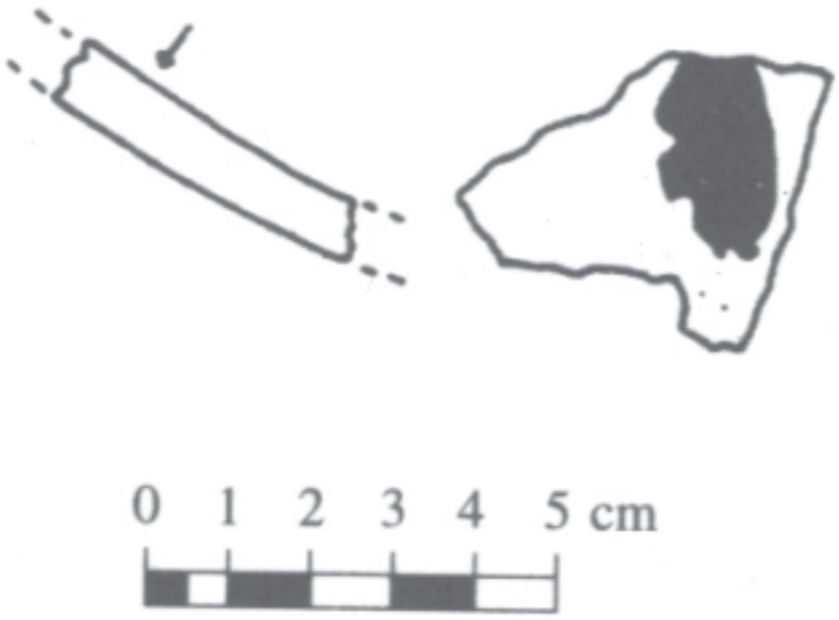

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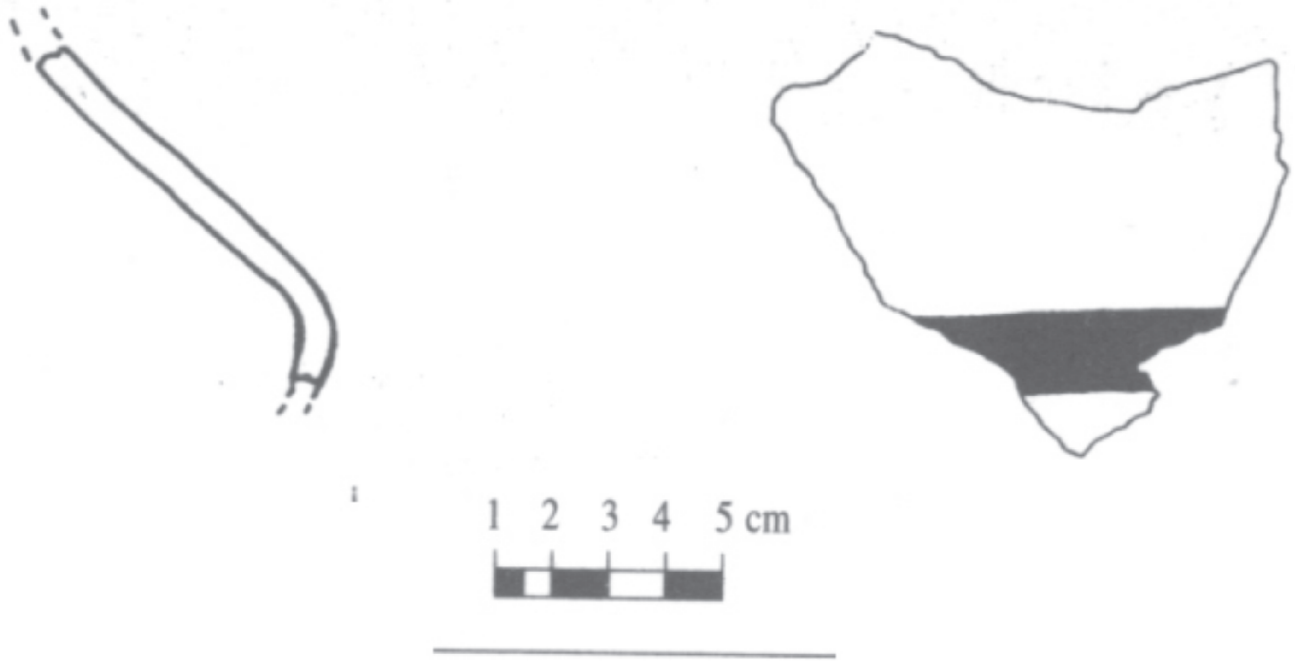

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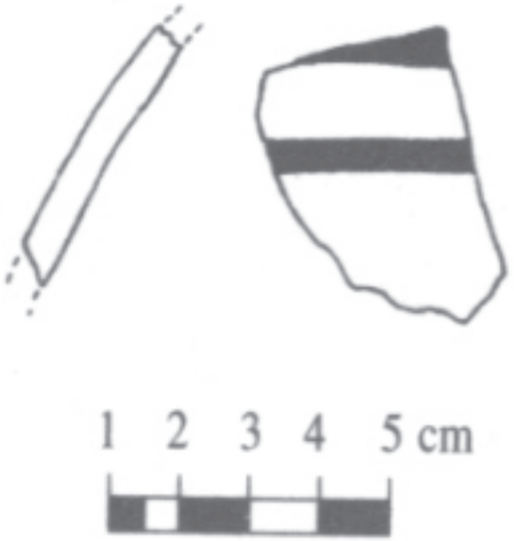

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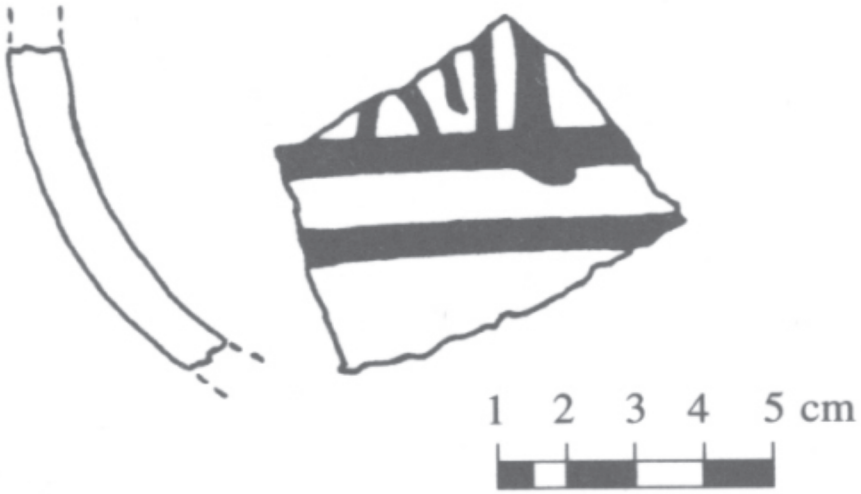

ID 155

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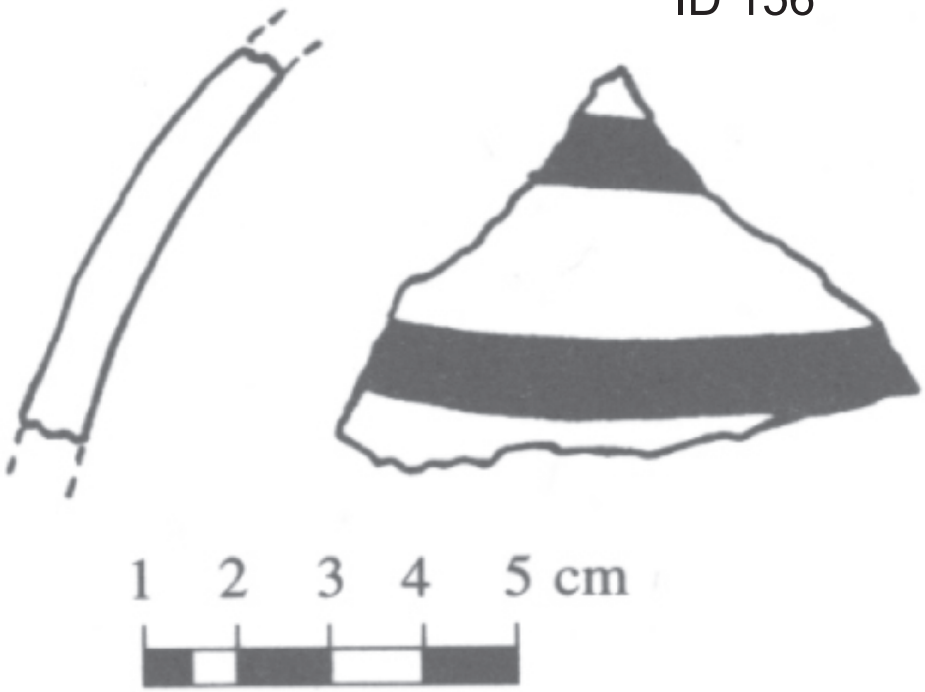

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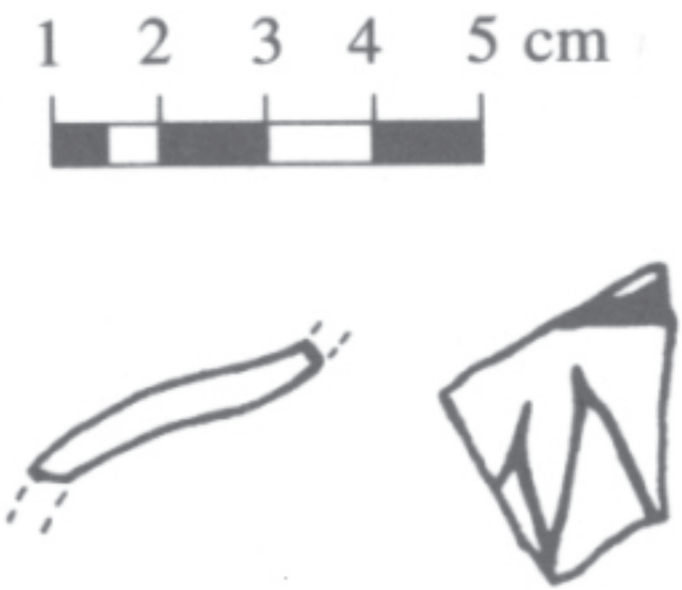

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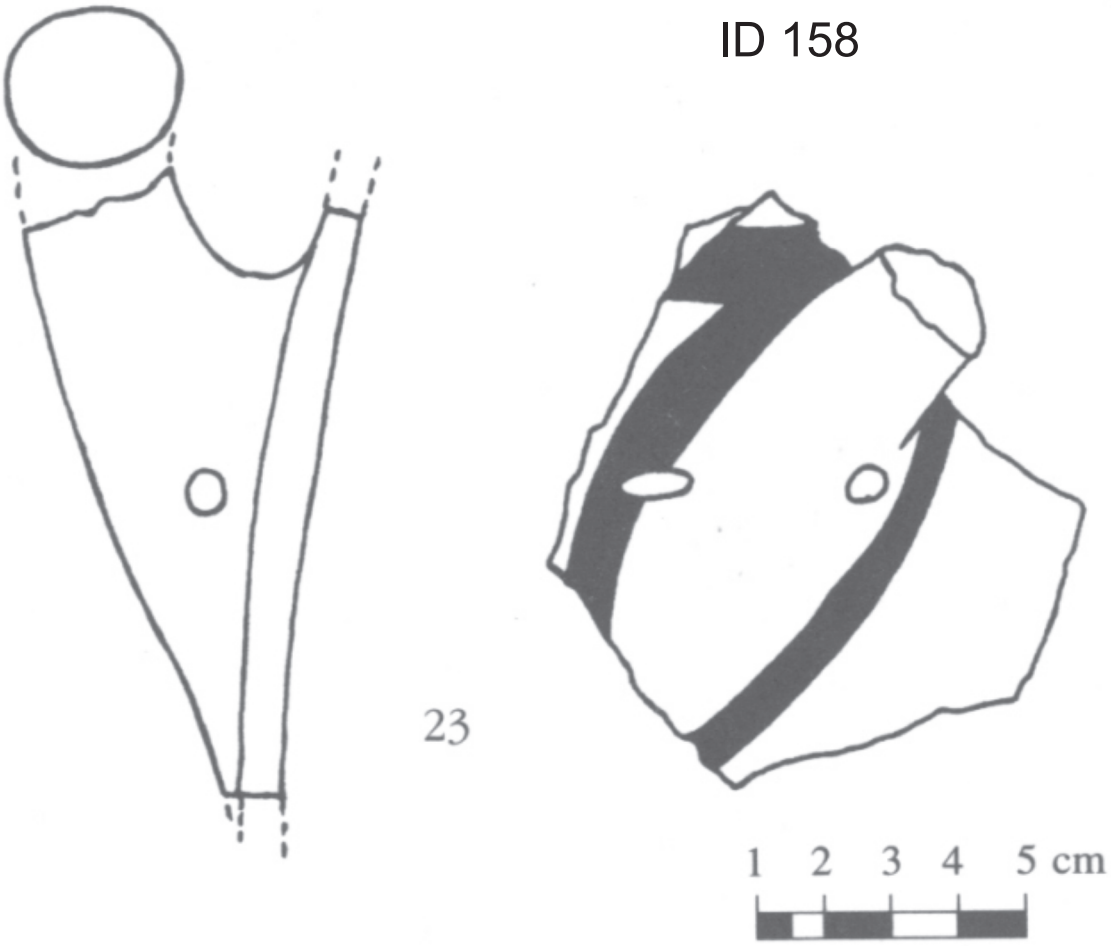

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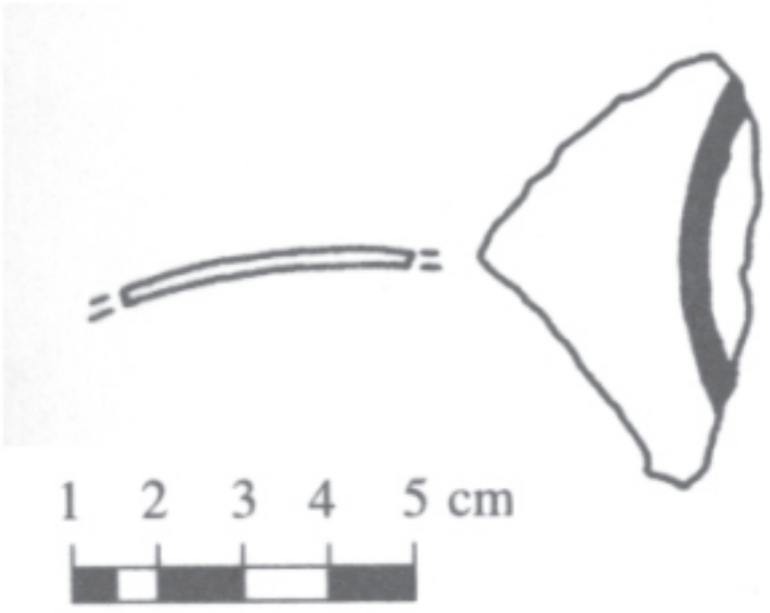

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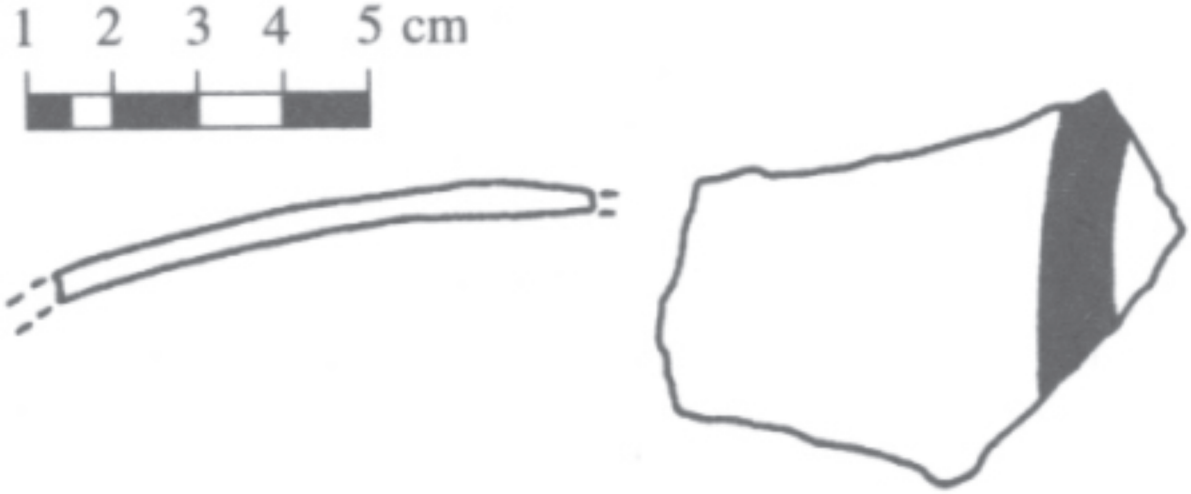

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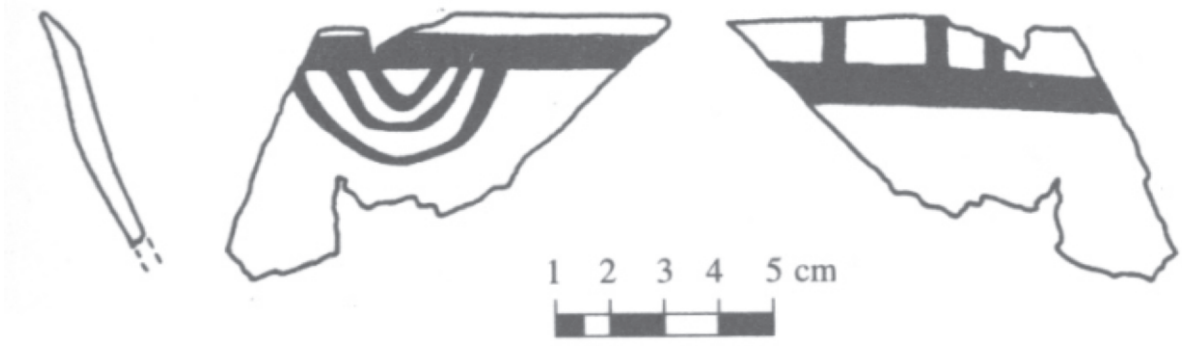

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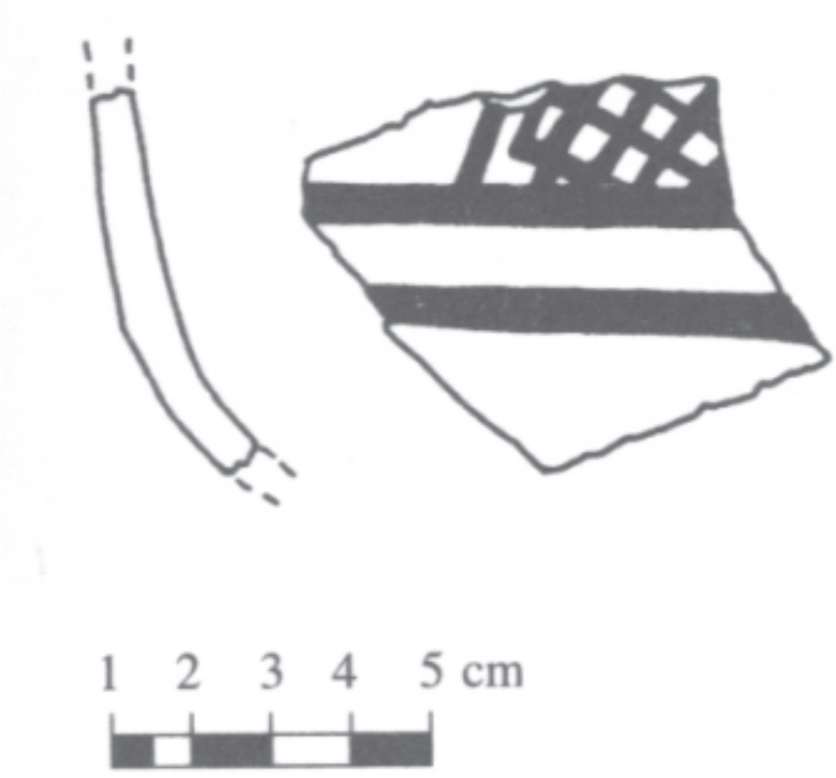

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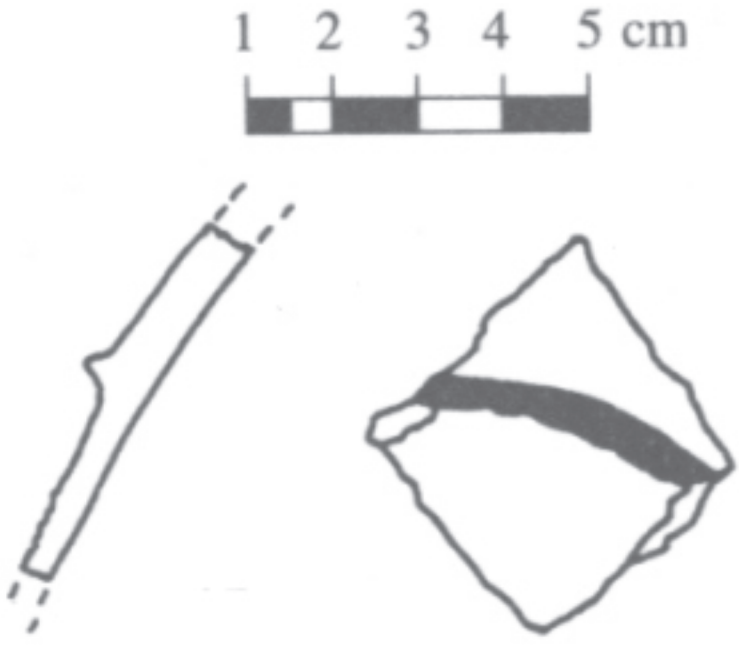

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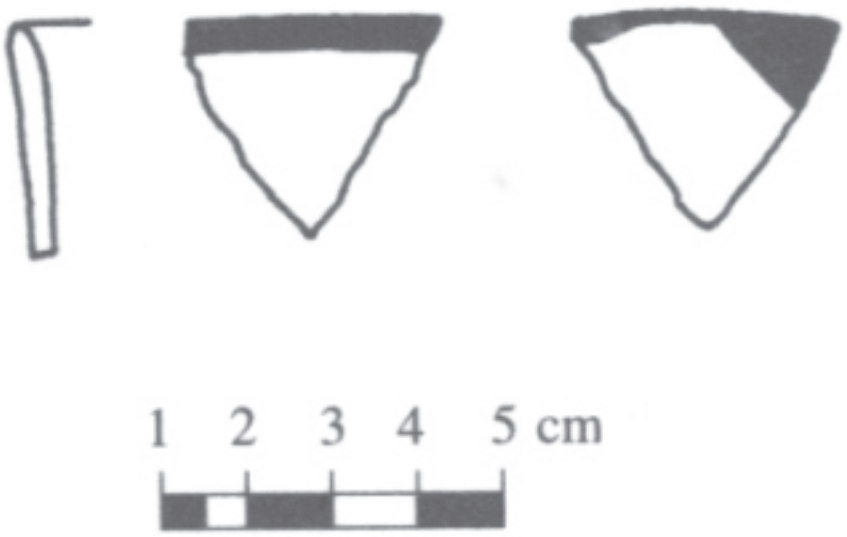

