universität wien

MASTERARBEIT / MASTER'S THESIS

Titel der Masterarbeit / Title of the Master's Thesis

„The Stratigraphy of the Hermitage on the Falkenstein"

verfasst von / submitted by

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angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree of

Master of Arts (MA)

Wien, 2022/ Vienna 2022

Studienkennzahl lt. Studienblatt / degree programme code as it appears on the student record sheet:	UA 066 801
Studienrichtung lt. Studienblatt / degree programme as it appears on the student record sheet:	Masterstudium Urgeschichte und Historische Archäologie
Betreut von / Supervisor:	ao. Univ.-Prof. Mag. Dr. Wolfgang Neubauer

Acknowledgements

I would like to express my deep and sincere gratitude to my research supervisor, Wolfgang Neubauer, whos dynamism, vision, sincerity and motivation have deeply inspired me. It was and is a great privilege and honor to work and study under his guidance.
Thanks to my colleagues Erich Nau, Roland Filzwieser for all their help and empathy, Mario Wallner for providing invaluable spiritual guidance throughout the years of this research, Immo Trinks and Erich Draganits for input in their specialties and all the others for their valuable comments. Thanks to Augustin Kloiber, curator of the local history museum, without whom the whole research project would not have been possible.
A big thanks goes to Grammarly and the replacement function, my family and the people who took their time to read parts of my work.
Last but not least special thanks to my friends, hobbies, work and lately kid without whom I would have never finished[1] this thesis so late.

[1] I started writing this acknowledgement before actually finishing the thesis - it is proving to be a wonderful source of procrastination and an optimistic speculation that I will, in fact, complete this thesis. As of now, whether this is pure optimism or will become reality in time, no one can say for sure.

Contents

Chapter 1

Introduction

The present master thesis examines the stratigraphy of a hermitage at the pilgrimage site of Falkenstein, located in St. Gilgen at the Wolfgangsee (Lake Wolfgang[2]) in the Austrian federal state of Salzburg.
The site is situated on a pathway leading from St. Gilgen to St. Wolfgang on a mountain saddle at 700 m above sea level (asl) between the Falkenstein and the Schafberg (Fig.1.1). The whole area is part of the Salzkammergut, an area in central Austria characterized by several deep valley lakes formed by glacial erosion during the Pleistocene. Geologically, a very small part of the Salzkammergut belongs to the Molasse Zone. Towards the south, it follows the Helvetic Unit, Flysch Zone, and, finally, the most extensive section is part of the Northern Calcareous Alps.[3]
The study area around the Falkenstein belongs entirely to the Northern Calcareous Alps and is mainly covered by dense forest; however, on the mountain saddle, there is a clearing. On the west side of this clearing, built into the rock face, is a small church – the Falkensteinkirche – and at the south end of the clearing is a small chapel housing a spring.
However, historical records mention an additional building at the site - a hermitage. This kind of housing served as a habitation for hermits. Hermits are defined as people who lived in seclusion from the world, although with time, other forms emerged, and hermits worked as teachers and sacristans and were often found at pilgrimage sites.[4] Hermitages are usually simple accommodation suitable for the inhabitant's ascetic way of living.
The above-mentioned historical records consist of documents that the hermits living in the hermitage created, estates and other general official documents, and historical depictions of the building. With this background information, a vivid picture of the hermitage's building history and the hermits' life can be reconstructed. The exact location and appearance of the hermitage were not known until its rediscovery through recent investigations.
In 2009, the first archaeological investigations in the area of the Falkenstein were made by the Vienna Institute for Archaeological Science (VIAS), University of Vi-

[2]in the following text only addressed to by its German name „Wolfgangsee"
[3]Schuster et al. 2015.
[4]Watteck 1972, 6.

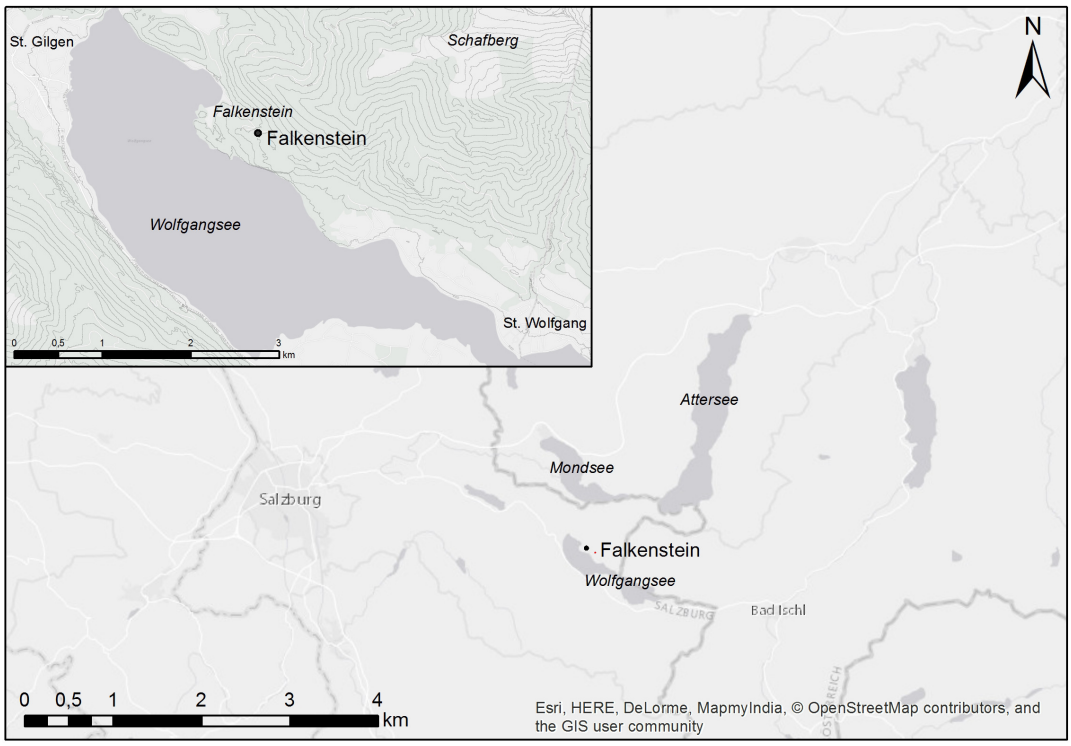

Fig. 1.1: Location of the archaeological site Falkenstein

enna. This group conducted a ground-penetrating radar (GPR) survey and located the building successfully. Two years later, excavations began to investigate the hermitage further. The excavations were carried out in two campaigns from August 02-31 in 2011 and July 02-20 in 2012 in cooperation with the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology (LBI ArchPro) and co-financed by private donations and a grant from the Marktgemeinde St. Gilgen. In 2011, the area of the original GPR surveyed site was extended to the east of the hermitage to locate further buildings.

The documentation of the excavations on the Falkenstein was done entirely digitally and in alignment with a standardized documentation process which had been extensively developed by Michael Doneus and Wolfgang Neubauer[5]; It is named "single surface documentation" based on 3D laser scanning and resulting in a complete 3D topographical record of all units of stratification combined with conventional ar-

[5]Doneus et al. 2003; Doneus & Neubauer 2004; Doneus & Neubauer 2005a; Doneus & Neubauer 2005b; Neubauer 2007a; Neubauer 2008; Neubauer & Doneus 2008; http://vias-geo.univie.ac.at/research-fields/archaeological-stratigraphy/.