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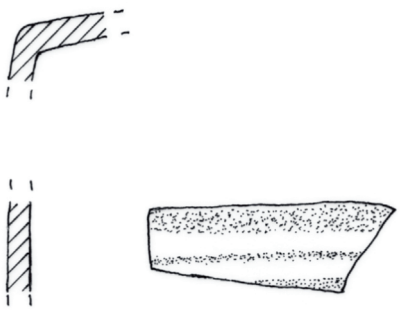

scala 1:1

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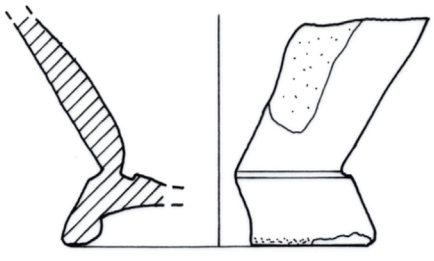

scala 1:1

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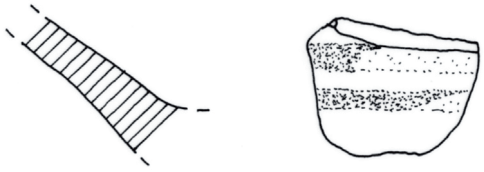
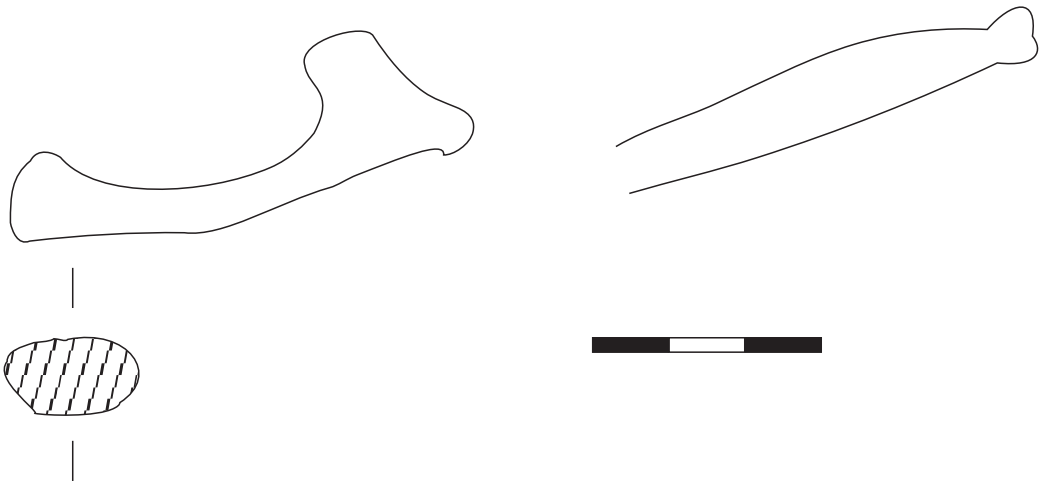


scala 1:1

ID 173

scala 1:1

ID 174



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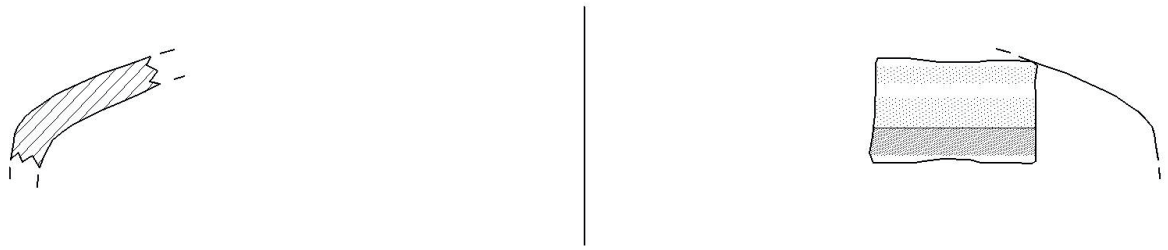
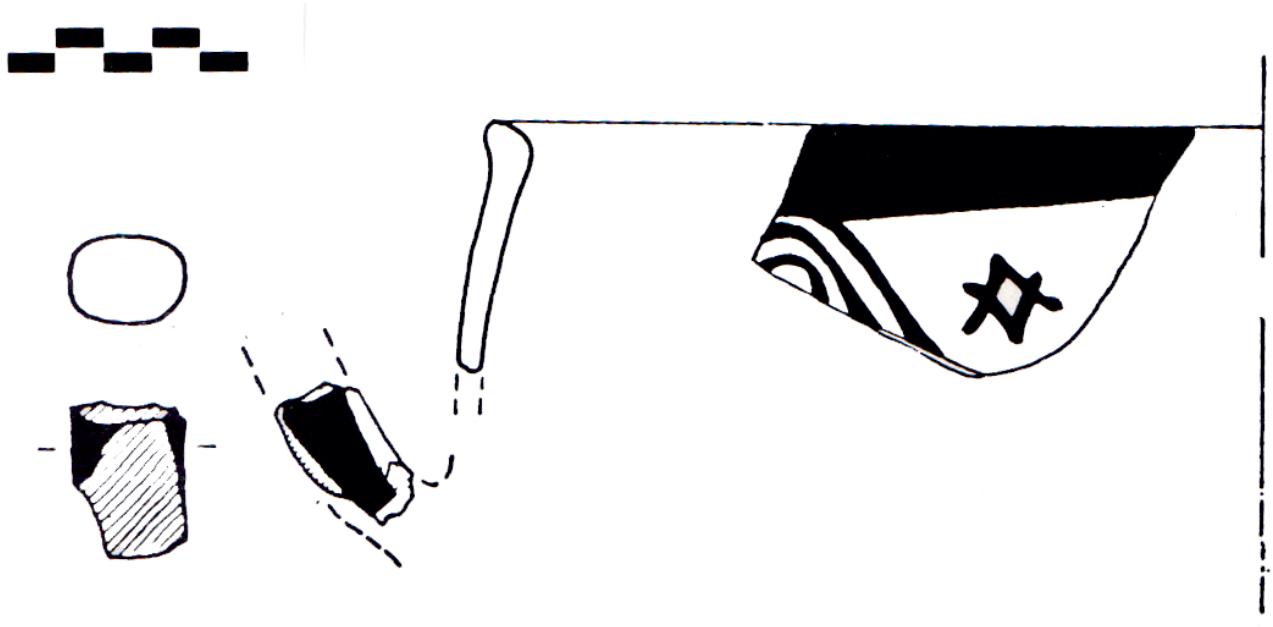


1 cm 5 cm

ID 180



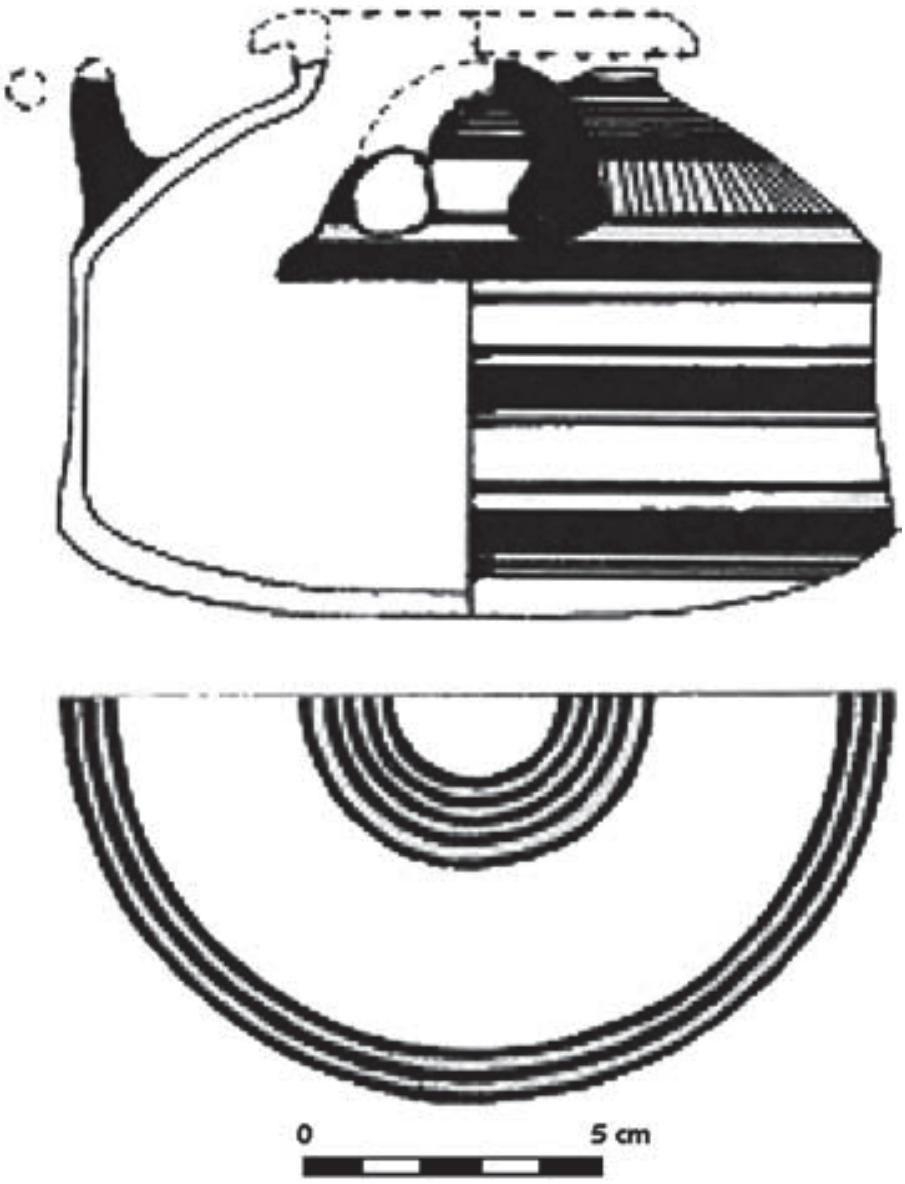
ID 181

ID 182

ID 183

ID 184

ID 185



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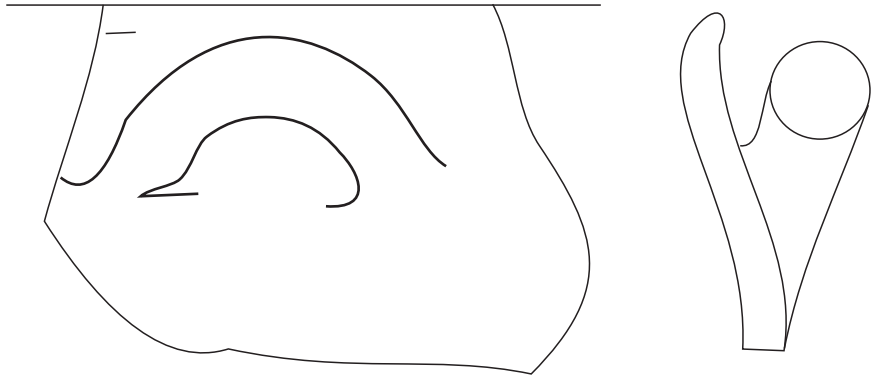

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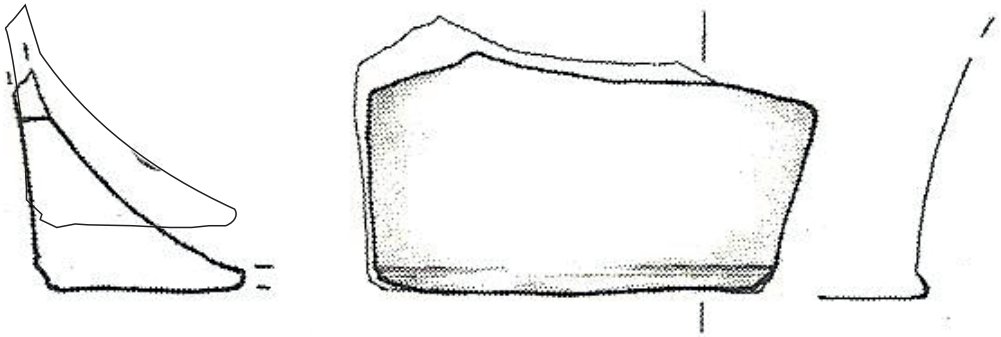

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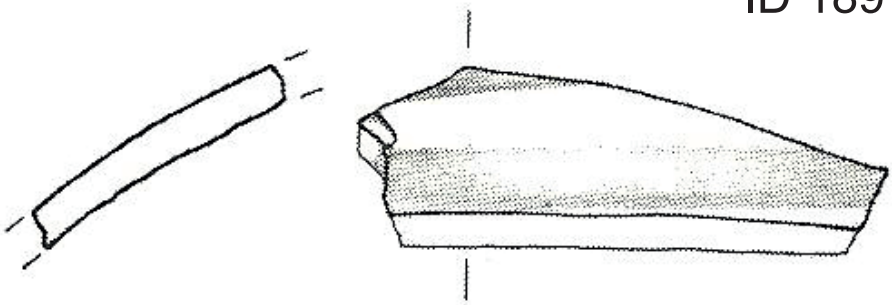

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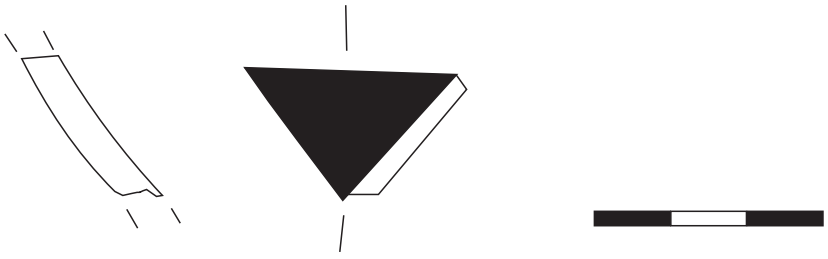

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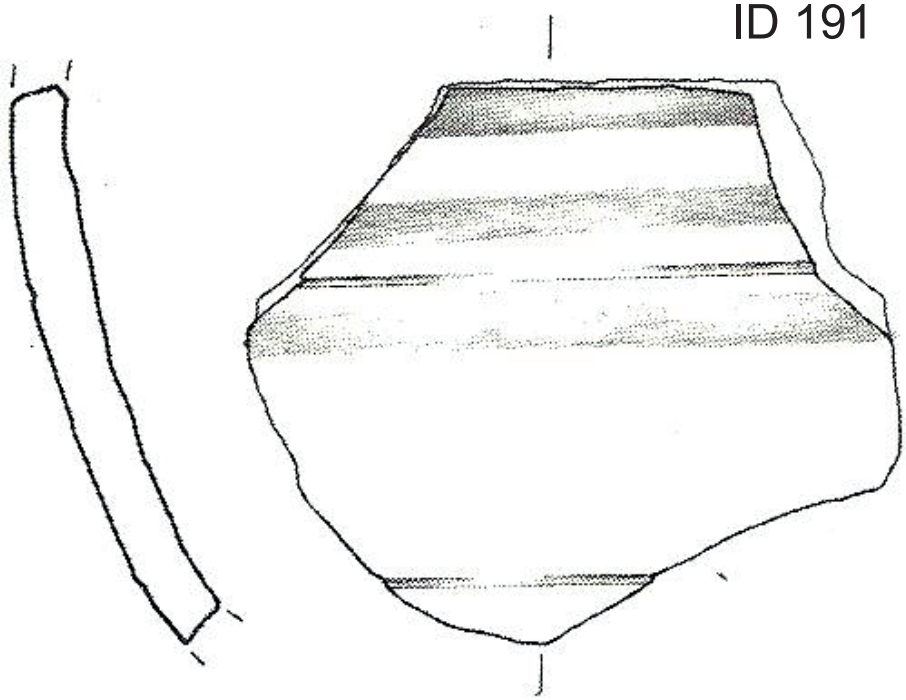

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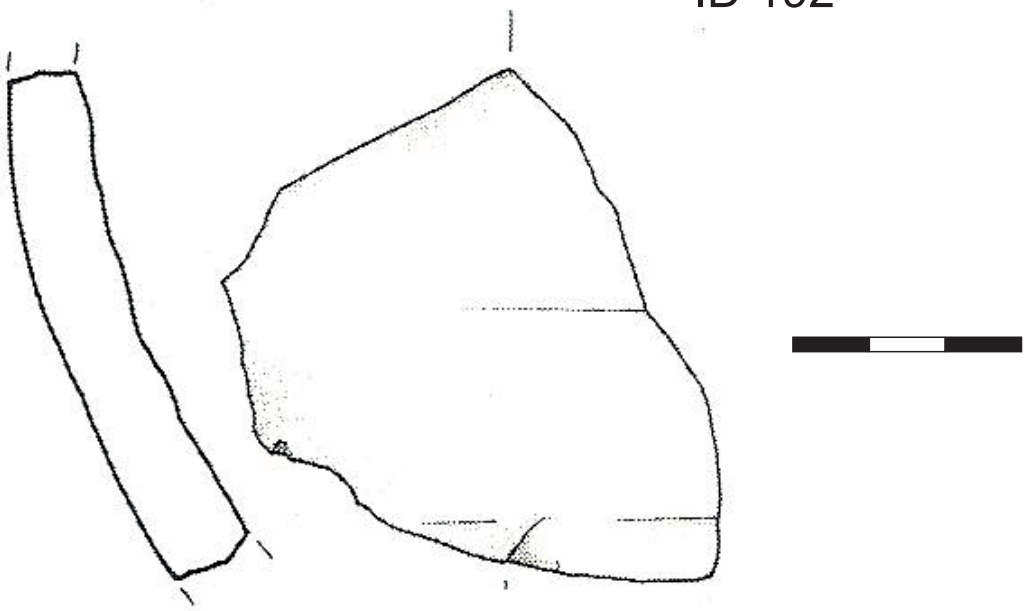

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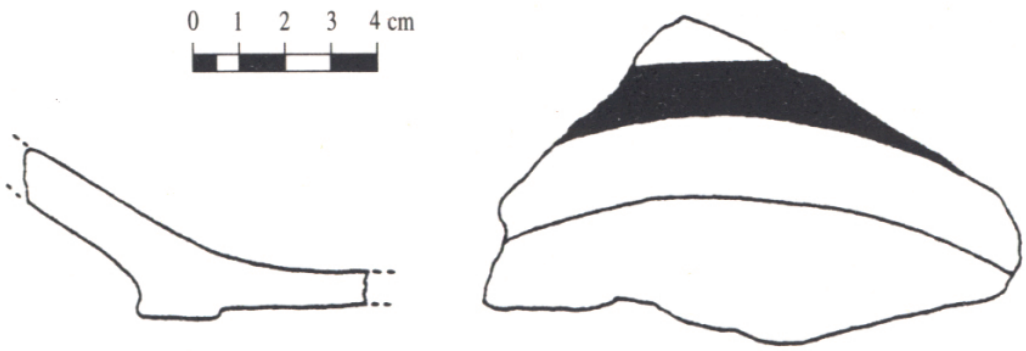


Bibliographical references of the drawings

ID 033, ID 035, ID 042, ID 079, ID 081, ID 086, ID 114, ID 115, ID 116, ID 126, ID 134, ID 137, ID 174, ID 190 (L. Soro; dig. elaboration M.S. Pintus)

ID 076, (Ferrarese Ceruti 1982a, fig. 18, p. 395)

ID 077; (Ferrarese Ceruti 1982a, fig. 21, p. 395)

ID 141, (Ferrarese Ceruti 1987, fig. 38, p. 450)

ID 144, (Ferrarese Ceruti 1986, fig. 6, p. 442)

ID 145, (Ferrarese Ceruti 1986, fig. 7, p. 442)

ID 146, (Ferrarese Ceruti 1986, fig. 5, p. 442)

ID 147, (Ferrarese Ceruti 1986, fig. 8, p. 442)

ID 149, (Ferrarese Ceruti 1985, fig. 12, p. 434)

ID 150, (Ferrarese Ceruti 1985, fig. 12, p. 434)

ID 151, (Ferrarese Ceruti 1985, fig. 12, p. 434)

ID 153, (Ferrarese Ceruti 1985, fig. 12, p. 434)

ID 154, (Ferrarese Ceruti 1986, fig. 19, p. 443)

ID 155, (Ferrarese Ceruti 1986, fig. 20, p. 443)

ID 156, (Ferrarese Ceruti 1986, fig. 21, p. 443)

ID 157, (Ferrarese Ceruti 1986, fig. 22, p. 443)

ID 158, (Ferrarese Ceruti 1986, fig. 23, p. 443)

ID 159, (Ferrarese Ceruti 1986, fig. 12, p. 443)

ID 160, (Ferrarese Ceruti 1986, fig. 13, p. 443)

ID 161, (Ferrarese Ceruti 1986, fig. 14, p. 443)

ID 162, (Ferrarese Ceruti 1986, fig. 15, p. 443)

ID 163, (Ferrarese Ceruti 1986, fig. 16, p. 443)

ID 164, (Ferrarese Ceruti 1986, fig. 17, p. 443)

ID 165, (Ferrarese Ceruti 1986, fig. 18, p. 443)

ID 170, ID 171, ID 172, ID 173 (Cucuzza 2009, pp. 4-5)

ID 179 (Pompianu - Soro 2012)

ID 180, ID 181, ID 182, ID 183, ID 184 (Lo Schiavo 1979, Tav. I)

ID 185 (Lo Schiavo - Vagnetti 1993, fig.4, p. 134)

ID 186 (Ugas 1982, pp.39-40)

ID 188, ID 189, ID 190, ID 191, ID 192 (Ugas 1992, Tav. IX a, p.227)

ID 199 (Ferrarese Ceruti 1982a, fig. 42, p. 397)

Tables of finds

Attend No

ID **007**

Inventory number *97710*

Collocation *Museo Archeologico Nazionale di Cagliari*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 10 SE

Period	Mycenaean (?)
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall with the edge
Radius	
Weight	
Height	3 cm
Width	5 cm
Thickness max.	0,5 cm
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	
int. Surface	

Decoration	Yes
Decoration (color)	reddish brown
Decoration (description)	*"Linea orizzontale, che corre nel punto di innesto tra la tesa dell'orlo e il collo. Pittura opaca, densa in taluni punti abrasa"* (M.L. Ferrarese Ceruti 11-05 -1981)

Overview

"Orlo ingrossato a sporto in fuori a formare una breve tesa. Il collo, che tende a restringersi notevolmente, doveva essere piuttosto lungo. Materiale e tecnica: Argilla figulina color crema. Superfici ingubbiate, color crema. Leggere tracce di tornio" (M.L. Ferrarese Ceruti 11-05-1981)

Hardness

Feel

Fracture

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

Annotation

It is impossible to examinate the fragment

References

Schedule RA 20000/46762

Attend Yes

ID **010**

Inventory number *97713*

Collocation *Box 10 A (Materiale selezionato vano A) -- Villa Siotto Sarroch CA*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 9

Period	Mycenaean (?)
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	20.72 mm
Width	29.37 mm
Thickness max.	5.35 mm
Thickness min.	4.49 mm
Core	8/6 2.5 Y
ext. Margin	8/6 2.5 Y
int. Margin	8/6 2.5 Y
ext. Surface	8/6 2.5 Y
int. Surface	8/6 2.5 Y

Decoration	Yes
Decoration (color)	2.5/1 2.5 YR
Decoration (description)	*"Superficie esterna decorata con Semicerchi concentrici frangiati contenuti tra due linee orizzontali, una a sottolineare l'orlo, l'altra, in basso più sottile. all'interno sottile linea nero bruna sottolinea l'orlo" (Ferrarese Ceruti 08-01 -1981)*

Overview

"Orlo leggermente ingrossato e riverso in fuori. Materiale e tecnica: Argilla figulina. superfici color crema ingubbiate: l'interna di un colore più chiaro rispetto all'esterna" (Ferrarese Ceruti 08-01-1981)
Fragment of a crater

Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	wiped

Annotation

In the publication and in the Schedule RA, there are trhee fragments; now there is only a fragment

References

Schedule RA 20000/4676
Ferrarese Ceruti 1979, fig. 4.4, 276; 1980, fig. 1.1, 279; 1981, fig. 10, 386

Attend No

ID **024**

Inventory number *97727*

Collocation *Museo Archeologico Nazionale di Cagliari*

Founding place **Nuraghe Antigori**

Context of founding Room A. layer 10 SE

Period	Mycenaen
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall with neck
Radius	
Weight	
Height	3,3 cm
Width	6 cm
Thickness max.	0,5 cm
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	
int. Surface	

Decoration	Yes
Decoration (color)	rosso
Decoration (description)	*"Nel punto di giunzione tra collo e spalla, una fascia rossa in pittura vivida, opaca, sebbene ora assai evanide ed abrasa a tratti"* (Ferrarese Ceruti 14-04-1981)

Overview

"Della brocchetta residua il tratto del collo e della spalla. Nel punto di giunzione tra collo e spalla una fascia rossa, in pittura vivida, opaca, sebben ora assai evanide ed abrasa a tratti. Materiale e tecnica: argilla depurata con molti inclusi. Superfici color crema, l'esterna ingubbiata, interna con visibili tracce di tornio" (Ferrarese Ceruti 14-04-1981)

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Schedule RA 20000/46779

Attend Yes

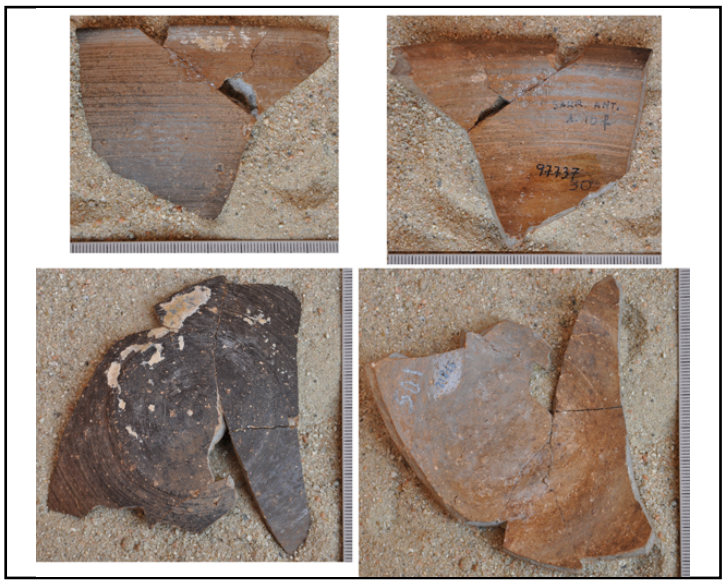
ID **033**

Inventory number *97737; 97812*

Collocation *Box 16; Busta vano A; vano T; Provenienza Varia. Villa Siotto Sarroch CA*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 10



Period	Mycenaean
Phase	Local production
Datation	
Status	partially restored
Fragments	5
Part	ege with wall; bottom
Radius	
Weight	
Height	6,5 cm
Width	5 cm
Thickness max.	0,5 cm
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	
int. Surface	

Decoration	No
Decoration (color)	/
Decoration (description)	/

Overview

"*Orlo assottigliato e riverso in fuori. Corpo notevolmente concavo. Le sottili righe della rifinitura alla stecca costituiscono l'unico motivo decorativo del recipiente.*
Materiale e tecnica: Argilla depurata con inclusi. Superfici igubbiate, color nocciola, più scura l'esterna. Una fitta serie di linee parallele documenta la rifinitura a stecca. impressioni del tornio appiattite dalla stecca" (Ferrarese Ceruti 2-03-1981; 2-04 -1981)

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	good
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	angular
Treatment (outer surf.)	burnished
Treatment (inner surf.)	burnished

Annotation

Schedule RA 20000/46789
Schedule RA 20000/46790

References

Schedule RA 20000/46789

Attend Yes

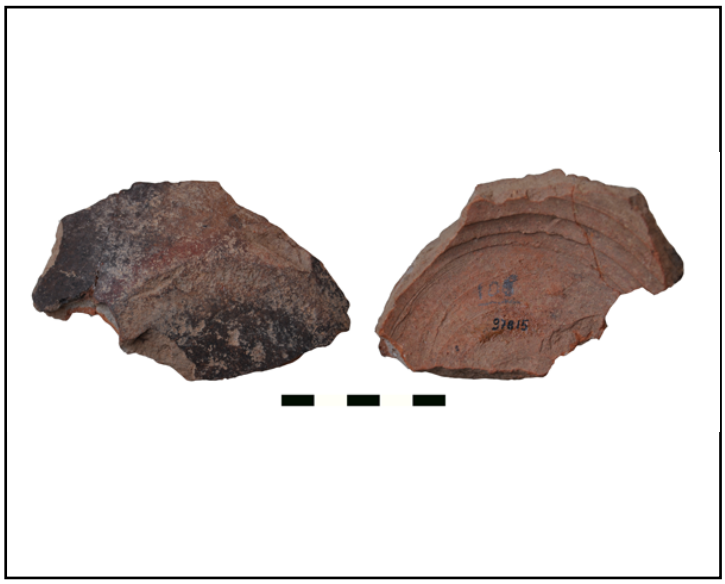
ID **035**

Inventory number *97815*

Collocation *Cassa 17 Villa Siotto Sarroch (CA)*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 13



Period	Mycenaean
Phase	Local production
Datation	
Status	partially restored
Fragments	2
Part	bottom with wall
Radius	50.50 mm
Weight	
Height	25.00
Width	100.04 mm
Thickness max.	11.24 mm
Thickness min.	80.30 mm
Core	7/1 5gy
ext. Margin	4/6 2.5 yr (red)
int. Margin	6/8 2.5YR
ext. Surface	3/1 2.5YR (bottom and
int. Surface	6/8 2.5 YR

Decoration	Yes
Decoration (color)	4/6 10R (red
Decoration (description)	*"Decorazione costituita da una linea rossa che delimita, in basso, il margine della parete nel suo innesto al fondo. Pittura rosso-vivo, molto diluita ed evanide*" (Ferrarese Ceruti 6-3-1981) Horizontal band (8 mm thickness)
Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	laminated
Inclusions (frequency)	moderate
Inclusions (distribution)	fair
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	angular
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

Overview

"*Frammento di vaso indeterminato, grande contenitore di derrate. Fondo piatto con margine arrotondatoMateriale e tecnica: Argilla depurata con inclusi, color cuoio*" (Ferrarese Ceruti 6-3-1981) Bottom of a closed vessel. The color of external surface is typical of the pottery defined "mycenaean local production"

Annotation

References

Schedule RA 20000/46867

Attend Yes

ID **036**

Inventory number /

Collocation *Box 17 Villa Siotto*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 13

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	04.00 mm
Width	07.50 mm
Thickness max.	11.40 mm
Thickness min.	7.39 mm
Core	8/4 5YR
ext. Margin	8/4 5YR
int. Margin	8/4 5YR
ext. Surface	8/4 5YR
int. Surface	8/4 5YR

Decoration	Yes
Decoration (color)	5/8 10R
Decoration (description)	There are two horizontal stripes (40.62 mm thickness) perpendicular to the wall. It is difficult to reconstruct the decoration because the piece is a fragment. There is a third stripe too, but it is very difficult to see.

Overview

Fragment of a wall, very probabilly it was a closed vessel. On the internal surface it is possible to see the inclusions.

Hardness	soft (can be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	irregular

Inclusions (frequency)	moderate
Inclusions (distribution)	good
Inclusions (size)	coarse (from 0,5 to
Inclusions (shape)	sub-angular
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

Annotation

The annotation on the internal surface "ANT A 13" indicates that the fragment comes from the space "a", layer 13.

References

Attend Yes

ID **038**

Inventory number /

Collocation *Box 17 Villa siotto*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 13 (?)

Period	Mycenaean
Phase	import
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	51.37 mm
Width	68.28 mm
Thickness max.	10.64 mm
Thickness min.	10.63 mm
Core	8/3 7.5 YR
ext. Margin	8/3 7.5 YR
int. Margin	8/3 7.5 YR
ext. Surface	8/3 7.5 YR
int. Surface	8/3 7.5 YR

Decoration	Yes
Decoration (color)	6/6 5YR ; 2.5/2; 3/2 5YR
Decoration (description)	Two parallel stripes perpendicular to the wall. One of them have thickness 6.05 mm and a colour reddish yellow, the other have thickness 17.66 mm and colour dark reddish brown, but is not complete visible. It is impossible to reconstruct the motiv decoration

Overview

Fragment of a close vessel, with decoration on the external surface.

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	subconoidal

Annotation

The internal surface can be compared with ID 36

Inclusions (frequency)	abundant
Inclusions (distribution)	good
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	irregular
Treatment (outer surf.)	knife-trimmed
Treatment (inner surf.)	throwing marks

References

Attend Yes

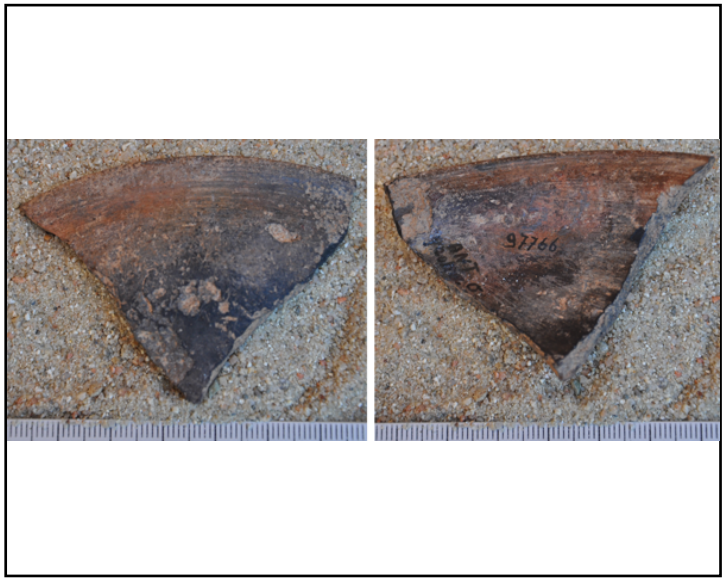
ID **042**

Inventory number *97766*

Collocation *Box 17 (gruppo C) Villa Siotto Sarroch CA*

Founding place **Nuraghe Antigori**

Context of founding Burial cave "o"



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	edge with wall
Radius	
Weight	
Height	47,80
Width	66,28
Thickness max.	5.55
Thickness min.	3.17
Core	2.5/N gley 1
ext. Margin	2.5/N gley 1
int. Margin	2.5/N gley 1
ext. Surface	6/8 2.5 YR near the edge;
int. Surface	6/8 2.5 YR near the edge

Decoration No

Decoration (color)

Decoration (description)

Overview

"*Ciotola emisferica. Orlo leggermente riverso in fuori a formare una tesa il cui margine è sottolineato da una leggera cordonatura. Materiale e tecnica: impasto depurato con inclusi, color bruno. Superfici ingubbiate, brune, rifinite alla stecca. Marcati i segni del tornio non completamente appiattiti dalla stecca*" (Ferrarese Ceruti 7-5-1981)

Hardness hard (cannot be scratched with the fingernail)

Feel smooth (no irregularities can be felt)

Fracture fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	wiped

References

Schedule RA 2000/46818
Ferrarese Ceruti 1982 a, p.170

Attend Yes

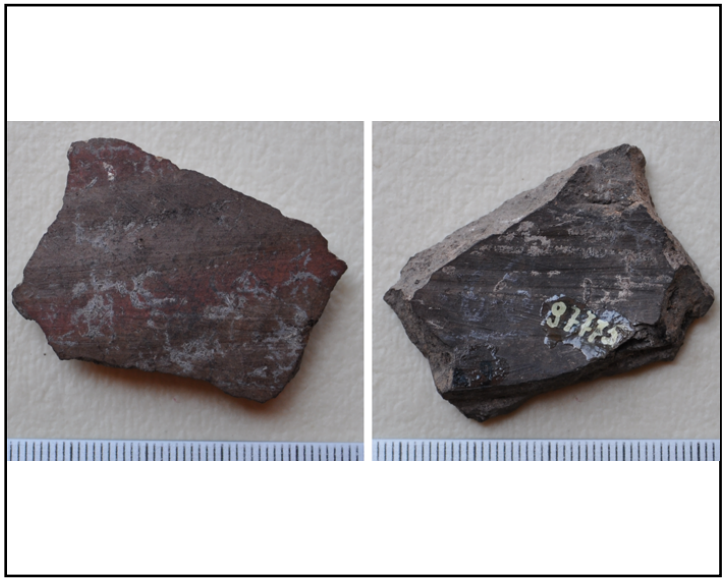
ID **044**

Inventory number *97775*

Collocation *Box 17 (gruppo C) Villa Slotto*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 9



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	41,68 mm
Width	41,53 mm
Thickness max.	8.85 mm
Thickness min.	7.63 mm
Core	5/1 10R
ext. Margin	5/1 10R
int. Margin	5/1 10R
ext. Surface	5/3 5YR
int. Surface	4/2 5YR

Decoration	Yes
Decoration (color)	4/6 10 R
Decoration (description)	*"Decorazione costituita da due linee orizzontali e parallele molto distanziate, color rosso, in pittura assai diluita ed evanide" (Ferrarese Ceruti 13-04-1981)* Two horizontal parallel stripes (thichness 6.30 mm)

Overview

"Il frammento è pertinente ad un tratto di parete che non presenta alcuna caratteristica. Argilla depurata con inclusi. Superfici ed impasto colore bruno scuro, rifinite alla stecca. Deboli tracce del tornio" (Ferrarese Ceruti 13-04-1981)

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	irregular

Inclusions (frequency)	moderate
Inclusions (distribution)	poor
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	rounded
Treatment (outer surf.)	smoothed
Treatment (inner surf.)	media

Annotation

There are not throwing marks 5/1 10R

References

Schedule RA 20000/46827

Attend Yes

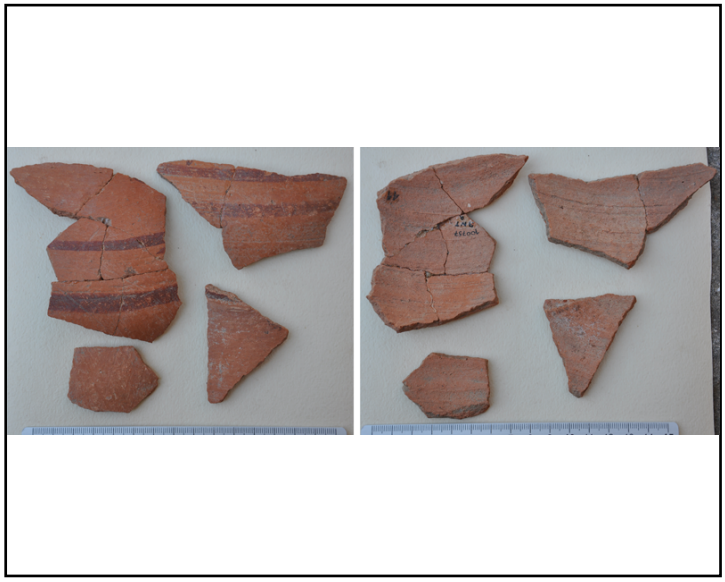
ID **048**

Inventory number *100757*

Collocation *Box 10 A (materiale selezionato Vano A) Villa Siotto Sarroch*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 9



Period	
Phase	
Datation	
Status	partially restored
Fragments	6; 2; 1; 1; (tot bustina 10)
Part	wall
Radius	
Weight	
Height	80,95 mm
Width	79,80 mm
Thickness max.	8,03 mm
Thickness min.	5,38 mm
Core	7/8 2.5YR
ext. Margin	
int. Margin	
ext. Surface	6/8 10 R
int. Surface	6/6 2.5 YR

Decoration	Yes
Decoration (color)	4/4 10 R
Decoration (description)	Two horizontal stripes (height 9,38 mm; 4,90 mm) on the external surface.

Overview

Maybe is a closed vessel.
The first group of the fragments have a inventory number (100757), but all the fragments are relevant to the same pot.
The colour and the tratment of the surface suggest a local production of this hypotetical jar

Hardness	very hard (cannot be scratched with a knife)
Feel	rough (irregularities can be felt)
Fracture	smooth

Annotation

There is not a referred Schedule RA

Inclusions (frequency)	moderate
Inclusions (distribution)	poor
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	sub-angular
Treatment (outer surf.)	knife-trimmed
Treatment (inner surf.)	throwing marks

References

Attend Yes

ID **076**

Inventory number *97791*

Collocation *Museo Archeologico Nazionale di Cagliari*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 10

Period Mycenaean

Phase import

Datation

Status fragment

Fragments 1

Part

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration Yes

Decoration (color)

Decoration (description) "*La superficie esterna è decorata da tre sottili linee parallele ed orizzontali che delimitano in basso una linea più larga dalla quale si dovevano dipartire delle decorazioni. All'esterno pittura in colore rosso bruno, assai diluita; all'interno una mano di pittura assai densa, ricopre tutta la superficie del frammento: è la stessa pittura dell'esterno che all'interno è bruna perchè assai densa. Pittura lucida" (Ferrarese Ceruti 16-02-1981)*

Overview

"Il vaso doveva avere forma aperta ma non determinabile per lo stato di frammentarietà del pezzo.. Nel margine sinistro in alto residua un tratto di grappa di restauro in piombo" (Ferrarese Ceruti 16-02-1981)
In this fragment it is very interesting the small lead cramp. (see the 3 Ch, p. 138)

Hardness

Feel

Fracture

Annotation

Inclusions (frequency) sparse

Inclusions (distribution) very poor

Inclusions (size) very fine (<0,1mm)

Inclusions (shape) rounded

Treatment (outer surf.) wiped

Treatment (inner surf.) wiped

References

Schedule RA 20000/46843; Ferrarese Ceruti 1979, 276; 1981, fig.7, 386;1982,fig. 18, 169
Photo courtesy of C. Buffa (Soprintendenza per i Beni archeologici per le Province di Cagliari e Oristano)

Attend Yes

ID **077**

Inventory number *97774*

Collocation *Museo Archeologico Nazionale di Cagliari*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 10

Period	Mycenaean
Phase	import
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	4,5 cm
Width	3,7 cm
Thickness max.	0,7 cm
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	
int. Surface	

Decoration Yes

Decoration (color)

Decoration (description) *"Decorazione costituita da una larga fascia superiore mentre il resto del frammento è occupato da una fascia ondulata di cui residua la parte superiore. pittura rosso brillante, lucida" (Ferrarese Ceruti 26-3-1981)*

Overview

"Forma aperta non identifcabile. Argilla figulina color occiola; superficie esterna ingubbiata color nocciola di un tono più scuro di quella interna" (Ferrarese Ceruti 26-3-1981)

Hardness soft (can be scratched with the fingernail)

Feel smooth (no irregularities can be felt)

Fracture hackly

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	smoothed
Treatment (inner surf.)	smoothed

References

Schedule RA 20000/ 46826
Ferrarese Ceruti 1981,fig.8, 386; 1982 a, p.
Photo courtesy by C. Buffa (Soprintendenza per i Beni Archeologici per le province di Cagliari e Oristano)

Attend Yes

ID **079**

Inventory number *97832*

Collocation *Box 14 (Gruppo A)*
Villa Siotto Sarroch (CA

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 9

Period	Mycenaean
Phase	import
Datation	
Status	fragment
Fragments	2
Part	edge with wall
Radius	10,3
Weight	
Height	34.13 mm
Width	42.06
Thickness max.	5.63
Thickness min.	4.41
Core	8/3 10YR
ext. Margin	8/3 10YR
int. Margin	8/3 10YR
ext. Surface	8/6 10YR
int. Surface	8/6 10YR

Decoration	Yes
Decoration (color)	4/2 7.5 YR
Decoration (description)	"*Decorazione costituita da una larga banda che occupa anche tutto il margine dell'orlo e che deborda brevemente anche nella superficie interna. Pittura nerastra lucente*"(Ferrarese Ceruti 10 -04 -1981)

Overview

"Orlo arrotondato e riverso leggermente in fuori. Argilla figulina color crema. ingubbio corlor crema su entrambe le superfici" (Ferrarese Ceruti 10 -04-1981)

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	throwing marks

References

Schedule RA 20000/46884

Attend Yes

ID **080**

Inventory number *97750*

Collocation *Museo Archeologico Nazionale di Cagliari*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 13

Period Minoan (?)

Phase import

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height 8,5 cm

Width 8 cm

Thickness max. 1,8 cm

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration Yes

Decoration (colour)

Decoration (description) *"La superficie esterna è decorata da una serie di linee parallele e oblique impresse con una stecca nella pasta molle del vaso, sì da dare origine ad una decorazione plastica. Queste bande sono distanziate tra loro da bande liscie. Residuano tra bande plastiche e due liscie" Ferrarese Ceruti 1-01-1981)*
Three dimensional decoration. Series of oblique slites on clay

Hardness

Feel

Fracture

Inclusions (frequency) moderate

Inclusions (distribution) good

Inclusions (size) medium (from 0,25 to

Inclusions (shape) irregular

Treatment (outer surf.)

Treatment (inner surf.) throwing marks

Overview

"Frammento di pithos. La lavorazione è grossolana. Materiale e tecnica: Argilla non depurata, al tornio, superficie nocciola ben rifinite" (Ferrarese Ceruti 1-01-1981)
Fragment of a big minoan pithos.

Annotation

References

Schedule RA 20000/46802; Ferrarese Ceruti 1979; 1981, fig. 9, 386; Ferrarese Ceruti 1982a, 1982; Photo courtesy by C. Buffa (Soprintendenza per i Beni Archeologici per le Province di Cagliari e Oristano)

Attend Yes

ID **081**

Inventory number *97722; 97777; 100755*

Collocation *Box 14 (Gruppo A)*
Villa Siotto Sarroch CA

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 9

Period	Minoan (?)
Phase	
Datation	
Status	partially restored
Fragments	10
Part	wall with horizontal handle
Radius	80,2 mm
Weight	
Height	49.04 mm
Width	35.07 mm
Thickness max.	3.43 mm
Thickness min.	3.07 mm
Core	8/6 10YR
ext. Margin	8/6 10YR
int. Margin	8/6 10YR
ext. Surface	8/4 10YR
int. Surface	8/4 10YR

Decoration	Yes
Decoration (color)	4/1 7.5 YR
Decoration (description)	Ext. decoration: stripe on the rim; band under the edge (thick. 10,10 mm).decoration on the handle and the wall. A big band under the handle. On the wall between the two bands a big spiral motiv. "*The spiral motif is too common to permit localization of its source, and the Antigori sherd is quite small*" (Pallson Hallager 1985, 301)
Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	throwing marks

Overview

"*Orlo arrotondato e leggermente sporto in fuori; La qualità della ceramica è ottima, non si notano tracce del tornio; argilla figulina, superficie esterna ingubbiata, color nocciola chiaro, impasto e superficie interna nocciola chiaro*" (Ferrarese Ceruti 06-01-1981;25-03 -1981)
Maybe is a Minoan crater, because the decoration remember some spiral motifs of vessels founded in Kommòs and Pallson Hallager founded comparison with a closed vessel in Chania

Annotation

The fragment 100755 is pertinent to the same assembly of fragments that includes 97722; 97777; 100755.

References

Schedule RA 20000/43774; RA 20000/46829;; Ferrarese Ceruti 1981, fig.6, 386; Pallson Hallager 1985, 301.

Attend Yes

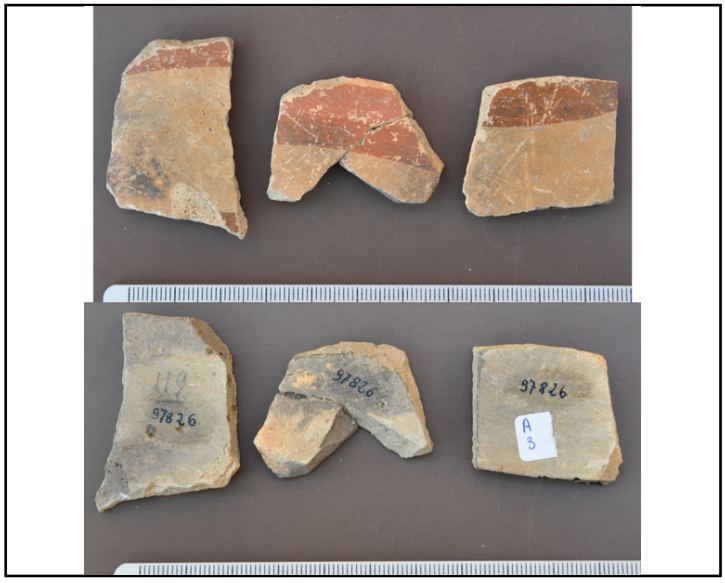
ID **082**

Inventory number *97826*

Collocation *Box 14 (gruppo A)*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 10 SE



Period	Mycenaean
Phase	
Datation	
Status	fragment
Fragments	3
Part	wall
Radius	
Weight	
Height	42.78 x 52.55 mm
Width	42.78 x 52.55 mm
Thickness max.	5.33 mm
Thickness min.	5.33 mm
Core	5/N Gley 1
ext. Margin	8/4 7.5 YR
int. Margin	8/2 7.5 YR
ext. Surface	7/4 7.5 YR
int. Surface	7/1 10 YR

Decoration	Yes
Decoration (color)	4/6 2.5 YR
Decoration (description)	"*Tracce di una larga banda dipinta lungo il margine, mentre il frammento più lungo mostra anche un piccolissimo tratto di una seconda banda nell'angolo inferiore destro. Pittura rossa lucida*" (Ferrarese Ceruti 30-03-1981) A big horizontal band

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	irregular

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	flat
Treatment (outer surf.)	wiped
Treatment (inner surf.)	throwing marks

Overview

"*Non è possibile precisare la forma dell'oggetto originario. Materiale e tecnica: argilla figulina. superficie esterna color crema, ingubbiata, interna grigio cenere. Segnoi del tornio appiattiti con la stecca. Pittura rossa, a tratti più chiara, lucida*" (Ferrarese Ceruti 30 -03-1981)
Three fragments of a same vessel. It is impossible to know the right shape, maybe an open vessel for the internal surface

Annotation

In the Schedule there are only two fragments.

References

Schedule RA 20000/46878

Attend Yes

ID **083**

Inventory number *100759*

Collocation *Box 14 (gruppo A)*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 13

Period	Mycenaean
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	73,69 mm
Width	85.09 mm
Thickness max.	8.32 mm
Thickness min.	4.91 mm
Core	5/10b gley 2
ext. Margin	6/6 2.5 YR
int. Margin	6/6 2.5 YR
ext. Surface	7/6 5YR
int. Surface	6/6 2.5 YR

Decoration

Decoration (color)	4/2 7.5 YR
Decoration (description)	two parallel bands (2 cm thickness)

Overview

Fragment of a close vessel,

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	fine

Inclusions (frequency)	moderate
Inclusions (distribution)	fair
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	Rotondeggiante
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

Annotation

The signature on the internal surface suggests the provenence. "ANT A 13" indicates Nuraghe Antigori, space "a", layer 13.

References

/

Attend Yes

ID **086**

Inventory number /

Collocation *Box 14 (gruppo A)*
Villa Siotto Sarroch CA

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 10 SE

Period	Mycenaean
Phase	
Datation	
Status	partially restored
Fragments	2
Part	handle with wall
Radius	
Weight	
Height	77.60 mm
Width	122.08
Thickness max.	11.40
Thickness min.	7.10
Core	6/8 2.5 YR
ext. Margin	6/8 2.5 YR
int. Margin	6/8 2.5 YR
ext. Surface	8/4 10 YR
int. Surface	6/6 2.5 YR

Decoration	Yes
Decoration (color)	7/6 5YR
Decoration (description)	A big band surrounds the handle. The handle have a stripe decoration too

Overview

It is difficult to have the really inclination of the fragment.
Closed vessel, maybe a big amphora with handle

Hardness	soft (can be scratched with the fingernail)
Feel	harsh (feels abrasive to the finger)
Fracture	irregular

Inclusions (frequency)	abundant
Inclusions (distribution)	fair
Inclusions (size)	very coarse (>1,00mm)
Inclusions (shape)	irregular
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

Annotation

On the internal surface of the big vase (maybe an amphora for food) there is the jont for the handle. In the publication there is a biggest fragment of the handle, now it lacks.

References

Ferrarese Ceruti 1981, fig.5, 386

Attend Yes

ID **103**

Inventory number *97798*

Collocation *Box 14 (Gruppo B) Villa Siotto Sarroch Ca*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 6

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	20.54 mm
Width	22.45 mm
Thickness max.	5.80 mm
Thickness min.	5.32 mm
Core	6/8 2.5 YR
ext. Margin	6/8 2.5 YR
int. Margin	6/8 2.5 YR
ext. Surface	6/8 2.5 YR
int. Surface	6/6 2.5 YR

Decoration	Yes
Decoration (color)	4/3 10 R
Decoration (description)	"*Decorazione costituita da tre semicerchi concentrici (spirale?) in pittura rosso violaceo, opaca*" (Ferrarese Ceruti 22-01 -1981)

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	irregular

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	sub-angular
Treatment (outer surf.)	smoothed
Treatment (inner surf.)	throwing marks

Overview

"*Frammento pertinente al corpo del vaso. Materiale e tecnica: Argilla assai grossolanamente depurata, con inclusi color cuoio. Superficie esterna ingubbiata, color cuoio, rifinita alla stecca. l'interna conserva leggere tracce del tornio*" (Ferrarese Ceruti 22-01-1981)

Small fragment of a wall.