chaeological documentation. The gathered data – comprised of the prospection data, excavation data, and already analyzed finds – was connected to the stratigraphic sequence (Harris Matrix) using the LBI ArchPro Software HarrisMatrixComposer[6].
The analysis of the finds from the two excavation campaigns is the topic of three master theses. The thesis of Katharina Vigl analyzed the pottery from the 2011 campaign and was finished in 2013[7]. Stephanie Helmel and Julia Mayr are currently working on their theses about glass and metal objects, respectively.
The aim of the present thesis is to reveal the building history of the hermitage by analyzing the topographical stratigraphic record.
Part of the thesis is the development of efficient techniques to visualize the topographical stratigraphic record as 3D volumes and 3D surfaces in a GIS (geographic information system) environment. The first objective is the development of a standardized workflow for processing the terrestrial laser scan data for a 3D visualization of the excavated surfaces and deposits as a prerequisite for a GIS-based analysis of the recorded stratification. The interpretation of the excavated stratigraphic units based on their characteristics and contents, topography, and stratigraphic relations allows for the assignment of the archaeological units into phases and periods. An important goal is to integrate the finds – the already analyzed pottery and coins and material currently being worked on – into the 3D stratigraphic analysis by including the respective databases in a GIS project.
Another essential point for phasing and periodization will be integrating the historical record. This includes its analysis, the comparison with the excavation data, and the evaluation of the data (source) itself.
The final objective is to combine the stratigraphic sequence with the topographical stratigraphic record, its associated finds and respective dating, and the historical record.
The main aim is to derive a sequence of events at Falkenstein to contribute to the primary research project to reveal insight into the living conditions of the hermits. With this contribution, it will be possible to gain further knowledge for investigating the tradition of the pilgrimage at Falkenstein and its historical background.

[6]Traxler & Neubauer 2008, www.harrismatrixcomposer.com.
[7]Vigl 2013.

Chapter 2

The archaeological site Falkenstein

Location and topographic situation

The archaeological site of Falkenstein is located in the community of St. Gilgen at the Wolfgangsee in the Austrian province of Salzburg. It is situated in the eastern part of the community territory, at the north-eastern shore of the Wolfgangsee, known from earlier documents as Abersee (Fig.1.1).

The maximum elevation of Falkenstein is 795 m asl and is located directly northeast of Wolfgangsee (545 m asl). Facing the lake, there is a rock face more than 200 m high, the so-called Falkensteinwand. A northwest-southeast-oriented valley separates the Falkenstein from the Schafberg (1782 m asl) towards the northeast. Both mountains form part of the Salzkammergut Mountains, the Northern Calcareous Alps mountain range.

The archaeological site is situated on a pathway leading from St. Gilgen to St. Wolfgang on a mountain saddle at 700 m asl between the Falkenstein and the Schafberg. There is a northwest – southeast-oriented artificial clearing on this saddle, which is confined by a rock face in the southwest. In the northwest, the saddle narrows and then opens again as a steep valley leading to the Wolfgangsee. Eastwards from the rock face, the terrain gently slopes into a depression but rises again north towards the steep tree-covered slope of the Schafberg and southeast-bound to an elevation, whereby the actual pathway continues to St. Wolfgang (Fig.2.1).

The Falkensteinkirche, described above, was built in the west of the clearing, directly on the rock face, covering a cave, which according to the legend, was home to Saint Wolfgang when he was living at the Falkenstein (Fig.2.1).

In addition to the Falkensteinkirche, other chapels can be found on the Falkenstein (Fig.2.1). The Schächerkapelle (robber chapel) or Kreuzkapelle (cross chapel), built in 1751[8], is located already after the steepest ascent as one follows the path from Fürberg up to the clearing. Traditionally, pilgrims pick up a stone down in the bay of Fürberg and carry it up to the chapel as an act of penitence. Piles of stones next to the chapel show evidence of this tradition.

[8] https://de.wikipedia.org/wiki/Liste_der_denkmalgeschützten_Objekte_in_Sankt_Gilgen; Ziller 1969, 53 states that it is was rebuilt 1751.