Annotation

References

Attend Yes

ID **114**

Inventory number /

Collocation *Box 16 - busta (Sarroch Antigori vano A ceramica micenea selezionata-vagnetti?) Villa Siotto Sarroch CA*

Founding place **Nuraghe Antigori**

Context of founding Room A

Period	Minoan (?)
Phase	import
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	25.55 mm
Width	39.56 mm
Thickness max.	5.49mm
Thickness min.	4.67 mm
Core	8/6 10 YR
ext. Margin	8/6 10 YR
int. Margin	8/6 10 YR
ext. Surface	7/6 10 YR
int. Surface	8/6 10 YR

Decoration	Yes
Decoration (color)	4/4 5YR; 3/2 5YR
Decoration (description)	4 horizontal lines sourrounds the wall: different thickness (6.81 mm; 1.56mm; 2.59 mm; 3.94 mm). There are 6vertical lines from the the biggest horizontal line. The paint is glossy
Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	Fine

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	liscia

Overview

Fragment of a wall.
Refined, polished on the external and internal surface. Throwing marks on the int. surf. but subsequently polished.
The color gradient of the decoration recalls the fragment ID 10

Annotation

References

Attend Yes

ID **115**

Inventory number /

Collocation *Box 16 -busta (Sarroch Antigori vano A ceramica micenea selezionata-vagnetti?)*

Founding place **Nuraghe Antigori**

Context of founding Room A, layer 13

Period	Minoan (?)
Phase	import
Datation	
Status	fragment
Fragments	2
Part	wall
Radius	
Weight	
Height	25.37 mm
Width	48.92 mm
Thickness max.	1.51 mm
Thickness min.	1.16 mm
Core	8/4 10 YR
ext. Margin	8/4 10 YR
int. Margin	8/4 10 YR
ext. Surface	8/6 10 YR
int. Surface	8/4 10 YR

Decoration	Yes
Decoration (color)	4/8 2.5 YR
Decoration (description)	Three horizontal parallels lines (thickness 4.54 mm; 1.86 mm1.95 mm)

Overview

Fragment of a wall.
There are similarities with ID 114.
The shape of the vessel is indeterminable .

Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	wiped
Treatment (inner surf.)	liscia

Annotation

On the smaller fragment it is written "Ant A13" (probabily significance is room A, layer 13); in the sachet there is a tag with the annotation "20 -10-81, Vano A Recupero clandestini" and another tag with "maybe cretan"

References

Attend Yes

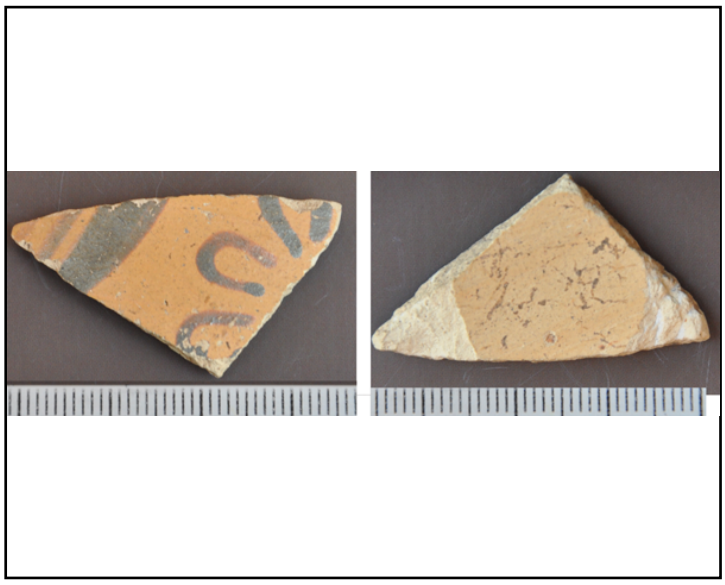
ID **116**

Inventory number /

Collocation *Box 16 -busta (Sarroch Antigori vano A ceramica micenea selezionata-vagnetti?)*

Founding place **Nuraghe Antigori**

Context of founding Room A (?)



Period	Minoan (?)
Phase	import
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	20.27 mm
Width	35.85 mm
Thickness max.	4.62 mm
Thickness min.	4.33 mm
Core	8/6 10 YR
ext. Margin	8/6 10 YR
int. Margin	8/6 10 YR
ext. Surface	7/8 7.5 YR
int. Surface	8/6 10 YR

Decoration	Yes
Decoration (color)	4/4 5YR; 3/2 5YR
Decoration (description)	Decoration with three lines and zig zag motivs

Overview

Very small fragment of a wall. Very purified clay.

Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	liscia

References

Attend Yes

ID **126**

Inventory number /

Collocation *Box 16 -busta (Sarroch Antigori vano A ceramica micenea selezionata-vagnetti?)*

Founding place **Nuraghe Antigori**

Context of founding Room A (?) layer 6 (?)

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	edge with wall
Radius	
Weight	
Height	31.90 mm
Width	50.96 mm
Thickness max.	4.54 mm
Thickness min.	4.22 mm
Core	7/10 G Gley 2
ext. Margin	8/4 7.5 YR
int. Margin	8/4 7.5 YR
ext. Surface	7/4 2.5 YR
int. Surface	8/4 5YR

Decoration	Yes
Decoration (color)	4/4 10 R
Decoration (description)	External surface. A band near the edge, three alternating semicircles under the band; Internal surface: a band under the edge and oblique strokes along the edge

Overview

frammento di vaso di forma aperta stesso genere dei precedenti
Fragment of an open vessel. Very similar to other fragments (ID 124; ID 125)

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Tag "Strato 6 25-3-1982 lato ovest 103 F"

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	smoothed
Treatment (inner surf.)	smoothed

References

Attend Yes

ID **132**

Inventory number /

Collocation *Box 82 (ceramica micenea e pezzi scelti nuragici)*

Founding place **Nuraghe Antigori**

Context of founding Tower F; layer 9

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	29.16 mm
Width	30.30 mm
Thickness max.	6.07 mm
Thickness min.	5.29 mm
Core	8/2 2.5 YR
ext. Margin	6/6 2.5 YR
int. Margin	6/6 2.5 YR
ext. Surface	trav7/4 e 6/4 5YR
int. Surface	7/3 5YR

Decoration	Yes
Decoration (color)	4/3 10 R
Decoration (description)	It seems to be the remains of a decorative cross lines. it is frequent in different decorations also founded in fragments of space A

Overview

Maybe was an open vessel. there is a thin layer of clay applied on the inner surface.

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	irregular

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	irregular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	smoothed

References

Attend Yes

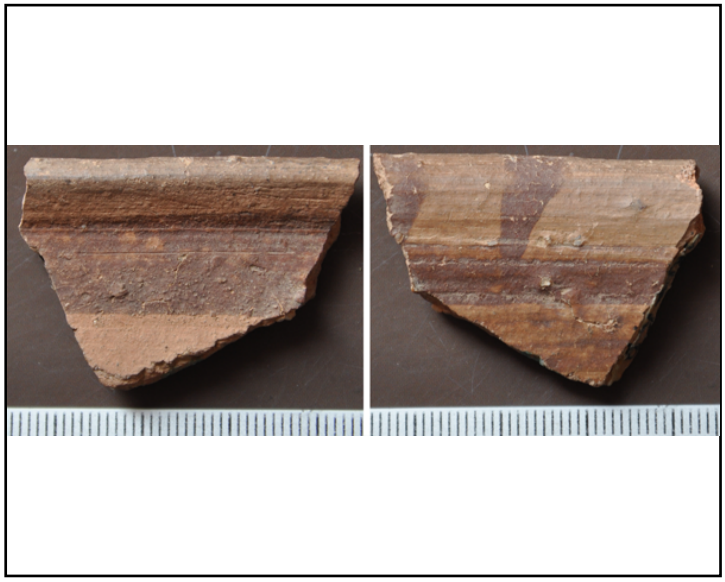
ID **134**

Inventory number /

Collocation *Box 82 (ceramica micenea e pezzi scelti nuragici)*

Founding place **Nuraghe Antigori**

Context of founding Tower F layer 9



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	edge with wall
Radius	
Weight	
Height	25.13 mm
Width	37.38 mm
Thickness max.	6.80 mm
Thickness min.	4.12 mm
Core	6/6 2.5 YR
ext. Margin	6/6 2.5 YR
int. Margin	6/6 2.5 YR
ext. Surface	7/6 5YR
int. Surface	6/3 7.5 YR

Decoration	Yes
Decoration (color)	4/4 2.5 Yr
Decoration (description)	External surface. Horizontal band (12.14 mm) immediately below the rim Internal surface. Band (6.27 mm) immediately below the rim behind the two triangles

Overview

Edge of an open vessel.
It have comparisons with others fragment founded in the space "a"

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	smooth

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	liscia

References

Attend Yes

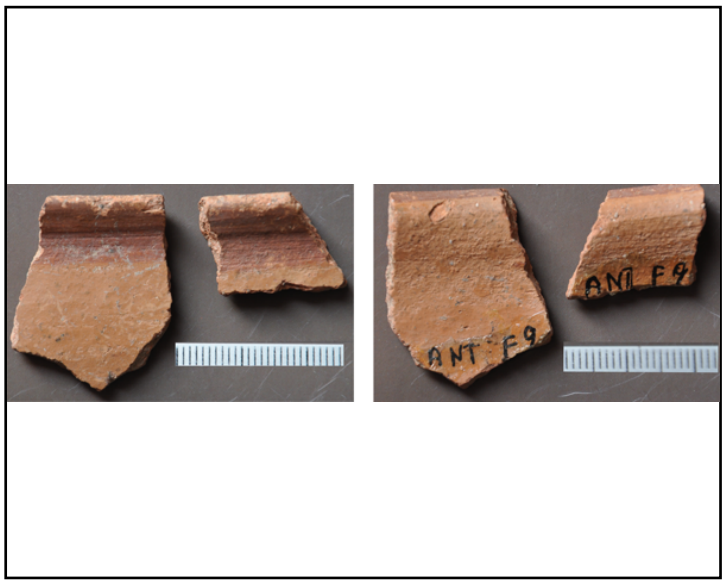
ID **137**

Inventory number /

Collocation *Box 82 (ceramica micenea e pezzi scelti nuragici)*

Founding place **Nuraghe Antigori**

Context of founding Tower F layer 9



Period	
Phase	
Datation	
Status	fragment
Fragments	2
Part	edge and wall
Radius	
Weight	
Height	30.08 mm; 15.41mm
Width	23.25 mm; 20.15 mm
Thickness max.	8.84 mm;
Thickness min.	3.83 mm; 3.77 mm
Core	4/8 2.5 YR
ext. Margin	
int. Margin	
ext. Surface	7/6 5 YR
int. Surface	

Decoration	Yes
Decoration (color)	4/4 10 R
Decoration (description)	External surface: horizontal band under the edge Internal surface: horizontal band uon the rim

Overview

Two edge's fragments of the same vessel.
Open vessel.

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	moderate
Inclusions (distribution)	poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	liscia

References

Attend Yes

ID **141**

Inventory number /

Collocation *Box 82 (ceramica micenea e pezzi scelti nuragici)*

Founding place **Nuraghe Antigori**

Context of founding Tower F layer 3

Decoration No

Decoration (colour)

Decoration (description)

Period

Phase import

Datation

Status complete

Fragments 1

Part necklace

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core 4/8 2.5 YR

ext. Margin

int. Margin

ext. Surface 4/8 2.5 YR

int. Surface 4/8 2.5 YR

Overview

Rounded shape with jagged edges, and a small hole in the middle,
Material is probabilly cornealian, despite the amber colour. It is probabilly a necklace element

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Ferrarese Ceruti 1987, 450, fig.38

Attend Yes

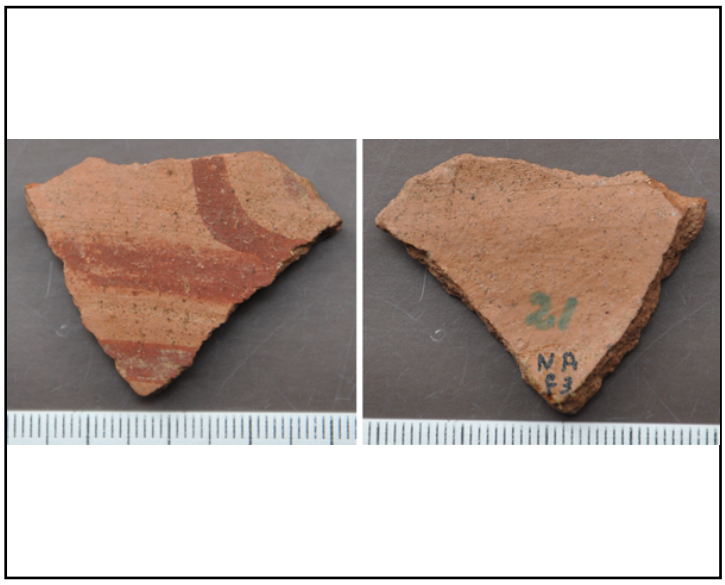
ID **142**

Inventory number /

Collocation *Box 82 (ceramica micenea e pezzi scelti nuragici)*

Founding place **Nuraghe Antigori**

Context of founding Tower F layer 3



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	33.12 mm
Width	38.74 mm
Thickness max.	6.12 mm
Thickness min.	5.03 mm
Core	7/6 5YR
ext. Margin	7/6 5YR
int. Margin	7/6 5YR
ext. Surface	7/6 5YR
int. Surface	7/6 5YR

Decoration	Yes
Decoration (colour)	4/6 10 R
Decoration (description)	two parallel bands (thick mm6.65 and 4.64). Above the biggest band there is the curved line.

Overview

Open shaped vessel.
Colour and mixture are very similar to fragments of the space "a".

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	wiped
Treatment (inner surf.)	burnished

References

Attend Yes

ID **143**

Inventory number /

Collocation *Box 82 (ceramica micenea e pezzi scelti nuragici)*

Founding place **Nuraghe Antigori**

Context of founding Tower F layer 3

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	very light weight
Height	30.29 mm
Width	36.23 mm
Thickness max.	7.92 mm
Thickness min.	7.02 mm
Core	6/N gley 1
ext. Margin	7//2 10 YR
int. Margin	7//2 10 YR
ext. Surface	7/3 10 YR
int. Surface	6/1 10YR

Decoration	Yes
Decoration (colour)	4/1 10 YR
Decoration (description)	Band (mm12.27)

Overview

piece too fragmented. Can not recognize the shape. Interesting aspect: very light weight

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	sub-angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	burnished

References

Attend Yes

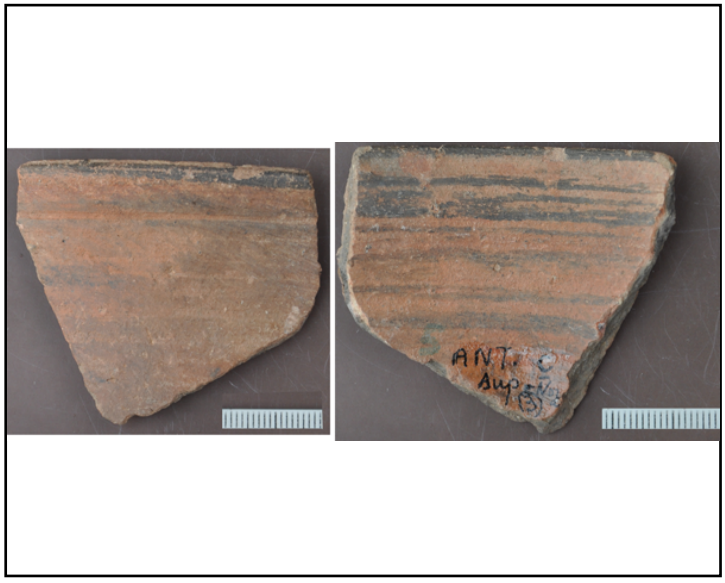
ID **144**

Inventory number /

Collocation *Box 9 (ex cassa 6676)*

Founding place **Nuraghe Antigori**

Context of founding Tower C layer 3 upper



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	edge with wall
Radius	
Weight	
Height	46.14 mm
Width	53.62 mm
Thickness max.	7.17 mm
Thickness min.	5.71 mm
Core	5/10 BG
ext. Margin	7/ 3 2.5 YR
int. Margin	7/ 3 2.5 YR
ext. Surface	5/3 2.5 YR
int. Surface	6/6 2.5 YR

Decoration	Yes
Decoration (colour)	3/1 7.5 YR
Decoration (description)	traces of paint along the edge and on the internal surface

Overview

Open cup with traces of slip, now abraded. The mixture and the colour are typical of the local production

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	subconoidal

Annotation

Inclusions (frequency)	moderate
Inclusions (distribution)	poor
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	sub-angular
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

References

Attend Yes

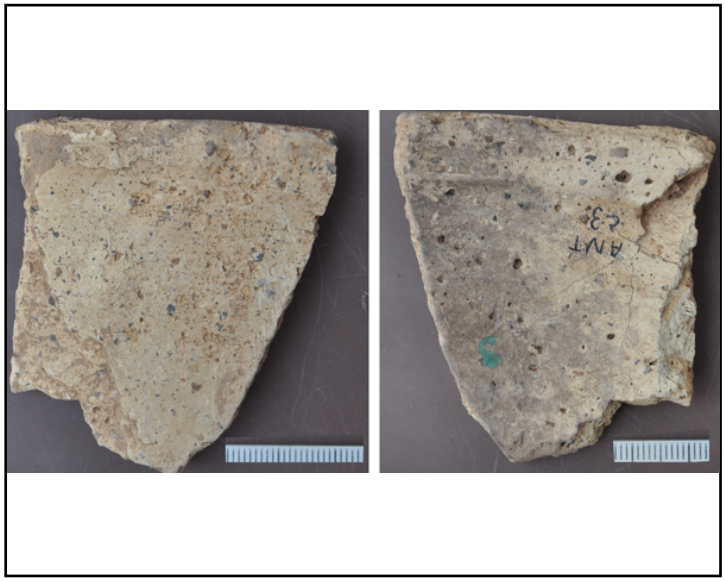
ID **145**

Inventory number /

Collocation *Box 9 (ex cassa 6676)*

Founding place **Nuraghe Antigori**

Context of founding Tower C layer 3



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	edge with wall
Radius	
Weight	
Height	60.61 mm
Width	54.98 mm
Thickness max.	10.69 mm
Thickness min.	8.41 mm
Core	8/2 2.5 YR
ext. Margin	
int. Margin	
ext. Surface	8/2 10 YR
int. Surface	8/2 10 YR

Decoration No

Decoration (colour)

Decoration (description)

Overview

"*Frammento di parete di vaso di forma sconosciuta. Superfici nocciola grossolanamente ingubbiate dello stesso colore e sommariamente lisciate. Impasto nocciola assai ricco di inclusi che talvolta traspaiono sotto l'ingubbio. una breve risega, in basso, sottolinea il punto di frattura*" (Ferrarese Ceruti 1986, 438)
The fragment is badly . It is very difficult toappreciate the structure.
Maybe a closed vessel,

Hardness hard (cannot be scratched with the fingernail)

Feel smooth (no irregularities can be felt)

Fracture irregular

Annotation

Inclusions (frequency)	moderate
Inclusions (distribution)	fair
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	rounded
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

References

Ferrarese Ceruti 1986, 438; 442, fig. 7

Attend Yes

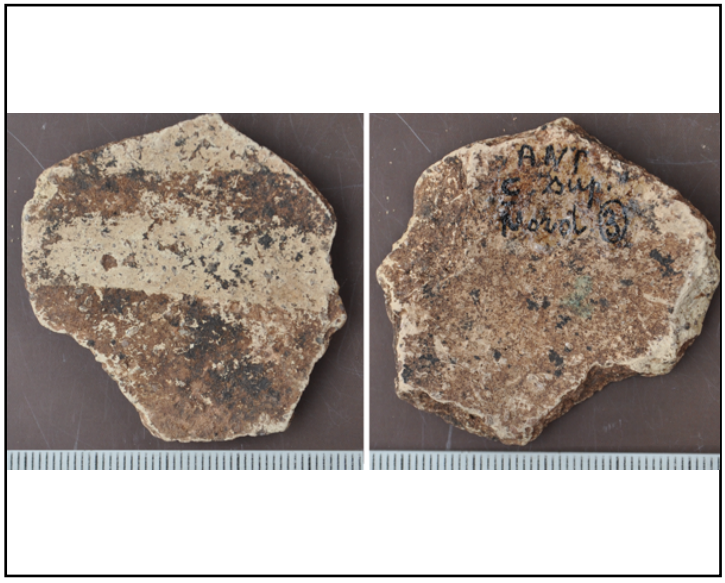
ID **146**

Inventory number /

Collocation *Box 9 (ex cassa 6676)*

Founding place **Nuraghe Antigori**

Context of founding Tower C layer 3 upper



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	45.41 mm
Width	45.70 mm
Thickness max.	6.81 mm
Thickness min.	5. 88 mm
Core	4/1 7.5 YR
ext. Margin	8/3 10 YR
int. Margin	8/3 10 YR
ext. Surface	8/3 10 YR
int. Surface	

Decoration	Yes
Decoration (colour)	5/3 7.5 YR
Decoration (description)	Two horizontal parallel bands (mm 8.01, 19.98 mm)

Overview

wall fragment very spoiled on the internal and external surface.
The treatment of internal surface indicates that it is a closed vessel

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	moderate
Inclusions (distribution)	poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	sub-angular
Treatment (outer surf.)	knife-trimmed
Treatment (inner surf.)	knife-trimmed

References

Attend Yes

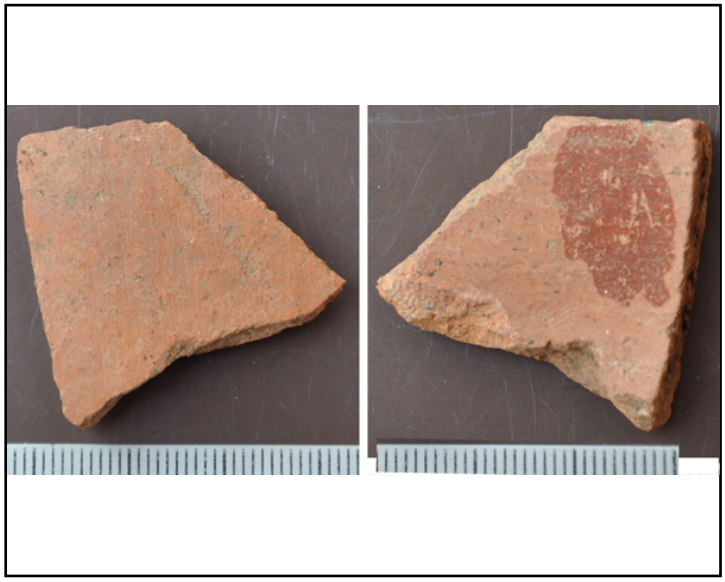
ID **147**

Inventory number /

Collocation *Box 9 (ex cassa 6676)*

Founding place **Nuraghe Antigori**

Context of founding Tower C (fireplace)



Period	
Phase	import
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	30.99 mm
Width	31.65 mm
Thickness max.	7.01 mm
Thickness min.	6.57 mm
Core	7/6 2.5 Yr
ext. Margin	
int. Margin	
ext. Surface	7/6 2.5 YR
int. Surface	7/4 2.5 YR

Decoration	Yes
Decoration (colour)	4/3 10 R
Decoration (description)	irregular patch on the inner surface

Overview

Fragment of a wall.
It is impossible to reconstruct the shape.

Hardness	very hard (cannot be scratched with a knife)
Feel	rough (irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	sub-angular
Treatment (outer surf.)	burnished
Treatment (inner surf.)	burnished

References

Ferrarese Ceruti 1986, 442, fig.8

Attend Yes

ID **149**

Inventory number *100754a*

Collocation *Box 83 Villa Siotto Sarroch (CA)*

Founding place **Nuraghe Sa Domo 'e s'Orku**

Context of founding trench D layer 3

Period	
Phase	
Datation	
Status	fragment
Fragments	4
Part	wall with edge
Radius	
Weight	
Height	73.77 mm
Width	108.91 mm
Thickness max.	8.87 mm
Thickness min.	6.58 mm
Core	8/4 5YR
ext. Margin	8/4 5YR
int. Margin	8/4 5YR
ext. Surface	8/2 10 YR
int. Surface	8/2 10 YR

Decoration	Yes
Decoration (colour)	4/1 5YR
Decoration (description)	Band (mm 21.49 thickness) between the neck and the shoulder of the vase

Overview

Fragment of a closed vessel, without slip.
Probabile vaso a collo, di sicura importazione.
Very purified clay.

Hardness	hard (cannot be scratched with the fingernail)
Feel	MEDIO (si apprezzano irregolarità)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	Fino(da 0,1 a 0,25mm)
Inclusions (shape)	Angolare
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

References

Ferrarese Ceruti 1982b, 401, fig.3

Attend Yes

ID **150**

Inventory number *100754b*

Collocation *Box 83 Villa Siotto Sarroch (CA)*

Founding place **Nuraghe Sa Domo 'e s'Orku**

Context of founding trench D layer 3

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	62.73 mm
Width	48.20 mm
Thickness max.	6.29 mm
Thickness min.	5.35 mm
Core	8/4 5YR
ext. Margin	8/4 5YR
int. Margin	8/4 5YR
ext. Surface	8/2 10 YR
int. Surface	8/2 10 YR

Decoration	Yes
Decoration (colour)	4/1 5YR
Decoration (description)	two horizontal parallel bands (thickness 16.83 mm and 10.65 mm)

Overview

wall of a closed vessel.
Very purified and light clay

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	angular
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

References

Ferrarese Ceruti 1982b, 401, fig.3

Attend Yes

ID **151**

Inventory number *100753*

Collocation *Box 83 Villa Siotto Sarroch (CA)*

Founding place **Nuraghe Sa Domo 'e s'Orku**

Context of founding trench A layer 3

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	46.34 mm
Width	36.44 mm
Thickness max.	8.24 mm
Thickness min.	5.81 mm
Core	6/6 2.5 YR
ext. Margin	6/6 2.5 YR
int. Margin	6/6 2.5 YR
ext. Surface	6/6 10 R
int. Surface	7/6 2.5 YR

Decoration	Yes
Decoration (colour)	4/4 10 R
Decoration (description)	Two parallel horizontal bands

Overview

closed vessel. We can have comparisons with finds in the space a.

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

Annotation

Tag: punic pottery
the fragment must be reviewed

References

Attend Yes

ID **152**

Inventory number /

Collocation *Box 83 Villa Siotto Sarroch (CA)*

Founding place **Nuraghe Sa Domo 'e s'Orku**

Context of founding trench B layer 3

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	bottom
Radius	
Weight	
Height	10.08 mm
Width	32.01 mm
Thickness max.	8.40 mm
Thickness min.	7.68 mm
Core	8/4 7.5 YR
ext. Margin	8/4 7.5 YR
int. Margin	8/4 7.5 YR
ext. Surface	4/2 5YR
int. Surface	8/4 7.5 YR

Decoration	Yes
Decoration (colour)	4/2 5YR
Decoration (description)	uniform painting on the external surface

Overview

bottom of figulina clay. Maybe a closed vessel for the internal surface treatment

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	throwing marks
Treatment (inner surf.)	throwing marks

References

Ferrarese Ceruti 1985,434, fig.12

Attend Yes

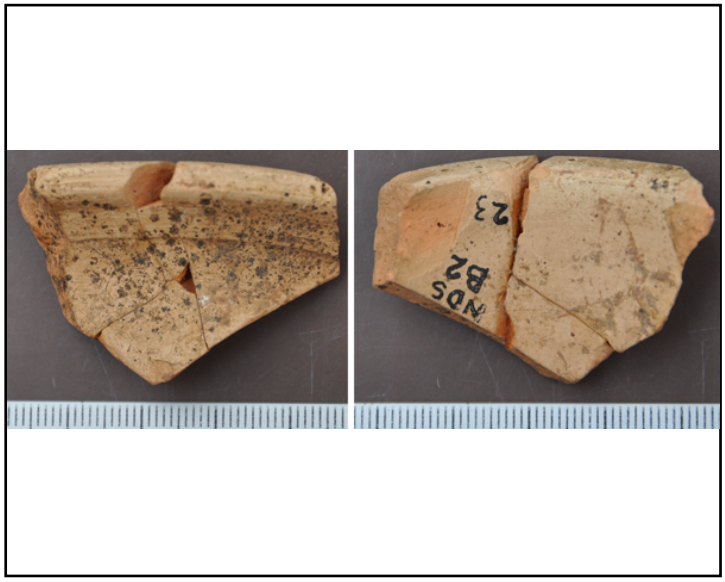
ID **153**

Inventory number *23*

Collocation *Box 83 Villa Siotto Sarroch (CA)*

Founding place **Nuraghe Sa Domo 'e s'Orku**

Context of founding trench B layer 2



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	edge and neck
Radius	
Weight	
Height	30.55 mm
Width	44.43 mm
Thickness max.	9.48 mm
Thickness min.	4.16 mm
Core	8/ 4 10YR
ext. Margin	8/4 5YR
int. Margin	8/4 5YR
ext. Surface	8/4 10 YR
int. Surface	8/4 10 YR

Decoration	No
Decoration (colour)	
Decoration (description)	

Overview

edge with neck of a closed vessel. figuline clay, mixture very purified

Hardness	hard (cannot be scratched with the fingernail)
Feel	rough (irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	good
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	flat
Treatment (outer surf.)	wiped
Treatment (inner surf.)	liscia

Annotation

the fragment is published but donìt have a description

References

Ferrarese Ceruti 1985, 434, fig.12

Attend Yes

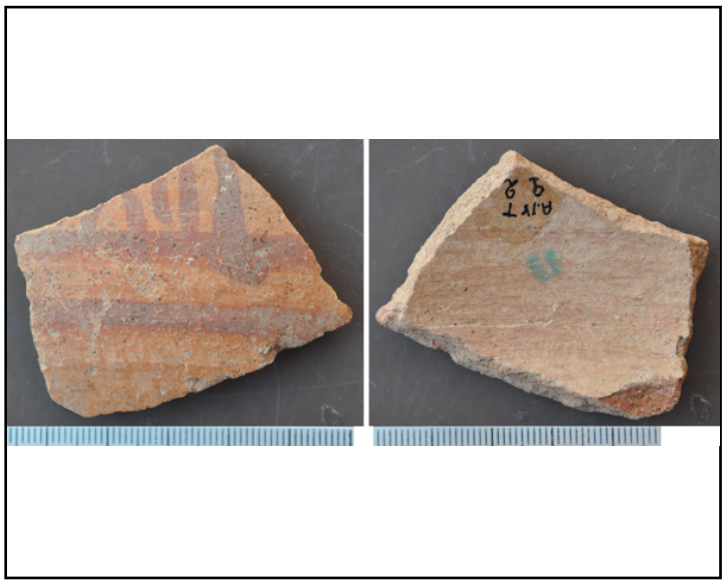
ID **154**

Inventory number *Ant Q 2*

Collocation *Box 37 (Materiale scelto) Villa Siotto Sarroch Ca*

Founding place **Nuraghe Antigori**

Context of founding Room Q, layer 2



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	36.63 mm
Width	51.06 mm
Thickness max.	8.06 mm
Thickness min.	6.29 mm
Core	5/6 2.5YR
ext. Margin	5/6 2.5YR
int. Margin	5/6 2.5YR
ext. Surface	6/6 5 YR
int. Surface	7/4 7.5 YR

Decoration	Yes
Decoration (colour)	4/4 10R
Decoration (description)	Two parallel bands (mm 5.07 and 5.56) typical net motif above the two bands "*Decorazione formata da una serie di semicerchi concentrici delineati in basso da due linee orizzontaòi. Pittura rosso violacea opaca*" (Ferrarese Ceruti 1986, 441-442)
Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	subconoidal
Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	coarse (from 0,5 to
Inclusions (shape)	sub-angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	smoothed

Overview

Open vessel. Maybe a cup. there are many comparisons with the fragments of space a

"*Frammento di grande vaso aperto (cratere?). Superfici color cuoio rifinite alla stecca. Impasto dello stesso colore, poco granuloso*". (Ferrarese Ceruti 1986, 441-442)

Annotation

References

Ferrarese Ceruti 1986, p.443, fig. 19

Attend Yes

ID **155**

Inventory number *Ant Q 2*

Collocation *Box 37 (Materiale scelto) Villa Siotto Sarroch Ca*

Founding place **Nuraghe Antigori**

Context of founding Room Q, layer 2

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	24.89 mm
Width	26.25 mm
Thickness max.	5.99 mm
Thickness min.	4.68 mm
Core	5/6 2.5YR
ext. Margin	5/6 2.5YR
int. Margin	5/6 2.5YR
ext. Surface	6/6 5 YR
int. Surface	7/4 7.5 YR

Decoration	Yes
Decoration (colour)	4/4 10R
Decoration (description)	horizontal band 5.36 mm thickness

Overview

fragment of a wall of an open vessel
" Frammento di vaso aperto. Superfici color cuoio rifinite alla stecca. Impasto dello stesso colore. Decorazione costituita da una linea orizzontale in pittura rosso violacea, opaca" (Ferrarese Ceruti 1986, 441)

Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	subconoidal

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	coarse (from 0,5 to
Inclusions (shape)	sub-angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	smoothed

References

Ferrarese Ceruti 1986, 443,fig.20

Attend Yes

ID **156**

Inventory number *Ant Q 2*

Collocation *Box 37 (Materiale scelto) Villa Siotto Sarroch Ca*

Founding place **Nuraghe Antigori**

Context of founding Room Q, layer 2

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	37.54 mm
Width	55.70 mm
Thickness max.	6.68 mm
Thickness min.	5.87 mm
Core	5/8 2.5 YR
ext. Margin	5/8 2.5 YR
int. Margin	5/8 2.5 YR
ext. Surface	7/6 5YR
int. Surface	7/6 5YR

Decoration	Yes
Decoration (colour)	4/4 10 R
Decoration (description)	Two horizontal parallel bands

Overview

fragment of wall. closed shape.
"*Frammento di grande vaso chiuso (brocca=). Superfici color cuoio; impasto abbastanza ben depurato dello stesso colore*". (Ferrarese Ceruti 1986, 441)

Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	hackly

Annotation

Inclusions (frequency)	moderate
Inclusions (distribution)	poor
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	angular
Treatment (outer surf.)	smoothed
Treatment (inner surf.)	throwing marks

References

Ferrarese Ceruti 1986, 443, fig.21

Attend Yes

ID **157**

Inventory number *Ant Q 3*

Collocation *Box 37 (Materiale scelto) Villa Siotto Sarroch Ca*

Founding place **Nuraghe Antigori**

Context of founding Room Q, layer 3

Period	
Phase	import
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	22.28 mm
Width	19.37 mm
Thickness max.	3.73 mm
Thickness min.	3.08 mm
Core	8/3 10YR
ext. Margin	8/3 10YR
int. Margin	8/3 10YR
ext. Surface	8/4 10 YR
int. Surface	8/3 10YR

Decoration	Yes
Decoration (colour)	5/8 10 R
Decoration (description)	Horizontal band with zig-zag decoration "*Decorazione costituita da una linea spezzata delimitata in alto da una linea orizzontale"* (Ferrarese Ceruti 1986, 441)

Overview

Imported vessel, very purified clay.
"Frammento di spalla di vaso chiuso (anforetta a staffa?). Frammento pertinente al frammento del vano P"
(Ferrarese Ceruti 1986, 441)

Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	hackly

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	smoothed
Treatment (inner surf.)	knife-trimmed

Annotation

Ferrarese Ceruti wrote that the fragment ID 157 and ID 161 are of the same vessel

References

Ferrarese Ceruti 1986, 443, fig. 21

Attend Yes

ID **158**

Inventory number *Ant Q 2*

Collocation *Box 37 (Materiale scelto) Villa Siotto Sarroch Ca*

Founding place **Nuraghe Antigori**

Context of founding Room Q, layer 2

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	handle
Radius	
Weight	
Height	83.29 mm
Width	70.48 mm
Thickness max.	14.65 mm
Thickness min.	6.81 mm
Core	6/5bg gley 2
ext. Margin	6/8 2.5 YR
int. Margin	6/8 2.5 YR
ext. Surface	6/6 5YR
int. Surface	6/6 5YR

Decoration	Yes
Decoration (colour)	4/8 10 R
Decoration (description)	*"Decorazione formata da una linea orizzontale. la base dell'ansa è circondata da una line. pittura rossa, brillante, densa*" (Ferrarese Ceruti 1986, 441) Decoration around the handle (between 13.24 mm and 6.56 mm)
Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	subconoidal
Inclusions (frequency)	sparse
Inclusions (distribution)	good
Inclusions (size)	medium (from 0,25 to
Inclusions (shape)	rounded
Treatment (outer surf.)	wiped
Treatment (inner surf.)	throwing marks

Overview

"*Frammento di ansa di grosso vaso. Superfici color cuoio, lisciate alla stecca, impasto color cuoio, ben depurato ma ricco di mica*" (Ferrarese Ceruti 1986, 441).Fragment of a closed vessel. Wall and handle with rounded section.
There are two holes in the handle (with diameter of 3.86mm) . Maybe the holes are functionally to keep hanging the vessel.

Annotation

References

Ferrarese Ceruti 1986, 443, fig.23

Attend Yes

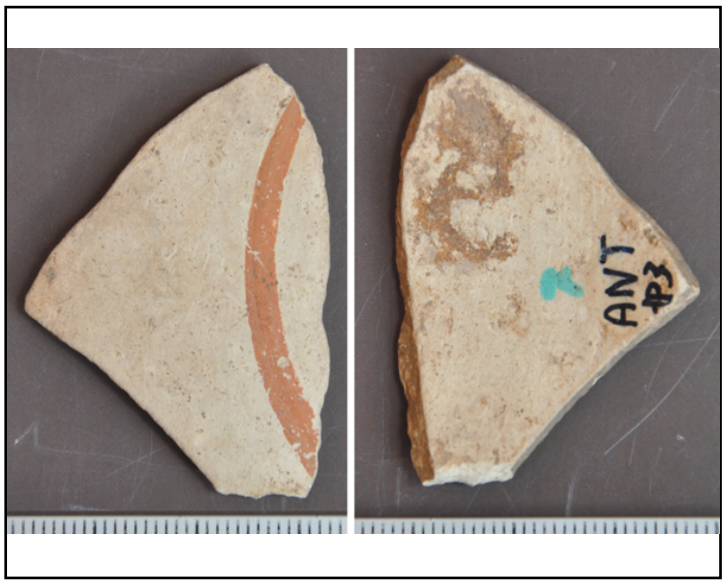
ID **159**

Inventory number *ANT P3*

Collocation *Box 44 villa Siotto Sarroch (CA)*

Founding place **Nuraghe Antigori**

Context of founding Room P, layer 3



Period	
Phase	import
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	30.18 mm
Width	42.58 mm
Thickness max.	3.20 mm
Thickness min.	2.66 mm
Core	8/3 10 YR
ext. Margin	8/3 10 YR
int. Margin	8/3 10 YR
ext. Surface	8/3 10 YR
int. Surface	8/3 10 YR

Decoration	Yes
Decoration (colour)	5/8 2.5 YR
Decoration (description)	*"Decorazione costituita da una linea orizzontale che corre nella parte alta della spalla, di un rosso assai brillante"* (Ferrarese Ceruti 1986, 441) Circular Band on the shoulder of the vessel(2.73 mm)
Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine
Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	burnished

Overview

"*Frammento di vaso chiuso (anforetta a staffa?). Superfici color nocciola chiarissimo, accuratamente lisciata l'esterna; impasto figulino dello stesso colore*" (Ferrarese Ceruti 1986, 441)
Maybe a closed vessel (stirrup jar?). Very refined and thin.

Annotation

The colour and the mixture are very similar to the stirrup jar ID 078

References

Ferrarese Ceruti 1986, 443, fig.12

Attend Yes

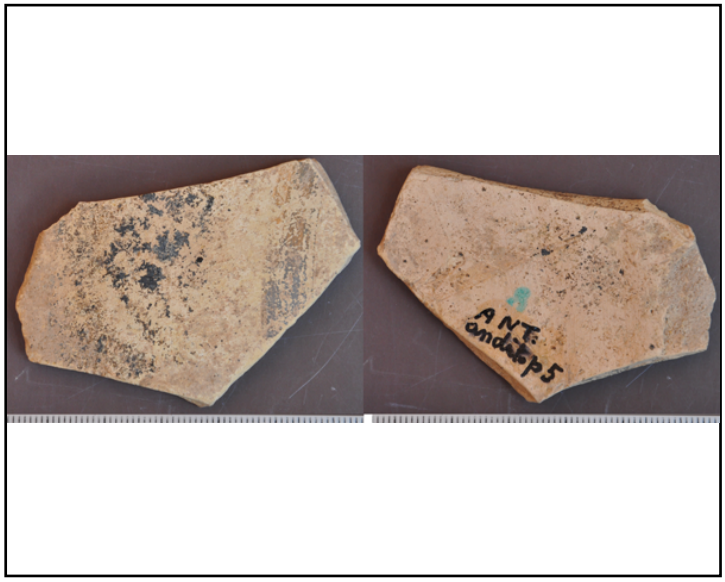
ID **160**

Inventory number *ANT andito P5*

Collocation *Box 44 villa Siotto Sarroch (CA)*

Founding place **Nuraghe Antigori**

Context of founding Room P, layer 5



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	44.60 mm
Width	59.43 mm
Thickness max.	5.53 mm
Thickness min.	3.93 mm
Core	8/4 7.5 YR
ext. Margin	8/4 7.5 YR
int. Margin	8/4 7.5 YR
ext. Surface	8/4 10 YR
int. Surface	8/4 7.5 YR

Decoration	Yes
Decoration (colour)	4/2 7.5 YR
Decoration (description)	*"Decorazione costituita da una linea orizzontale che corre sulla parte alta della spalla del recipiente; pittura bruna, piuttosto diluita, svanita a tratti, lucida"* (Ferrarese Ceruti 1986, 441) Horizontal band (thickness 9.51 mm)
Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	angular
Treatment (outer surf.)	smoothed
Treatment (inner surf.)	throwing marks

Overview

Fragment of a closed vessel, very refined clay.
" Frammento di vaso chiuso di grandi dimensioni. Superfici nocciola chiaro, opache, impasto dello stesso colore, figulino".
(Ferrarese Ceruti 1986, 441)

Annotation

References

Ferrarese Ceruti 1986, 443, fig. 13

Attend Yes

ID **161**

Inventory number *ANT P4*

Collocation *Box 44 villa Siotto Sarroch (CA)*

Founding place **Nuraghe Antigori**

Context of founding Room P, layer 4

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	18.40 mm
Width	24.55 mm
Thickness max.	3.72 mm
Thickness min.	3.03 mm
Core	8/4 10 YR
ext. Margin	8/4 10 YR
int. Margin	8/4 10 YR
ext. Surface	8/6 10 YR
int. Surface	8/3 10YR

Decoration	Yes
Decoration (colour)	4/8 2.5 YR
Decoration (description)	*"Decorazione costituita da una linea spezzata che forma angoli accentuatamente acuti. Pittura rossa, brillante (Ferrarese Ceruti 1986, 441)* zig zag decoration

Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	Angolare
Treatment (outer surf.)	wiped
Treatment (inner surf.)	liscia

Overview

"Frammento di corpo di vaso chiuso (anforetta a staffa?) pertinente al corpo. Superfici color crema, ingubbiatura dello stesso colore esterna, lucidata accuratamente. Appartiene allo stesso recipiente di Q3" (Ferrarese Ceruti 1986, 441)
Very refined clay, closed vessel maybe a stirrup jar

Annotation

There is a comparision with the ID 157

References

Ferrarese Ceruti 1986, 443, fig. 14

Attend Yes

ID **162**

Inventory number *ANT P3*

Collocation *Box 44 villa Siotto Sarroch (CA)*

Founding place **Nuraghe Antigori**

Context of founding Room P, layer 5

Period	
Phase	
Datation	
Status	fragment
Fragments	3
Part	edge with wall
Radius	
Weight	
Height	32.57 mm
Width	67.70 mm
Thickness max.	5.83 mm
Thickness min.	4.84 mm
Core	7/6 2.5 yR
ext. Margin	6/1 2.5 YR
int. Margin	6/1 2.5 YR
ext. Surface	6/3 7.5 YR
int. Surface	5/3 7.5 YR

Decoration	Yes
Decoration (colour)	4/4 10 R
Decoration (description)	*"Decorazione costituita da una linea orizzontale che corre poco sotto l'orlo e da cui partono tre file di semicerchi concentrici. All'interno una linea orizzontale unisce tra loro linee verticali che partono dall'orlo. Pittura rosso violacea, opaca*" (Ferrarese Ceruti 1986, 440) Ext. surf. Horizontal band on the edge. Three halfcircles under the band. Int. surf. Horizontal band under the edge and by oblique strokes along the edge
Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	sub-angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	liscia

Overview

"Frammento di orlo di cratere. orlo assottigliato e riverso all'esterno. Superfici color cuoio, entrambe rifinite alla stecca; evidenti i segni del tornio su quella interna." (Ferrarese Ceruti 1986, 440)
Open vessel
Vaso di forma aperta probabile coppa.
Decorazione canonica e steccatura a lucido.

Annotation

References

Ferrarese Ceruti 1986, 443, fig. 15

Attend Yes

ID **163**

Inventory number *ANT andito P5*

Collocation *Box 44 villa Siotto Sarroch (CA)*

Founding place **Nuraghe Antigori**

Context of founding Room P, layer 5

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	46.60 mm
Width	66.19 mm
Thickness max.	6.38 mm
Thickness min.	5.01 mm
Core	6/5BG
ext. Margin	5/1 2.5 YR
int. Margin	5/1 2.5 YR
ext. Surface	6/4 5YR
int. Surface	6/4 5YR

Decoration	Yes
Decoration (colour)	4/4 10 R
Decoration (description)	Two horizontal parallel bands (thickness 6.20 mm e 4.54 mm) A net motif over one band "*Decorazione costituita da un semicerchio campito da reticolato delimitato in basso da due linee orizzontali. Pittura rosso violacea, opaca*" Ferrarese Ceruti 1986, 440)
Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	sub-angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	smoothed

Overview

Fragment of an open vessel.
"*Frammento di vaso chiuso(Brocca?). Superfici color cuoio, rifinita alla stecca l'esterna. Impasto dello stesso colore, abbastanza ben depurato*". (Ferrarese Ceruti 1986, 440)

Annotation

The fragment have comparisons with other finds of the "space a"

References

Ferrarese Ceruti 1986, 443, fig. 16

Attend Yes

ID **164**

Inventory number *ANT P5*

Collocation *Box 44 villa Siotto Sarroch (CA)*

Founding place **Nuraghe Antigori**

Context of founding Room P, layer 5

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall with handle
Radius	
Weight	
Height	40.52 mm
Width	40.25 mm
Thickness max.	9.90 mm
Thickness min.	7.61 mm
Core	6/6 5YR
ext. Margin	6/6 5YR
int. Margin	6/6 5YR
ext. Surface	5/6 2.5 YR
int. Surface	8/4 7.5 YR

Decoration	Yes
Decoration (colour)	5/4 2.5 YR
Decoration (description)	"*Decorazione costituita da un semicerchio che doveva circondare l'attacco dell'ansa. Pittura rosso violacea, opaca*" (Ferrarese Ceruti 1986, 440)

Overview

" *Frammento di parete di vaso chiuso. Sulla parete residua u attacco d'ansa. Superfici color cuoio, l'esterna rifinita alla stecca, l'interna ruvida e con nette impronte del tornio* " (Ferrarese Ceruti 1986, 440)

Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	sub-angular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	burnished

References

Ferrarese Ceruti 1986, 443, fig.17

Attend Yes

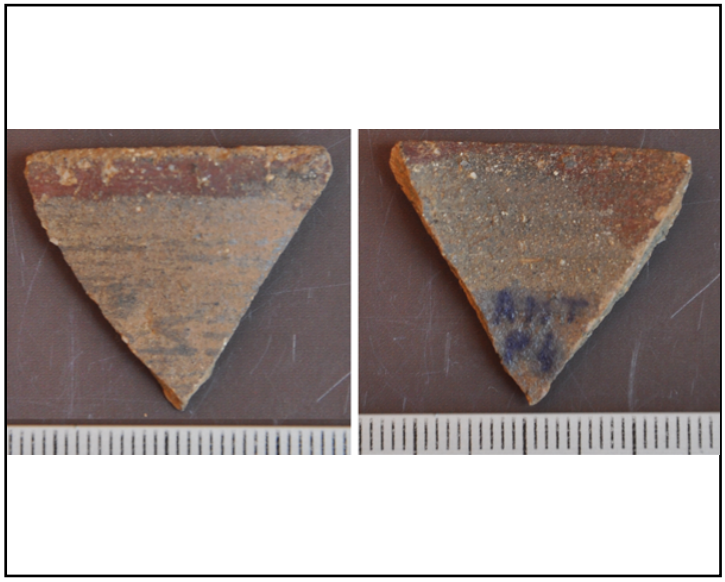
ID **165**

Inventory number *ANT P4*

Collocation *Box 44 villa Siotto Sarroch (CA)*

Founding place **Nuraghe Antigori**

Context of founding Room P, layer 4



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	edge with wall
Radius	
Weight	
Height	24.10 mm
Width	27.41 mm
Thickness max.	3.83 mm
Thickness min.	2.78 mm
Core	6/1 5YR
ext. Margin	7/6 5YR
int. Margin	7/6 5YR
ext. Surface	6/4 7.5 YR
int. Surface	5/1 2.5 YR

Decoration	Yes
Decoration (colour)	4/4 10 R
Decoration (description)	"*All'esterno una riga orizzontale in pittura rosso violacea, opaca sottolinea l'orlo; all'interno residuano due macchie di colore triangolari distanziate*" (Ferrarese Ceruti 1986, 440)

Overview

"*Frammento d'orlo di vasetto. Impasto bruno-nocciola, dello stesso colore delle superfici: l'esterna grossolanamente rifinita alla stecca; l'interna ruvida con evidenti segni del tornio*" (Ferrarese Ceruti 1986, 440)

Hardness

Feel

Fracture

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	smoothed
Treatment (inner surf.)	throwing marks

Annotation

References

(Ferrarese Ceruti 1986, 443, fig. 18)

Attend No

ID **166**

Inventory number /

Collocation

Founding place **Nuraghe Is Baccas**

Context of founding Survey "Progetto Nora" South slopes

Decoration	Yes
Decoration (colour)	red/black
Decoration (description)	Three parallel stripes and a rhombus with internal lines

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	white
int. Surface	

Overview

Fragment of a wall

Hardness

Feel

Fracture

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

Annotation

We can have information about this fragment only from the picture

References

Botto Rendeli 1997, 723-725

Attend No

ID **167**

Inventory number /

Collocation

Founding place **Nuraghe Is Baccas**

Context of founding Survey "Progetto Nora" South slopes

Decoration	Yes
Decoration (colour)	red
Decoration (description)	two vertical parallel bands.

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	leather colour
int. Surface	

Overview

fragment of a wall

Hardness

Feel

Fracture

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

Annotation

We can have information about this fragment only from the picture

References

Botto Rendeli 1997, 723-725

Attend No

ID **168**

Inventory number *Na 92 0/3006*

Collocation *Museo Archeologico Nazionale di Cagliari (in the sommer of 2007)*

Founding place **Nora**

Context of founding Forum

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	edge
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	8/4 7.5YR
ext. Margin	8/4 7.5YR
int. Margin	8/4 7.5YR
ext. Surface	7/6 7.5YR
int. Surface	8/6 10YR

Decoration	Yes
Decoration (colour)	black /orange
Decoration (description)	External surface: three concentric semicircles Internal surface: a band on the edge

Overview

Fragment of an open vessel, probabilly a bowl

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	wiped
Treatment (inner surf.)	wiped

References

Bernardini 2010, tab IV.2

Attend Yes

ID **169**

Inventory number *NR 92/D/3006*

Collocation *Museo Archeologico Nazionale di Cagliari (in Sommer 1997)*

Founding place **Nora**

Context of founding Forum

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	7/6 7.5YR
int. Surface	7/6 7.5YR

Decoration	Yes
Decoration (colour)	red
Decoration (description)	Two parallel horizontal stripes which run along the surface of the vessel and a series of perpendicular bands

Overview

fragment of a wall of a figulina clay

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	flat
Treatment (outer surf.)	wiped
Treatment (inner surf.)	wiped

References

Bernardini 2010 Tab.IV.1

Attend Yes

ID **170**

Inventory number *NR04/PG/11029/G/1*

Collocation

Founding place **Nora**

Context of founding Forum US 11029 (Area III, period IX, Event A, Activity A2)

Period	
Phase	
Datation	
Status	fragment
Fragments	2
Part	edge
Radius	
Weight	
Height	a) 3,7cm; b) 3,2 cm
Width	a) 1cm; b) 1,1 cm
Thickness max.	a) 0,4 cm; b) 0,25cm
Thickness min.	
Core	5 YR 6/4-6
ext. Margin	
int. Margin	
ext. Surface	10 YR 8/3
int. Surface	5 YR 6/4-6

Decoration	Yes
Decoration (colour)	10 YR 5/8
Decoration (description)	on the outside with three parallel horizontal orange bands

Overview

Two fragments which do not seem to belong to the same pot: one shoulder and the fragment of wall, probably belonging to an alabastron with a straight wall and an angled shoulder

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	
Treatment (outer surf.)	
Treatment (inner surf.)	

References

Cucuzza 2009, 4

Attend Yes

ID **171**

Inventory number *NR00/PD/5168/G/1*

Collocation

Founding place **Nora**

Context of founding Forum US 5168 (Area I, period IV, Event A, activity A4)

Period

Phase

Datation

Status fragment

Fragments 1

Part neck

Radius 2 cm ca

Weight

Height 3 cm

Width 4,2 cm

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface 7,5 YR 8/2

int. Surface

Decoration No

Decoration (colour)

Decoration (description)

Overview

fragment of a closed vessel which still displays the remaining stretch of a wall, decorated with a clay monochrome

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Cucuzza 2009, 4; Tav. I b, 2.

Attend Yes

ID **172**

Inventory number *NR03/PG/11014/G/1.*

Collocation

Founding place **Nora**

Context of founding Forum (Area III, Event VIII, Period A, Activity A2)

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	1,8 cm
Width	2,4 cm
Thickness max.	0,8 cm
Thickness min.	0,4 cm
Core	
ext. Margin	
int. Margin	
ext. Surface	7,5 YR 6/4
int. Surface	

Decoration	Yes
Decoration (colour)	black
Decoration (description)	two parallel horizontal bands

Overview

fragment of a wall of an open-shaped vessel,

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Cucuzza 2009, 4-5; Tav. I b, 3.

Attend

ID **173**

Inventory number *NR00/PD/5258/G/1.*

Collocation

Founding place **Nora**

Context of founding Forum US 5258

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	3 cm
Width	2,2 cm
Thickness max.	0,3 cm
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	7,5 YR 7/3
int. Surface	

Decoration	Yes
Decoration (colour)	black
Decoration (description)	5 black parallel stripes of different sizes

Overview

the fragment of a closed-shape wall

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Cucuzza 2009, 5; Tav. I b, 4.

Attend Yes

ID **174**

Inventory number

Collocation

Founding place **Nuraghe Antigori**

Context of founding Tower C (focolare)

Period	Cypriot
Phase	
Datation	
Status	fragment
Fragments	1
Part	handle
Radius	
Weight	
Height	
Width	6,3 cm
Thickness max.	1 cm
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	
int. Surface	

Decoration No

Decoration (colour)

Decoration (description)

Overview

Piece of a wish bone handle
" *Frammento di ansa del tipo wishbone. Auperfici color cuoio, levigate, impasto nocciola che sfuma nel grigio al centro dello spessore. Il frammento è spezzato, nella parte più lunga, all'attacco con la parete del vaso*" (Ferrarese Ceruti 1986, 439)

Hardness very hard (cannot be scratched with a knife)

Feel smooth (no irregularities can be felt)

Fracture hackly

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	irregular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	wiped

References

Ferrarese Ceruti 1986, 439; 443 fig. 9

Attend Yes

ID **175**

Inventory number /

Collocation

Founding place **Medau Is Lais**

Context of founding Survey

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	
int. Surface	

Decoration	Yes
Decoration (colour)	black
Decoration (description)	rather wide horizontal black band, with an irregular outline and a thinner parallel line

Overview

fragment of a wall. closed vessel (probably an alabastron), It is decorated on the outside and consists of a rather wide horizontal black band, with an irregular outline and a thinner parallel line

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	wiped
Treatment (inner surf.)	smoothed

References

Bernardini Bernardini, 2006, 110-111

Attend No

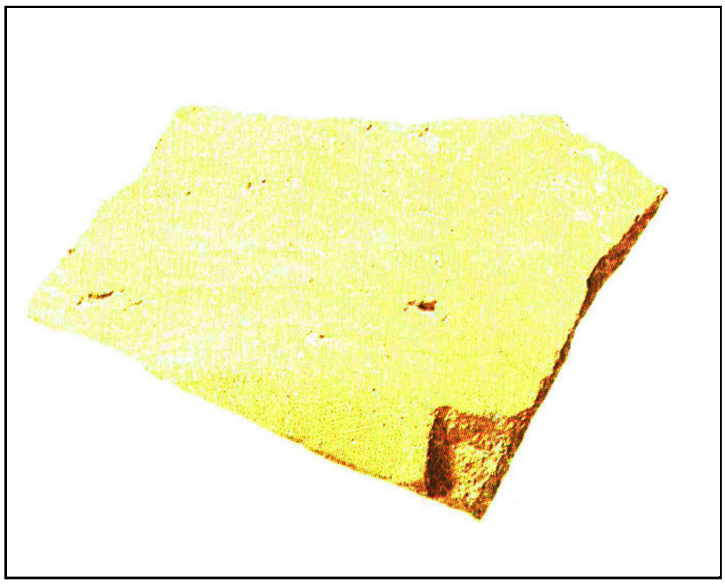
ID **176**

Inventory number

Collocation

Founding place **Nuraghe Su Nuraxi**

Context of founding Hut 17



Period

Phase

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration

Decoration (colour)

Decoration (description)

Overview

fragment of a wall, maybe slipped on the external surface

Hardness

Feel

Fracture

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

Annotation

Only the referred image exists . Ferrarese Ceruti, 1981, 609, M Fig 17

References

Ferrarese Ceruti, 1981, 609, M Fig 17

Attend No

ID 177

Inventory number

Collocation

Founding place Nuraghe Su Nuraxi

Context of founding Hut 23

Period

Phase

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration

Decoration (colour)

Decoration (description)

Overview

Fragment of a wall

Hardness

Feel

Fracture

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

Annotation

There are no drawings ; no metric references, only the referred image

References

Ferrarese Ceruti, 1981, 609, M Fig 17

Attend No

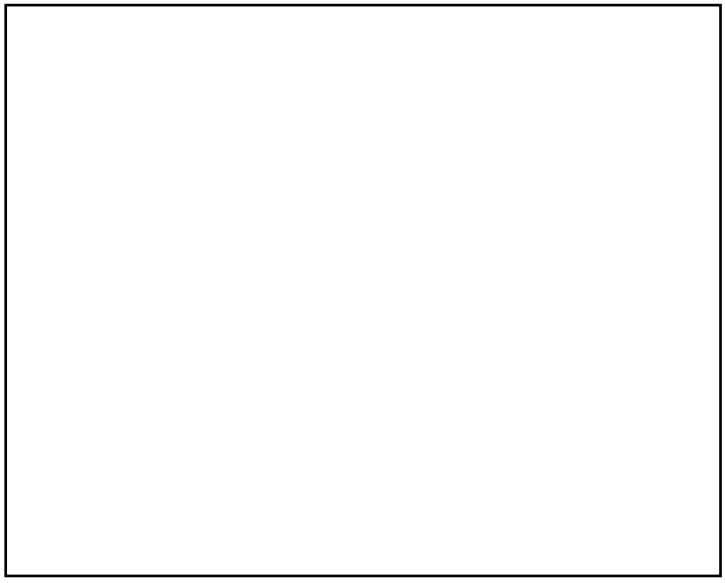
ID **178**

Inventory number /

Collocation

Founding place **Nuraghe Duos Nuraghes**

Context of founding layer 14



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	*orange – brown*
int. Surface	

Decoration	Yes
Decoration (colour)	brown
Decoration (description)	*bands of different widths*

Overview

"*a painted wall shard in a very hard fine tempered yellow-red paste The shard probably from a jar has a light orange – brown slip painted on the outside in dark red – brown bands of different widths*" (Webster 2001, 67)

Hardness

Feel

Fracture

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

Annotation

There is no photo, no drawings, no metric references about this fragment. It was impossible to re-examinate. The fragment is lost!

References

Webster 2001, 54

Attend Yes

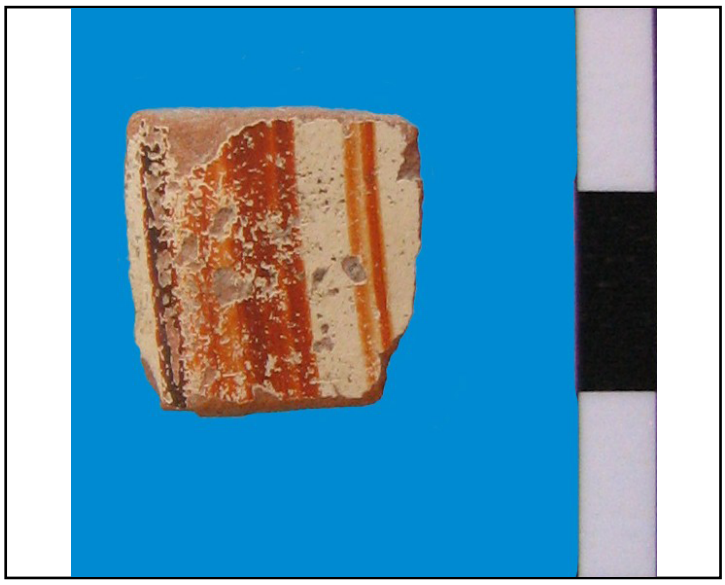
ID **179**

Inventory number *RS 372*

Collocation *Sant'Anticoo. Archaeological Museum*

Founding place **Sulky (Cronicario)**

Context of founding US 3280



Period	Mycenaean
Phase	TEIIIA:2;TEIIIB
Datation	
Status	fragment
Fragments	1
Part	wall
Radius	
Weight	
Height	1,4 cm
Width	0,9 cm
Thickness max.	
Thickness min.	
Core	5 YR 6/6
ext. Margin	5 YR 6/6
int. Margin	5 YR 6/6
ext. Surface	10YR 8/3
int. Surface	5 YR 6/6

Decoration	Yes
Decoration (colour)	2.5YR 3/4;2.5YR 3/6;2.5 YR 5/8
Decoration (description)	Differents stripes for colour and dimension.

Overview

The fragment is probabilly related tp a closed vessel, maybe an alabastron
The fragment is very small, but it is possible to see the keel (carène).

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	burnished
Treatment (inner surf.)	throwing marks

Annotation

References

Pompianu-Soro 2012

Attend No

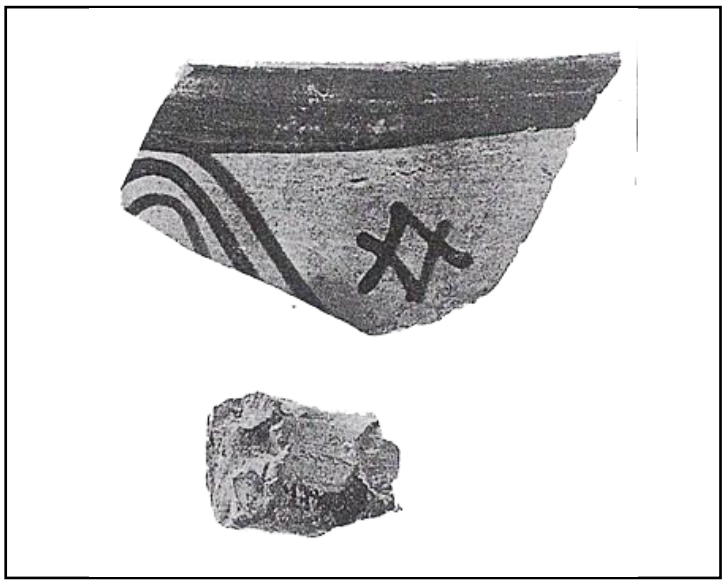
ID **180**

Inventory number *38892*

Collocation

Founding place **Orosei**

Context of founding



Period

Phase

Datation

Status fragment

Fragments 1 (maybe 2)

Part

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core rose

ext. Margin

int. Margin

ext. Surface cream

int. Surface cream

Decoration Yes

Decoration (colour) brown

Decoration (description) a band that runs along the hem, both on the outside of the vessel and on the inside surface. Also a pattern of concentric semicircles and a stylised iris flower (FM 10.A 6)
"*motivo ad arco trilobato con riempitivo di angoli intrecciati" (Lo Schiavo 1982, 186)*

Overview

fragment of a crater (FT 281 or FT 282) with a thickened and everted rim.
"*Frammento di cratere comprendente l'orlo e una porzione della parete. Orlo sottolineato in pittura bruna tendente al rossiccio, Un frammento di ansa è forse pertinente allo stesso vaso*" (Lo Schiavo 1982, 186)

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Fulvia Lo Schiavo 1979; Ead. 1982, 186, Tav. LXIX,1 a-b

Attend No

ID **181**

Inventory number *38894*

Founding place **Orosei**

Collocation

Context of founding

No Image

Period

Phase

Datation

Status fragment

Fragments 1

Part

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core yellow

ext. Margin

int. Margin

ext. Surface Cream

int. Surface

Decoration Yes

Decoration (colour) brown

Decoration (description) horizontal band on the outer surface and two thinner stripes similar to the semi-circle decorations, of the same colour of the entire inner surface.
"*decorato in color bruno da una banda orizzontale e da due linee curve*" (Lo Schiavo 1982, 186)

Overview

small fragment of an open vessel.
"*Frammento di vaso aperto con profilo svasato*" (Lo Schiavo 1982, 186)

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

References

Lo Schiavo 1979; Ead. (Lo Schiavo 1982, 186, Tav.LXIX,2

Treatment (outer surf.)

Treatment (inner surf.)

Attend No

ID **182**

Inventory number *38896*

Founding place **Orosei**

Collocation

Context of founding

No Image

Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	yellowish
ext. Margin	
int. Margin	
ext. Surface	cream
int. Surface	

Decoration	Yes
Decoration (colour)	dark brown
Decoration (description)	"*Fascia curvilinea*" (Lo Schaivo 1982, 187) curved decoration on the outer surface

Overview

"*Frammento di vaso chiuso in argilla giallina con inbubbiatura color crema*" (Lo Schiavo 1982, 187)
Small fragment of well purified clay wall,

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

References

Lo Schiavo 1979; Ead. 1982, 187, Tav. LXIX,3)

Treatment (outer surf.)

Treatment (inner surf.)

Attend No

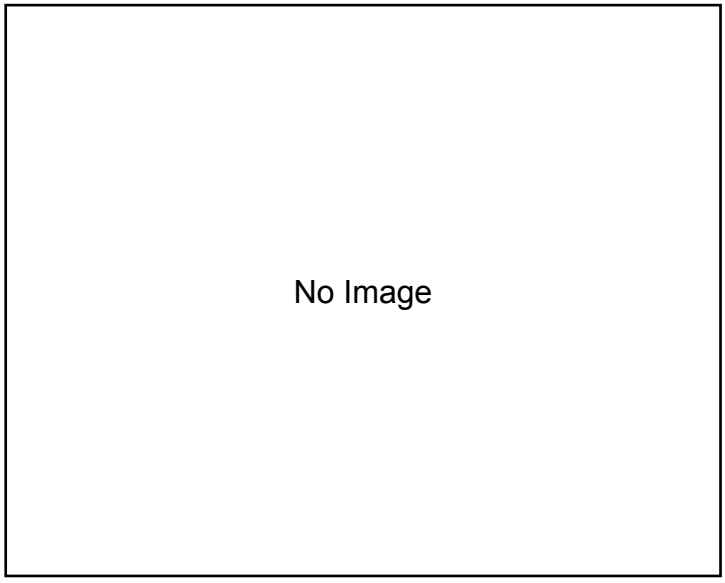
ID **183**

Inventory number *38897*

Collocation

Founding place **Orosei**

Context of founding



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	yellow
ext. Margin	
int. Margin	
ext. Surface	brown
int. Surface	brown

Decoration	Yes
Decoration (colour)	brown
Decoration (description)	all the internal and external surfaces are painted

Overview

"*Frammento di vaso di forma imprecisabile in argilla giallina completamente dipinto all'esterno e all'interno in bruno scuro*" (Lo Schiavo 1982, 187)
Fragment of a vessel (unclear shape), made of well purified clay,

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Lo Schiavo 1979; Ead. 1982, 187, Tav. LXIX, 4

Attend No

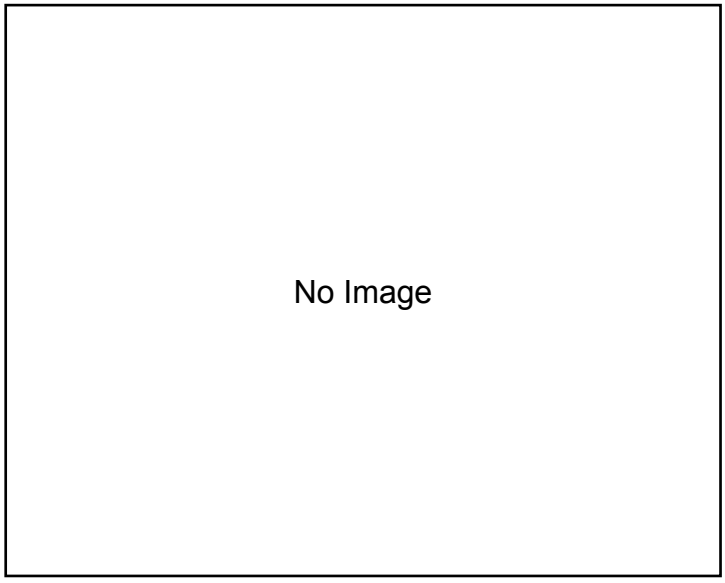
ID **184**

Inventory number *38898*

Collocation

Founding place **Orosei**

Context of founding



Period	
Phase	
Datation	
Status	fragment
Fragments	1
Part	
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	rose
ext. Margin	
int. Margin	
ext. Surface	
int. Surface	

Decoration	Yes
Decoration (colour)	red
Decoration (description)	painted on the external surface.

Overview

"*Frammento di ansa a bastoncello di argilla rosata, dipinta esternamente in colore rossiccio*" (Lo Schiavo 1982, 187)
Fragment of a flattened oval-section loop made of very purified clay.

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Lo Schiavo 1979; Ead. 1982, 187, Tav. LXIX, 5

Attend Yes

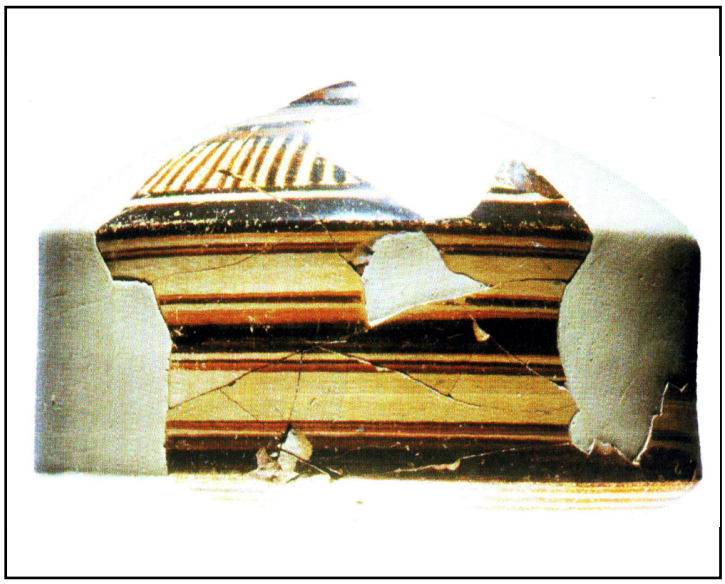
ID **185**

Inventory number

Collocation *Museo Archeologico Nazionale di Nuoro*

Founding place **Nuraghe Arrubiu**

Context of founding Tower A; courtyard B; tower C



Period	
Phase	
Datation	LH IIIA: 2
Status	partially restored
Fragments	
Part	
Radius	14 cm
Weight	
Height	10.3
Width	
Thickness max.	0.25 cm
Thickness min.	0.6 mm
Core	
ext. Margin	
int. Margin	
ext. Surface	10 YR 3/8.3
int. Surface	

Decoration	Yes
Decoration (colour)	10.R 2.5 / 1; 10 R 5/5.8; 2.5 YR/4.8
Decoration (description)	"Decorazione lineare formata da un fascio di linee sottili verticali fra le anse, tre bande spesse affiancate da bande sottili sulla parete, fasci di linee sottili concentriche sulla base" (Lo Schiavo - Vagnetti 1993, 134)decorations consist of several alternating thin horizontal lines and other thicker vertical lines on the body, matching the three loops on the shoulder, ranging from dark brown to orange red
Hardness	very hard (cannot be scratched with a knife)
Feel	smooth (no irregularities can be felt)

Fracture

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	
Treatment (outer surf.)	wiped
Treatment (inner surf.)	

Overview

"Alabastron frammentario triansato con spalla ad angolo. Spalla arrotondata distinta dalla parete mediante uno spigolo vivo, parete dritta, lievemente concava, base arrotondata e leggermente convessa.Il vasetto è lacunoso in più punti, ma conserva l'intero profilo ad esclusione del collo e della bocca, completamente mancanti. Delle anse di conservano solo gli attacchi e i piccoli frammenti isolati" (Lo Schiavo-Vagnetti 1993, 134)
Angular Alabastron (FT 94)
.The shoulder of the vase is different from the straight wall, slightly concave with a sharp edge. No neck nor mouth remain, but the base is decorated and slightly convex.

Annotation

References

Lo Schiavo F. –Vagnetti L., 1993, 121-148
Cossu 2003

Attend No

ID **186**

Inventory number

Collocation

Founding place **Corti Beccia**

Context of founding

No Image

Period

Phase

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface yellow -beige

int. Surface

Decoration No

Decoration (colour)

Decoration (description)

Overview

Open shape. Figuline clay. Monochrome
maybe a bell shaped bowl
Flared brim remains on the wall, carrying an horizontal loop and a circular section.
"*Forma aperta; parete ricurva e rientrante presso il labbro svasato. Ansa a impostazione orizzontale, rialzata, a bastoncello, sulla spalla sotto il labbro. Superfici giallo beige, a tratti nocciola. Pasta gialla figulina ben cotta, pareti sottili, spalla non distinta dalla vasca, desinente con labbro riverso orizzontale obliqua*" (Ugas 1982, 41)

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

References

Ugas 1982, 39-40

Treatment (outer surf.)

Treatment (inner surf.)

Attend Yes

ID **187**

Inventory number

Collocation *Museo Archeologico Oristano*

Founding place **Tharros_Muru Mannu**

Context of founding Nuragic village

Period	
Phase	
Datation	LH IIIA:2
Status	fragment
Fragments	1
Part	
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	red
ext. Margin	
int. Margin	
ext. Surface	light brown slip
int. Surface	

Decoration	Yes
Decoration (colour)	black
Decoration (description)	two black horizontal stripes and a spiral pattern

Overview

Wall of a closed-shaped vessel

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	smooth

Annotation

Inclusions (frequency)	sparse
Inclusions (distribution)	poor
Inclusions (size)	fine (from 0,1 to 0,25mm)
Inclusions (shape)	rounded
Treatment (outer surf.)	wiped
Treatment (inner surf.)	

References

Acquaro et al. 1982 37-52; Acquaro et al.1983, 49-89; Bernardini 1989, 287-288; Bernardini 2010, tav. I,2

Attend No

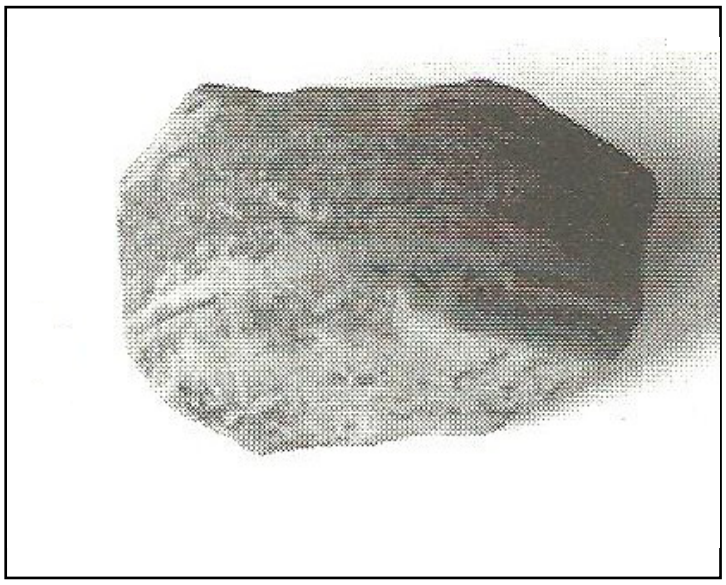
ID **188**

Inventory number

Collocation

Founding place **Monte Zara**

Context of founding hut 34S



Period

Phase

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration Yes

Decoration (colour)

Decoration (description) band on the external surface

Overview

fragment of a raised base

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Ugas 1992, tav. IX b

Attend No

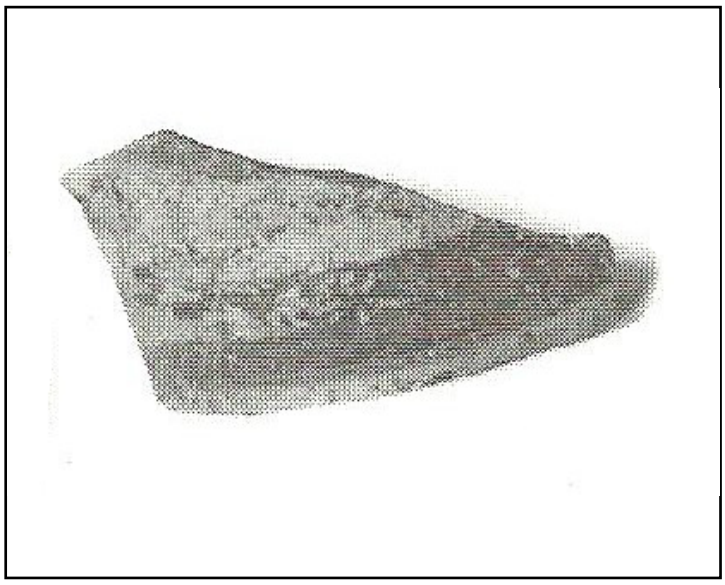
ID **189**

Inventory number

Collocation

Founding place **Monte Zara**

Context of founding hut 34S



Period

Phase

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration Yes

Decoration (colour)

Decoration (description) two parallel horizontal bands

Overview

wall of a closed vessel; as the orientation of its pattern seems to suggest, it may be closed shape, perhaps the shoulder of a jar

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Ugas 1992, tav. IX b

Attend No

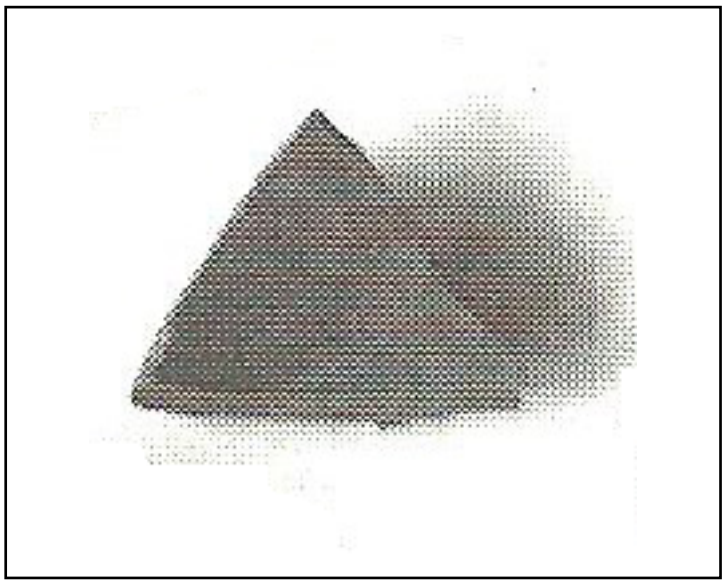
ID **190**

Inventory number

Collocation

Founding place **Monte Zara**

Context of founding hut 34S



Period

Phase

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration

Decoration (colour)

Decoration (description)

Overview

small fragment of wall, that despite the drawing, could hardly be attributed to a closed or open shape vase

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Ugas 1992, Tav. IX b

Attend No

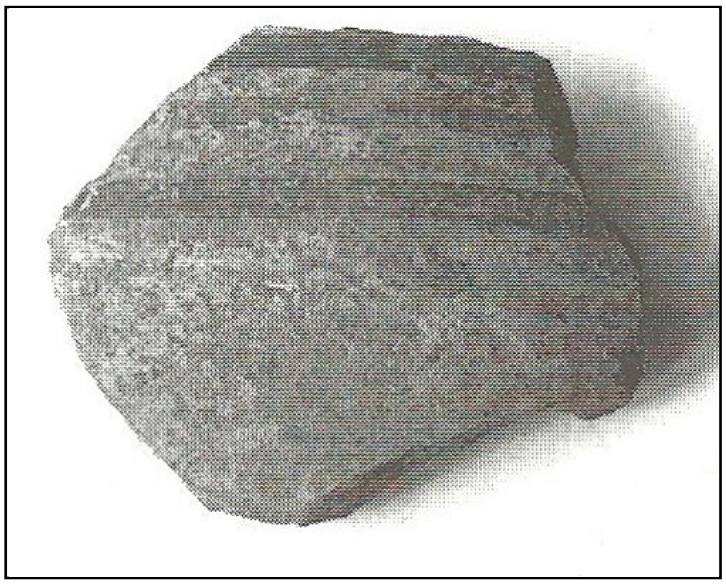
ID **191**

Inventory number

Collocation

Founding place **Monte Zara**

Context of founding hut 34S



Period

Phase

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration Yes

Decoration (colour)

Decoration (description) two (maybe three) thin horizontal bands thichness >2 cm

Overview

fragment of wall

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

References

Ugas 1992, Tav. IX b

Attend No

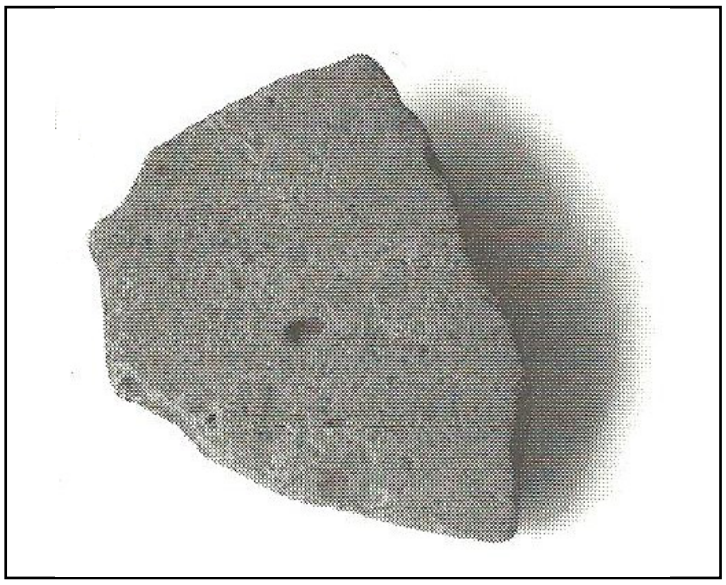
ID **192**

Inventory number

Collocation

Founding place **Monte Zara**

Context of founding hut 34S



Period

Phase

Datation

Status fragment

Fragments 1

Part wall

Radius

Weight

Height

Width

Thickness max.

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration No

Decoration (colour)

Decoration (description)

Overview

fragment of a wall

Hardness

Feel

Fracture

Annotation

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

References

Ugas 1992, Tav. IX b

Treatment (outer surf.)

Treatment (inner surf.)

Attend Yes

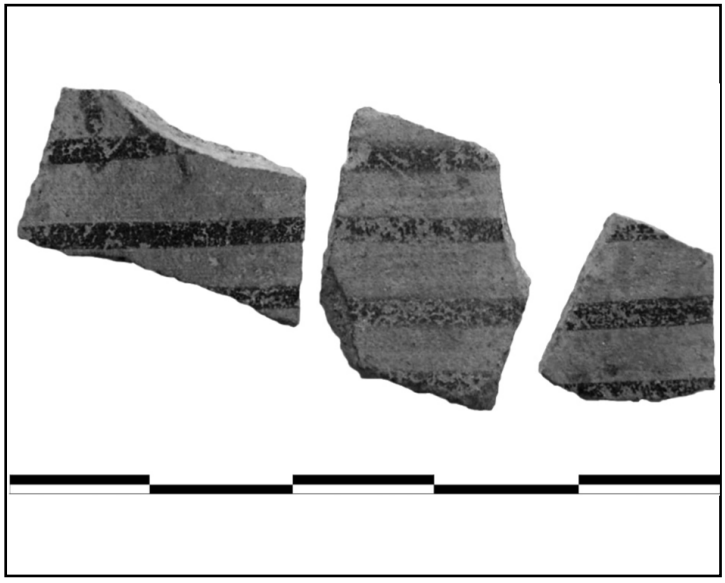
ID **193**

Inventory number

Collocation *Museo Archeologico Sant'Antioco*

Founding place **Sulky Cronicario**

Context of founding Cronicario



Period	Maybe Philistine?
Phase	
Datation	
Status	fragment
Fragments	3
Part	wall
Radius	
Weight	
Height	
Width	
Thickness max.	
Thickness min.	
Core	
ext. Margin	
int. Margin	
ext. Surface	
int. Surface	

Decoration	Yes
Decoration (colour)	black
Decoration (description)	parallel horizontal bands thin 10 mm

Overview

three fragments maybe pertinents to the same vessel

Hardness	hard (cannot be scratched with the fingernail)
Feel	smooth (no irregularities can be felt)
Fracture	fine

Inclusions (frequency)	sparse
Inclusions (distribution)	very poor
Inclusions (size)	very fine (<0,1mm)
Inclusions (shape)	irregular
Treatment (outer surf.)	wiped
Treatment (inner surf.)	smoothed

Annotation

The fragments are published like a part of a Philistine vessel, but it is not excluded theyr Mycenaean provenence.

References

Bartoloni 2006, fig.1, 1602

Attend No

ID **199**

Inventory number *97779*

Collocation /

Founding place **Nuraghe Antigori**

Context of founding Room A, Layer 10

Period Mycenaean

Phase LHIII B

Datation

Status fragment

Fragments 1

Part bottom with wall

Radius

Weight

Height 8 cm

Width 12 cm

Thickness max. 1 cm

Thickness min.

Core

ext. Margin

int. Margin

ext. Surface

int. Surface

Decoration Yes

Decoration (colour)

Decoration (description) *"Tutta la superficie interna era ricoperta da una pittura lucida bruna che tende a diventare rossiccia nei punti in cui è più diluita. Ora essa è molto abrasa e a tratti, scomparsa. la superficie esterna mostra tracce molto evanidi di una linea bruna in pittura opaca che sottolinea la gola di innesto della parete al fondo"*

Hardness

Feel

Fracture

Inclusions (frequency)

Inclusions (distribution)

Inclusions (size)

Inclusions (shape)

Treatment (outer surf.)

Treatment (inner surf.)

Overview

"Frammento di grosso vaso. Forma aperta. Il frammento mostra un fondo ad anello dal margine inferiore appiattito. Materiale e tecnica: argilla depurata con superfici accuratamente rifinite all'esterno e all'interno (ora a tratti abrase) con grossolana rifinitura sul fondo. Superficie esterna bruno chiara, int. nocciola" (Ferrarese Ceruti 05-01-1981)

Annotation

References

Schedule RA 20000/46831; Ferrarese Ceruti 1979, 276;

Tables of finds

Photo references

ID 010; ID 033; ID035; ID 036; ID 038; ID 042; ID 044; ID 048; ID 079; ID 081; ID 082; ID 082; ID 086; ID 103; ID 114; ID 115; ID 116; ID 126; ID 132; ID 134; ID 137; ID 141; ID 142; ID 143; ID 144; ID 145; ID 146; ID 147; ID 149; ID 150; ID 151; ID 152, ID 153; ID 154; ID 155; ID 156; ID 157; ID 158; ID 159; ID 160; ID 161; ID 162; ID 163; ID 164; ID 165; ID 174; ID 187 **(Photo by Laura Soro)**

ID 167; ID 168 **(Photo courtesy by Marco Rendeli)**

ID 076; ID 077; ID 168; ID 169; ID 080; ID 175 **(Photo courtesy by Claudio Buffa, official photografer of Soprintendenza Archeologica per le Province di Cagliari e Oristano) ;**

ID 170; ID 171; ID 172; ID 173 (Cucuzza 2009, 4 Tav. IIb)

ID 176; ID 177 (Ferrarese Ceruti 1981, 609, M fig. 17)

ID 179 **(Photo courtesy by Elisa Pompianu, published in Pompianu - Soro 2012)**

ID 180 (Lo Schiavo 1979, Tav. 1)

ID 185 **(Photo courtesy by Soprintendenza per i beni Archeologici per le Province di Sassari e Nuoro)**

ID 188; ID 189; ID 190; ID 191; ID 192 (Ugas 1992, Tav. IXb)

ID 193 (Bartoloni 2006, fig. 1, 1602)

ID 007; ID 024; ID 199 (photo of Schedule RA, of Ministero per i Beni e le attività culturali).

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Abstract (English)

“Mycenaean finds in Sardinia. Cross-cultural contacts in the 2nd Millenium B.C.”

The first Mycenaean items were found in Sardinia in the late 70s. The discovery marked an important (Nuragic and Aegean) archaeological milestone in the cultural exchanges carried out across the Mediterranean during the second millennium B.C.

This work includes an analysis of the history of published findings and studies, and an analysis of the contexts of discovery of the Mycenaean materials found in Sardinia and the Nuragic materials found in Greece. However, the study mainly focuses on the findings for which a clear context was identified. Since several findings are still unavailable or difficult to date, all the ones already known have been filed thanks to the catalogue cards made available by the Ministry of Cultural Heritage and Activities. For approximately 200 pieces, new designs and new photographic documentation were produced. New research methodologies were experimented and provided new data on the presence of Mycenaean finds in Sardinia through landscape archaeology and applied computer science, both on the coast and the inner sites of the Island. Archaeological literature has always explained the contacts between Sardinia and the Mycenaean world through the presence of large amounts of metal on the island, such as copper, silver, lead, tin and iron. But, through the analysis of available and new unpublished data on Nuragic civilization, new hypotheses have been provided on the reasons why contacts and cross-culturality took place, through some of the research questions disregard by the existing literature, re-evaluating the role of Nuragic Sardinia that too often was considered the "metallurgical flagship" of the western Mediterranean. Thanks to the new ideas proposed in this study, which do not provide any final answers, research provides new hypotheses on the events which took place during the second millennium B.C., characterized by the movement of goods, persons and cultures between the Aegean and the western Mediterranean, inspired by the ancient spirit of navigation.

Zusammenfassung Deutsch

„Mykenische Funde auf Sardinien. Zu den transkulturellen Kontakten im 2. Jahrtausend v. Chr.“

Die ersten Funde mykenischer Keramik in Sardinien wurden in den 1970er Jahren gemacht. Diese Entdeckungen sind im Hinblick auf den kulturellen Austausch im Mittelmeerraum des 2. Jahrtausends v. Chr. auch heute noch von großer Bedeutung, und das nicht nur für die nuraghische Archäologie, sondern auch für die ägäische.

In der vorliegenden Studie wird die Forschungsgeschichte zu diesen Funden dargestellt, und es werden die Fundkontexte des mykenischen Materials in Sardinien und jene der nuraghischen Artefakte in Griechenland von Neuem untersucht. Dabei liegt das Hauptaugenmerk auf jenen Funden, deren Kontext rekonstruiert und eingeordnet werden kann. Da heute ein großer Teil der Funde leider nicht mehr auffindbar ist bzw. nicht mehr kontextuell zugeordnet werden kann, werden hier all jene Objekte katalogisiert, die bekannt – wenn auch oft nicht mehr auffindbar – sind, wobei die Katalogeinträge des italienischen Kulturministeriums die Grundlage dafür bilden. Von einer Reihe von Objekten werden neue Zeichnungen und eine neue Fotodokumentation vorgelegt. Es handelt sich dabei um ca. 200 Stücke.

Es wurden neue Forschungsmethoden erprobt, die mittels der Landschaftsarchäologie und angewandter Informatik neue Erkenntnisse zur Verbreitung mykenischer Funde in Sardinien, und zwar nicht nur entlang der Küsten, sondern auch im Landesinneren, liefern können. In der Forschungsliteratur wurden die Kontakte zwischen mykenischer Welt und Sardinien stets auf die Bedeutung der großen Metallvorkommen der Insel zurückgeführt, im Besonderen auf die Kupfer-, Silber-, Blei-, Zinn- und Eisenerzlagerstätten. Jedoch wurden als Ergebnis der neuen Untersuchung und auch auf der Basis noch unpublizierter Daten zur nuraghischen Zivilisation neue Hypothesen zu den Motiven jener Kontakte und ihrer Transkulturalität formuliert, wobei

neue Fragestellungen oder solche, die in der vorhandenen Literatur bislang noch kaum Beachtung fanden bzw. nicht im Detail verfolgt wurden, zur Anwendung kamen. Auf diese Weise konnte die Rolle des nuraghischen Sardiniens neu bestimmt werden, das in der Vergangenheit allzu oft darauf reduziert wurde, der „Leuchtturm des Metalls“ im westlichen Mittelmeer gewesen zu sein. Wenn die Studie auch keine endgültigen Antworten geben kann, so bereichert sie doch dank der neuen Ansätze, die sich im Verlauf der Arbeit ergaben, das Bild des zweiten vorchristlichen Jahrtausends, während dessen sich zwischen Ägäis und westlichem Mittelmeer in der einen wie der anderen Richtung Güter, Menschen und Kulturen bewegten – animiert vom antiken Geist der Seefahrt.

Europass-Lebenslauf

Angaben zur Person

Nachname(n) / Vorname(n)	**Laura Soro**
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E-mail	laurasoro@gmail.com; a0302304@unet.univie.ac.at.
Staatsangehörigkeit	Italienische
Geburtsdatum	11-09-1980
Geschlecht	Weiblich

Gewünschte Beschäftigung / Gewünschtes Berufsfeld	**Archäologie (Ur und Frühgeschichte); Ur und Frühgeschichte Sardiniens; Ägäische Archäologie; Landscape Archaeology; Informatik und Archäologie**

Berufserfahrung

• Daten	**Oktober 2012 – bis jetzt**
Wichtigste Tätigkeiten und Zuständigkeiten	Planung und Ausführung der archaeologisches Eingriff. Nuraghe Nolza
Name und Adresse des Arbeitgebers	Comune di Meana Sardo (Nuoro- Sardinia-Italien)
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	**2011 –2013**
Wichtigste Tätigkeiten und Zuständigkeiten	Ausgrabung von Punta di Zambrone (Vibo Valentia- Kalabrien Italien). **http://www.fwf.ac.at/de/abstracts/abstract.asp?L=D&PROJ=P23619** Wissenschaftliche Cooperation, Informatisierung Grabungs Daten. GIS Kreation.
Name und Adresse des Arbeitgebers	Dr. R. Jung; Universität Salzburg Altertumswissenschaften, Residenzplatz 1 5010 Salzburg, Austria
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	**Von Dez. 2011 - bis heute**
Wichtigste Tätigkeiten und Zuständigkeiten	Archaeologische Führung an der Museo Archeologico Nazionale „G. A. Sanna“ - Sassari-
Name und Adresse des Arbeitgebers	Associazione Culturale Tabvlarasa, via dei Mille, 82, 07100 Sassari
Tätigkeitsbereich oder Branche	Archaeologische Führung
• Daten	09/09/2010- 10/09/**2010**
Wichtigste Tätigkeiten und Zuständigkeiten	Archaeologische Führung. Archaeologin Referent für die archaeologisches Siedlungen für Sky-TV. „Piccola grande Italia“ - Comune di Bultei (Sassari - Sardinien - Italien)
Name und Adresse des Arbeitgebers	Comune di Bultei. Bultei (Sassari -Sardinien -Italien) - Sky TV
Tätigkeitsbereich oder Branche	Archäologische Führung

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Datum April 2013

• Daten	04/08/2009- 04/11/**2009**
Wichtigste Tätigkeiten und Zuständigkeiten	Archaeologische Notfall-Ausgrabung von Sa Osa (Cabras-Oristano-Sardinien);Mitarbeiter und Leiter der Ausgrabung. Experimentelle Photogrammetisch-GIS Kreation.
Name und Adresse des Arbeitgebers	SPO (Servizi Provincia Oristano), Oristano Provinz
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	04/04/2009- 04/09/**2009**
Wichtigste Tätigkeiten und Zuständigkeiten	Verarbeitung der kartographischen Daten von archäologischen Folgenabschätzung der Pipeline auf dem Gebiet der Olbia-Loiri-Monti (Sassari Sardinien Italien).
Name und Adresse des Arbeitgebers	GALSI http://www.galsi.com/
Tätigkeitsbereich oder Branche	archäologischen Folgenabschätzung
• Daten	04/08/2008- 04/10/**2008**
Wichtigste Tätigkeiten und Zuständigkeiten	Archaeologische Notfall-Ausgrabung von Sa Osa (Cabras-Oristano-Sardinien): Neolitische und Bronzezeitliche Siedlung;Mitarbeiter und Leiter der Ausgrabung. Experimentelle Photogrammetisch-GIS Kreation.
Name und Adresse des Arbeitgebers	Società Cooperativa a.r.l. Penisola del Sinis, Loc. S.Giovanni di Sinis, Cabras (Oristano Sardinien Italien)
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	21/05/2007 – 7/06/2007
Wichtigste Tätigkeiten und Zuständigkeiten	Vorbereitung des Bebauungsplan des Valledoria Gebiet, um die von archäologischen Folgenabschätzung zu beurteilen.
Name und Adresse des Arbeitgebers	Cumune di Valledoria. Valledoria (Sassari, Sardinien, Italien)
Tätigkeitsbereich oder Branche	Archaeologie
• Daten	29/01/2008 – 29/01/**2009**
Wichtigste Tätigkeiten und Zuständigkeiten	Erstellen eines Arbeitsplan, Koordination einer Arbeitsgruppe; Leitung Dokumentation der Data Base von Integrated Land Information System (GIS) des Kulturerbes von Sardinien um Datenmanagement zu integrieren.
Name und Adresse des Arbeitgebers	Ministero per i Beni e le Attività culturali. Soprintendenza per i Beni Archeologici per le Province di Cagliari e Oristano. P.zza Indipendenza, 7 Cagliari.
Tätigkeitsbereich oder Branche	Informatik Archaeologie. Sardinien Regierung APQ 2005 SarBC4-29
• Daten	21/05/2007 – 7/06/2007
Wichtigste Tätigkeiten und Zuständigkeiten	Neolitische Notfall-Ausgrabung von Gribaia (Nurachi-Oristano-Sardinien):Mitarbeiter an der Leitung der Ausgrabung. Experimentelle Photogrammetisch-GIS Kreation.
Name und Adresse des Arbeitgebers	Soprintendenza Archeologica per le Province di Cagliari e Oristano. Dr. A. Usai. P.zza Indipendenza, 7 Cagliari (Italien) . alessandro.usai@beniculturali.it
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	10/05/2007 – 10/08/**2007**

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Wichtigste Tätigkeiten und Zuständigkeiten	Analyse der mykenischen Materialien an der Soprintendenza per i Beni Archeologici per le Province di Cagliari e Oristano, Besuch, surveys und Analyse der Siedlungen; Analyse von relevanten Dokumenten; Grabungsarbeiten und Dokumentation im Archäologischen Oberaufsicht. Teilnahme und Koordinierung der Kontrollen auf dem Gebiet, archaeologische Kartographie Produktion, nützlich für den Standort von Denkmälern, durch den Einsatz von DGPS-Technologien und mobile GIS als Funktion der Landschaft Archäologie.
Name und Adresse des Arbeitgebers	Soprintendenza Archeologica per le Province di Cagliari e Oristano. Tutor: Dott. A. Usai. P.zza Indipendenza, 7 Cagliari
Tätigkeitsbereich oder Branche	Praktikum mit Stipendium „Post Lauream“ von Universität Sassari
• Daten	23/10/2006 – 6/11/2006
Wichtigste Tätigkeiten und Zuständigkeiten	Archaeologische Ausgrabung an der Siedlung von Castel di Pietra (Gavorrano -Grosseto Toskana - Italien)
Name und Adresse des Arbeitgebers	LAM (Dipartimento di Arch. Medievale – Università di Siena – Polo Universitario di Grosseto. Direzione Scientifica Prof. R. Francovich- Prof.. C. Citter
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	Oktober 2006
Wichtigste Tätigkeiten und Zuständigkeiten	Geophysykalische Prospektion mit Magnetometer, Siedlung von Roselle (Grosseto - Toskana - Italien)
Name und Adresse des Arbeitgebers	Lap&T (Laboratorio di Archeologia dei Paesaggi e telerilevamento). Università di Siena Polo Universitario di Grosseto. Direzione Scientifica Dott. S. Campana.
Tätigkeitsbereich oder Branche	Remote Sensing
• Daten	Von September bis Oktober 2006.
Wichtigste Tätigkeiten und Zuständigkeiten	Archaeologisches Survey. Gebiet von Cinigiano (Grosseto - Toskana - Italien)
Name und Adresse des Arbeitgebers	Lap&T (Laboratorio di Archeologia dei Paesaggi e telerilevamento). Università di Siena Polo Universitario di Grosseto. Direzione Scientifica Dott. S. Campana.
Tätigkeitsbereich oder Branche	Archaeologisches Survey
• Daten	September 2006
Wichtigste Tätigkeiten und Zuständigkeiten	Geo - Archaeologisches Survey. Gebiet von Campagnatico (Grosseto - Toskana - Italien)
Name und Adresse des Arbeitgebers	GALA (Laboratorio di geoarcheologia), Università degli Studi di Siena- Polo Universitario di Grosseto (Direzione scientifica Dott. A. Arnoldus Huyzendveld)
Tätigkeitsbereich oder Branche	Geo - Archaeologisches Survey
• Daten	April 2006
Wichtigste Tätigkeiten und Zuständigkeiten	Bestimmung des Ph-Wert, des Vorandehsein den Karbonat, den Phosphat, den Fett-Säure, den Eisweiß in den keramische und Boden-Proben
Name und Adresse des Arbeitgebers	LSAA (Laboratorio di Scienze applicate all´archeologia), Universitá di Siena-Polo Universitario di Grosseto.
Tätigkeitsbereich oder Branche	Archäometrische Analyse
• Daten	März 2006
Wichtigste Tätigkeiten und Zuständigkeiten	Relief und stratigraphysche Analyse, photogrammetrische Analyse des Archotektur von „Pieve di S. Mustiola“, Sticciano, (Grosseto Toskana-Italien)
Name und Adresse des Arbeitgebers	LAAUM (Laboratorio di archeologia dellßarchitettura e dellßurbanistica medievale). Wissenschaftliche Direktorin Prof. G. Bianchi, Universitá di Siena-Polo Universitario di Grosseto.
Tätigkeitsbereich oder Branche	Archäologie des Architekturs

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• Daten	Dezember 2005
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Archäologische Ausgrabung der römische Nekropole von *Turris Libissonis*. (Porto Torres, Sassari, Sardinien Italien)
Name und Adresse des Arbeitgebers	Dr. A. Pandolfi- Soprintendenya Archeologica per le Province di Sassari e Nuoro
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	von 15-07-2005 bis 30-07-2005
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Archäologische Ausgrabung, graphische und photographische Dokumentierung bei der phoenissae Festung des „Nuraghe Sirai“, Carbonia, Cagliari (Sardinien-Italien)
Name und Adresse des Arbeitgebers	Referentin Dr. C. Perra; Wissenschaftliche Direktor: Prof. Piero Bartoloni, Dipartimento di Storia, Universitä degli Studi di Sassari, unter Mitwirkung von C.N.R (Centro Nazionale delle Ricerche)
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	von März bis Mai 2003
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Mitarbeit an des Relief und des Zeichnung der „*Nuraghe Oes*“und „*Nuraghe Cagules*“ (Giave-Sassari/Italien) und des „*Nuraghe Bianco*“, bei Sassari (Sardinien-Italien)
Name und Adresse des Arbeitgebers	Referentin Mag.Lavinia Foddai, Dipartimento di Storia, Universitä degli Studi di Sassari
Tätigkeitsbereich oder Branche	Archäologische Zeichnung und Relief
• Daten	von 3-9-2002 bis 15-10-2002
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Archäologische Ausgrabung, graphische und photographische Dokumentierung, Analzse den Archäologische Reste und den Epigraphe bei dem Amphitheater von der römische Stadt „Uchi Maius“, Tunisien
Name und Adresse des Arbeitgebers	Referent: Dr. Doz. A. Teatini; Wissenschaftliche Direktor: Prof. A. Mastino, Dipartimento di Storia, Universitá degli Studi di Sassari unter Mitwirkung der *Institut National du Patrimonie de Tunis.*
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	von 08-07-2002 bis 26-07-2002
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Archäologische Ausgrabung, graphische und photographische Dokumentierung bei der phoenissae Festung des „Nuraghe Sirai“, Carbonia, Cagliari (Sardinien-Italien)
Name und Adresse des Arbeitgebers	Referentin Dr. C. Perra; Wissenschaftliche Direktor: Prof. Piero Bartoloni, Dipartimento di Storia, Universitä degli Studi di Sassari, unter Mitwirkung von C.N.R (Centro Nazionale delle Ricerche)
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	von 06-10-2001 bis 03-11-2001
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Archäologische Ausgrabung, graphische und photographische Dokumentierung, Analzse den Archäologische Reste und den Epigraphe bei dem Amphitheater von der römische Stadt „Uchi Maius“, Tunisien
Name und Adresse des Arbeitgebers	Referent: Dr. Doz. A. Teatini; Wissenschaftliche Direktor: Prof. A. Mastino, Dipartimento di Storia, Universitá degli Studi di Sassari unter Mitwirkung der *Institut National du Patrimonie de Tunis.*
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	von 16-07-2001 bis 27-07-2001

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Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Archäologische Ausgrabung, graphische Dokumentierung, Analyse den archäologische Reste bei der frügeschichtliche Siedlung von „Monte d´Accoddi“, Sassari, Sardinien (Italien)
Name und Adresse des Arbeitgebers	Prof. A. Moravetti, Dipartimento di Storia, Universitá degli Studi di Sassari
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	von 02-07-2001 bis 14-07-2001
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Archäologische Ausgrabung, graphische und photographische Dokumentierung, Analzse den Archäologische Reste in der Siedlung von S. Cromazio-Villaspeciosa, Cagliari (Sardinien Italien)
Name und Adresse des Arbeitgebers	Prof. G. Pianu, Dipartimento di Storia, Universitä degli Studi di Sasari unter Mitwirkung von Soprintendenza Archeologica delle Province di Cagliari e Oristano.
Tätigkeitsbereich oder Branche	Archäologische Ausgrabung
• Daten	von 01-07-2000 bis 22-07-2000
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Analyse und Katalogisierung den archäologische Reste von Sybrita, Thronos Kephala Amariou, Rethimnon Kreta Griechenland.
Name und Adresse des Arbeitgebers	Dr. A.L. D´Agata, ICEVO (Istituto per gli Studi delle Civiltä dellßEgeo e del Vicino Oriente), C. N. R. Rome
Tätigkeitsbereich oder Branche	Arch. Ausgrabüng
• Daten	von 04-08-1999 bis 15-09-1999
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Archäologische Ausgrabung in der nuraghische Tempel – La Purissima, Alghero- Sassari (Sardinien Italien)
Name und Adresse des Arbeitgebers	Soprintendenza Archeologica per le Province di Sassari e Nuoro
Tätigkeitsbereich oder Branche	Arch. Ausgrabung
• Daten	von 4-07-1998 bis 11-07-1998
Beruf oder Funktion	Praktikum
Wichtigste Tätigkeiten und Zuständigkeiten	Beteilung an der archäologische Ausgrabung von Uchi Maius, Tunisien
Name und Adresse des Arbeitgebers	Prof. Marco Milanese, Prof. Attilio Mastino, Dipartimento di Storia, Universitä degli Studi di Sasari

Schulbildung

• Daten	06. Februar 2012/ 10. Februar 2012
Bezeichnung	**ECDL GIS**
Name und Art der Bildungs- oder Ausbildungseinrichtung	Università degli Studi di Trieste Servizio di Geomatica e Sistemi Informativi Territoriali dell'Università di Trieste
• Daten	14. Dezember 2011
Bezeichnung	Ofizielle Reiseleiterin von Sardinien Region (nr. 1336) Registro Regionale delle Guide Turistiche della Regione Autonoma della Sardegna
Name und Art der Bildungs- oder Ausbildungseinrichtung	**Regione autonoma della Sardegna – Registro Regionale delle Guide turistiche** (DDS. 1607 del 14.12.2011)
• Daten	15. Spetember 2008/ 26. September 2008

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Bezeichnung	III Corso di alta formazione in Tecnologie digitali applicate ai beni culturali: dal *fieldwork* alla realtà virtuale. Virtual Archaeology and digital technologies for Culture: from fieldwork to virtual reality
Name und Art der Bildungs- oder Ausbildungseinrichtung	**ITABC-CNR (Istituto per le Tecnologie Applicate ai Beni Culturali – Consiglio Nazionale delle Ricerche) www.itabc.cnr.it**
• Daten	Von 27. August bis 27 September 2007
Bezeichnung	Studium bei der Italienische Archaeologische Schule in Athen im Bereich des Doktoratsstudium
Name und Art der Bildungs- oder Ausbildungseinrichtung	SAIA (Italienische Archäologische Schule in Athen), Direktor Prof. E. Greco, Athen, Odos Parthenonos 14, Athen
• Daten	Von SS 2007
Bezeichnung	Doktoratsstudium an der Universität Wien Institut für klassische Archäologie. <<**Mykenische Funde auf Sardinien: zu den transkulturelle „kontakte" im 2. Jahrtausend v. Chr**.>>
Name und Art der Bildungs- oder Ausbildungseinrichtung	Universität Wien – Institut für klassische Archäologie. Betreuer Prof. Dr. Frity Blakolmer
Stufe der nationalen oder internationalen Klassifikation	PhD im Bearbeitung
• Daten	Von 19.01.2006 bis 29.01.2007
Bezeichnung der erworbenen Qualifikation	Master II Stufe „Archeologia territoriale e gestione informatica dei dati archeologici. Archeologia urbana e medievale". (*Landscape archaeology and informatic management of archaeological dates*). Master Thesis: „ ***Land Evaluation in archeologia: un'applicazione per modellare la raggiungibilità dei siti con materiale ceramico miceneo in Sardegna*" (*Experimental land evaluation in archaeology: an application to modelling the accessibility of the sites with myk. ceramic in Sardinia***). Betreuer Prof. Antonia Arnoldus Huyzendveld (Geoarchäology); Dr. Giancarlo Macchi (G.I.S. und *Spatial analysis*). Note: **Excellent**
Hauptfächer/berufliche Fähigkeiten	Archäologie der Architektur, Archäologische Zeichnen und Relief durch Informatik-Instrumente, Bauarchäologie, Luftbildarchäologie; Archäologisch-geophzsikalische Prospektion; Widerstandkartierung, Erhaltung den Archäologische Strukturen und Restauration der archäologische Funden, Archäometrie, Geoarchäologie, Informatik-Leitung der landschaftlich-stattliche archäologische Daten (GIS, spatial analysis), Remote sensing, Phisische Anthropologie, Planung den archäologische Museen und Ausstellungen, Ur und Frühgeschichte Italiens, Römische Archäologie Italiens, Mittelalter Archäologie Italiens und Europas.
Name und Art der Bildungs- oder Ausbildungseinrichtung	Universität von Siena, Direktor Prof. R. Francovich.
Stufe der nationalen oder internationalen Klassifikation	Master II Level
• Daten	von Nov. 1999 bis nov. 2005
Bezeichnung der erworbenen Qualifikation	Magister Studium „Lettere classiche indirizzo archeologico"
Hauptfächer/berufliche Fähigkeiten	Ur und Frühgeschichte; Ur und Frühgeschichte Sardiniens, Ägäische Archäologie; Diplomarbeit: „**Die kykladischen Idole aus Sardinischer Urgeschichte**", note **110/110 e lode (1 plus Mention)**
Name und Art der Bildungs- oder Ausbildungseinrichtung	Università degli Studi di Sassari , Facoltà di Lettere e Filosofia; Betreuer Prof. Alberto Moravetti (Università degli Studi di Sassari); Mitbetreuer Mag. Dr. Fritz Blakolmer (Universität Wien-Institut für klassische Archäologie)
Stufe der nationalen oder internationalen Klassifikation	Magister
• Daten	Von Sept. 2003 bis Nov. 2004
Bezeichnung der erworbenen Qualifikation	Erasmus Stipendium

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Hauptfächer/berufliche Fähigkeiten	Arbeit an der Diplomarbeit unter Mitwirkung von Mag. Dr. Fritz Blakolmer (Institut für klassische Archäologie), Vorlesungen, Seminar und Pro-Seminar, Prüfungen an der Institut für Geschichte, Klassische Archäologie und klassische Philologie
Name und Art der Bildungs- oder Ausbildungseinrichtung	Universität Wien
Stufe der nationalen oder internationalen Klassifikation	EU Mobiblität-Stipendium
• Daten	Sept. 1994- Juli 1999
Bezeichnung der erworbenen Qualifikation	Diplom an der Gymnasium, mit note 95/100
Hauptfächer/berufliche Fähigkeiten	Italienische, Latein, Alte Griechisch, Geschichte, Philosophie, Kunstgeschichte
Name und Art der Bildungs- oder Ausbildungseinrichtung	Liceo Classico „D.A. Azuni“, Sassari, Sardinien Italien
Stufe der nationalen oder internationalen Klassifikation	Diplom-Matura
Berufsbildung (Kongresse Seminar, Workshops)	
• Daten	21 e 22 Novembre 2009 – Convegno telematico
Bezeichnung der erworbenen Qualifikation	
Hauptfächer/berufliche Fähigkeiten	**IV Congresso di Archeologia del Sottosuolo – Telematico** **«Le acque del passato: opere idrauliche dall’antichità al XX secolo»**
Name und Art der Bildungs- oder Ausbildungseinrichtung	*Vortrag:* *Pietro Francesco Serreli, Laura Soro, Silvia Vidili. Lo scavo dei pozzi e dei silos nel sito archeologico di Sa Osa (Cabras – Oristano – Sardegna).* *http://www.livestream.com/napoliunderground/video?clipId=pla_4f413e12-eed2-4899-a8f1-921c663b4c46*
• Daten	23-28/11/2009 - Cagliari-Barumini-Sassari
Bezeichnung der erworbenen Qualifikation	XLIV Riunione Scientifica dell’ I.I.P.P (Istituto Italiano di Preistoria e Protostoria- Italienische Institut für Ur und Frühgeschichte) – **La preistoria e la protostoria della Sardegna**
Hauptfächer/berufliche Fähigkeiten	
Name und Art der Bildungs- oder Ausbildungseinrichtung	*Vortragen:* *- A. Usai, S. Sebis, A. Depalmas, R. T. Melis, G. Carenti, L. Pau, S. Sechi, P. F. Serreli, L. Soro, S. Vidili, M. Zedda, **L’insediamento nuragico di Sa Osa (Cabras – OR). Il sito e l’occupazione del Bronzo Medio.*** *- A. Usai, S. Sebis, A. Depalmas, R. T. Melis, S. Caruso, G. Castangia, L. Pau, I. Sanna, S. Sechi, P. F. Serreli, L. Soro, S. Vidili, M. Zedda, A. Zupancic, **L’insediamento nuragico di Sa Osa (Cabras – OR). L’occupazione del Bronzo Recente e Finale.*** *- L. Soro, **Una soluzione fotogrammetrica per la creazione di un GIS da scavo: il caso di Sa Osa (Cabras-OR)*** *- L. Soro, G. Carenti, **La fossa C dello scavo archeologico di Sa Osa (Cabras, OR)** [sessione poster]*
• Daten	6-7/09/2009 Salzburg (Austria)
Bezeichnung der erworbenen Qualifikation	

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Hauptfächer/berufliche Fähigkeiten	***ÖSTERREICHISCHE FORSCHUNGEN ZUR ÄGÄISCHEN BRONZEZEIT 2009***Paris Lodron - Universität Salzburg Ao.Univ.-Prof. Mag. Dr. Claus Reinholdt Institut für Klassische Archäologie der Universität Wien – Prof. Fritz Blakolmer
Name und Art der Bildungs- oder Ausbildungseinrichtung	Vortrag: <<***Sardinien und die mykenische Welt. Die Forschungen der letzten 30 Jahre*** >>.
• Daten	3-5/11/2008 Wien
Bezeichnung der erworbenen Qualifikation	
Hauptfächer/berufliche Fähigkeiten	Workshop XIII "Archäologie und Computer"- Kulturelles Erbe und Neue Technologien
Name und Art der Bildungs- oder Ausbildungseinrichtung	*Vortrag mit A. USai <<Between necessity and economy: the archaeological field excavation at Gribaia (Sardinia, Italy). A photogrammetry-solution to document a small archaeological heritage>>.*
• Daten	2-6/04/2008 Budapest (HU)
Bezeichnung der erworbenen Qualifikation	36th Annual Conference on Computer Applications and Quantitative Methods in Archaeology On the Road to Reconstructing the Past- Budapest http://www.caa2008.org
Hauptfächer/berufliche Fähigkeiten	CAA - Computer Applications and Quantitative Methods in Archaeology Leiden University http://caa.leidenuniv.nl/
Name und Art der Bildungs- oder Ausbildungseinrichtung	Vortrag:*Experimental Land Evaluation in Archaeology: an application to model the accessibility of nuragic sites with mycenaean materials in Sardinia*
• Daten	26.-29./02/2008
Bezeichnung der erworbenen Qualifikation	2°Convegno giovani archeologi "Federico Halberr" Istituto di Norvegia. Rom.
Hauptfächer/berufliche Fähigkeiten	Tagung für jünge Archaeologen
Name und Art der Bildungs- oder Ausbildungseinrichtung	***1. Preis für Junge Archaeologe "Federico Halberr"***
• Daten	12-12-2007 University of Hull (UK)
Bezeichnung der erworbenen Qualifikation	Workshop: "Aerial archaeology, computer visualisation and past Landscapes: an international workshop".
Hauptfächer/berufliche Fähigkeiten	Aerial Archaeology Research Group (AARG); University of Hull - the SimVis Research Group; English Heritage.
Name und Art der Bildungs- oder Ausbildungseinrichtung	Praktikum un Stipendium von English Heritage
• Daten	09.Okt. 2007- 13.Okt. 2007
Bezeichnung der erworbenen Qualifikation	XLII Riunione Scientifica dell' I.I.P.P (Istituto Italiano di Preistoria e Protostoria- Italienische Institut für Ur und Frühgeschichte) – "L'arte preistorica in Italia" Trento - RIva del Garda
Hauptfächer/berufliche Fähigkeiten	Vortrag**: „*Gli idoli "cicladici" della Sardegna preistorica: attraverso la tipologia e* la distribuzione nel territorio, nuove osservazioni sull'uso, significato e valore**>>**
Name und Art der Bildungs- oder Ausbildungseinrichtung	I.I.P.P. Istituto Italiano di Preistoria e Protostoria (Italienische Institut für Ur und Frühgeschichte)- Universitä degli Studi di Trento, Dipartimento di Filosofia, Storia e Beni Culturali (Universität von Trento, Institut für Philosophie,Geschichte und Archäologie), - Museo Tridentino di Scienze Naturali (Natuwissenschaftliche Museum von Trento)
• Daten	26.Sept. 2006- 30.Sept. 2006
Bezeichnung der erworbenen Qualifikation	Convegno Nazionale dei Giovani Archeologi „Uomo e territorio, dinamiche di popolazione e sfruttamento delle risorse umane nell'antichità"

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Hauptfächer/berufliche Fähigkeiten	- Organisierung des Kongress - Vorstellung des Plakatt **„*Gli Idoli cicladici della Sardegna Preistorica: ricerche sulla distribuzione*“**
Name und Art der Bildungs- oder Ausbildungseinrichtung	Associazione Archeologica *Aidu Entos*; Università degli Studi di Sassari; C.I.A.I.M.O
• Daten	8 Mai 2006
Bezeichnung der erworbenen Qualifikation	Workshop: ”*Open source, free software, open formats* nei processi di ricerca archeologica”,
Name und Art der Bildungs- oder Ausbildungseinrichtung	ASIAA lab (Laboratorio di analisi spaziale e informatica applicata all’archeologia), Dr. G. Macchi, Università degli Studi di Siena.
• Daten	27 Februar 2007
Bezeichnung der erworbenen Qualifikation	Tagesstudium: ”Evoluzione e preistoria dell’uomo nella società contemporanea. Percorsi conoscitivi e forme di trasmissione di un sapere scientifico”.
Name und Art der Bildungs- oder Ausbildungseinrichtung	Dipartimento di archeologia e storia delle arti. Sezione di Preistoria e Protostoria, Prof. L. Sarti, Università degli Studi di Siena.
• Daten	2000-2001
Hauptfächer/berufliche Fähigkeiten	Seminar: “Disegno e tecnologia della ceramica”(Zeichnung und Tecnologie des Keramik), 40 Stunde
Name und Art der Bildungs- oder Ausbildungseinrichtung	Mag. Denise Marras- Università degli Studi di Sassari - Dipartimento di Storia
• Daten	04. April. 2001- 03.Mai.2001
Hauptfächer/berufliche Fähigkeiten	Seminar von Latein Epigraphie über “Instrumentum Domesticum”, 20 Stunde
Name und Art der Bildungs- oder Ausbildungseinrichtung	Prof. Giovanna Sotgiu – Universitä degli Studi di Cagliari (Sardinien Italien)
• Daten	07.Dez.2000-10 Dez.2000
Hauptfächer/berufliche Fähigkeiten	XIV Congresso sull´ ”Africa Romana”: Lo spazio marittimo del Mediterraneo Occidentale: Geografia storica ed economica.
Name und Art der Bildungs- oder Ausbildungseinrichtung	Università degli Studi di Sassari - Dipartimento di Storia; Prof. Attilio Mastino, Prof. R. Zucca.

Persönliche Fähigkeiten und Kompetenzen

Muttersprache(n) **Italienisch**

Sonstige Sprache(n) **DEUTSCH; SPANISCH; ENGLISCH**

Selbstbeurteilung	**Verstehen**				**Sprechen**				**Schreiben**
Europäische Kompetenzstufe (*)	Hören		Lesen		An Gesprächen teilnehmen		Zusammen-hängendes Sprechen		
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Spanisch	C1		B2		C1		B2		A2
Englisch	A2		B1		A2		A2		A2

(*) Referenzniveau des gemeinsamen europäischen Referenzrahmens

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IKT-Kenntnisse und Kompetenzen	• Softwares G.I.S(Geographical Information System) and G.I.P.(Geographical Image Processing): **ArcGis; ArcView; Global Mapper; Er Mapper; Geo Concept; S.A.U.**(Spatial Analysis Utilities) • Softwares for Georaferencing Raster and Vector Images: **Geographic Transformer; Geographic calculator; CartLab** • **Adobe Photoshop; FileMaker ; Autocad; Adobe Illustrator; Digicad 3D;** • **Adobe Go Live; Macromedia Director MX; DreamWeaver MX**
Wissenschaftliche Publikationen	• **L. Soro, Una soluzione fotogrammetrica per la creazione di un GIS da scavo: il caso di Sa Osa (Cabras-OR),** in **Atti della LXIV Riunione Scientifica dell'IIPP 2009, Firenze 2012, 1201-1206** • **L. Soro,** G. Carenti, **La fossa C dello scavo archeologico di Sa Osa (Cabras, OR),** in **Atti della LXIV Riunione Scientifica dell'IIPP 2009, Firenze 2012 1421-1428** • A. Usai, S. Sebis,A. Depalmas, R. T. Melis,M.Zedda, G.Carenti, S. Caruso,G, Castangia,P. F. Serreli, **L. Soro,** S. Vidili, A. Zupancic,V. Chergia, L. Pau, I. Sanna, S. Sechi, **L'insediamento nuragico di Sa Osa (Cabras – OR),** in **Atti della LXIV Riunione Scientifica dell'IIPP 2009, Firenze 2012, 771-782** • **L. Soro, Gli idoli "cicladici" della Sardegna preistorica: attraverso la tipologia e la distribuzione nel territorio, nuove osservazioni sull'uso, significato e valore**, Atti della XLII Riunione Scientifica dell'I.I.P.P. 9-13 Ottobre 2007, Trento Riva del Garda, in **Preistoria alpina: rendiconti della Società di cultura preistorica tridentina, Museo tridentino di storia naturale**, **A. 2012, vol.1**, **pp. 211-217** • **L.Soro - Un sistema informativo geografico (GIS) in uno scavo d'emergenza: il caso di Sa Osa (Cabras-OR), in Tharros Felix IV, Ed. Carocci, 2011, pp.313-319** • **L.Soro-Sardinien und die mykenische Welt. Die Forschungen der letzten 30 Jahre, in Blakolmer F., Reinholdt C., Weilhartner J., Nightingale G., (eds.),ÖSTERREICHISCHE FORSCHUNGEN ZUR ÄGÄISCHEN BRONZEZEIT 2009, Berichte des Tagungs 6-7 Marz 2009, Wien 2011, pp.283-294** • **L. Soro, Experimental Land Evaluation in Archaeology: an application to model the accessibility of nuragic sites with mycenaean materials in Sardinia, in CAA 2008, 2-6 Aprile 2008, Budapest, Hungary edited by E. Jerem, F. Redo and V. Szeverenyi, Budapest, Archaeolongua Foundation, 2011, pp. 533-542.** • **L. Soro - A.Usai, Between necessity and economy: the archaeological field excavation at Gribaia (Sardinia, Italy). A photogrammetry-solution to document a small archaeological heritage** in Workshop 13, Archaeologie und Computer, 3-5/11-2008, Vienna (Austria). • **L. Soro**, **Gli idoli "cicladici" della Sardegna Preistorica: ricerche sulla distribuzione Uomo e territorio : dinamiche di frequentazione e di sfruttamento delle risorse naturali nell'antichità : atti del Convegno nazionale dei giovani archeologi : Sassari 27-30 settembre 2006 , p. 234-236** • *E. Pompianu* ***– L.Soro, Nuove testimonianze micenee da Sulky (Sardegna), Rivista di Studi Fenici 39, 2012*** *(im drück)* • ***P. F. Serreli, L. Soro, S. Vidili. Lo scavo dei pozzi e dei silos nel sito archeologico di Sa Osa (Cabras – Oristano – Sardegna), in*** **«Hypogean Archaeology Research and Documentation of Underground Structures» (British Archaeological Reports), della Federazione Nazionale Cavità Artificiali (F.N.C.A.),** (in corso di stampa) • **L. Soro, Land Evaluation sperimentale in archeologia. Un'applicazione per modellare l'accessibilità dei siti con materiale miceneo in Sardegna**, in Atti del II Convegno dei Giovani Archeologi - Federico Halberr, Roma 26-28 Febbraio 2008 (in corso di stampa)

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