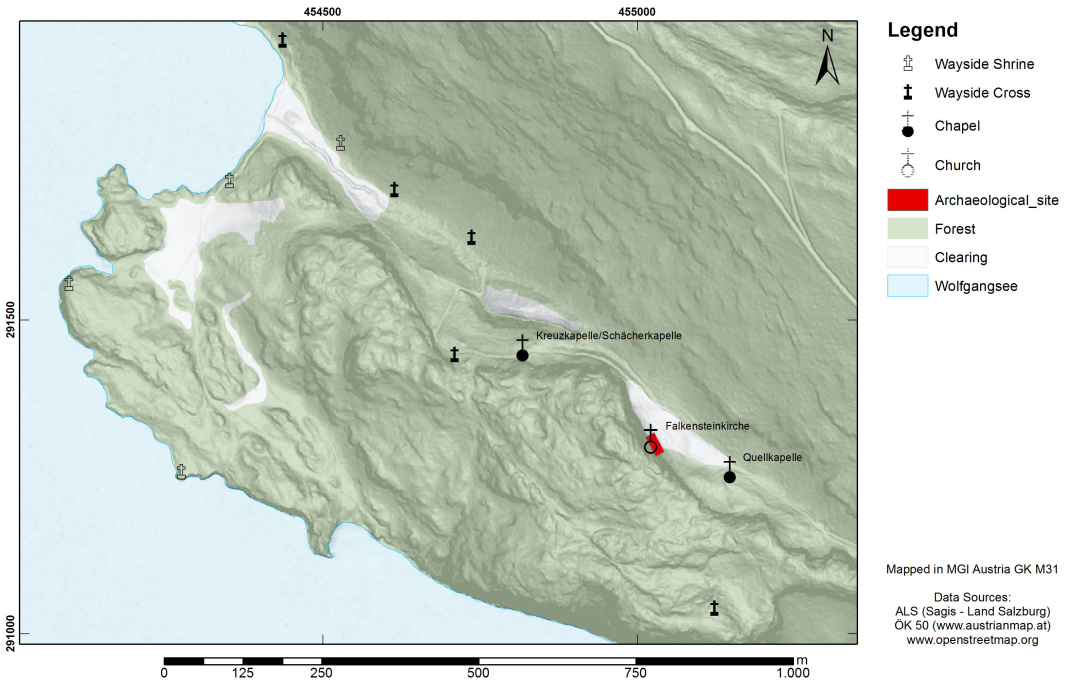

Fig. 2.1: Topographic map of the Falkenstein; the archaeological site is located right next to the Falkensteinkirche.

The Brunnkapelle/Quellkapelle (well/spring chapel) is located at the southern end of the clearing, next to the Falkensteinkirche. Supposedly, it was erected earlier than the church[9]. In 1669, a new roof was built, which then was totally renewed in 1724[10]. According to the legend, it was built where Saint Wolfgang aroused the spring from underneath the rocks (see chapter 2). The spring water flows into a basin inside the chapel.

The Schlafkapelle (sleeping chapel) was built in the 17th century, next to the rock face. The 19th-century Hackelwurfkapelle (axe throw chapel) is located at the southern break-off of the pathway to the lake. According to the legend, this is the location where Saint Wolfgang hurled his axe into the valley. Descending to the lake towards Ried, the Rastkapelle (rest chapel). It is built on a stone where Wolfgang is said to have rested. Finally, at Ried, there is the so-called Falkensteinbauernkapelle (Falkenstein farmer chapel).[11] All mentioned chapels along the pilgrim's path are nowadays equipped with information boards explaining the individual sites.

[9] Ziller 1969, 50

[10] Ziller 1969, 50.

[11] Die Kunstdenkmäler Österreichs. Dehio Salzburg 1986. St. Gilgen, Wallfahrtskirchlein Unsere Liebe Frau und hl. Wolfgang, auf dem Falkenstein, Wegkapellen am Falkenstein (Ried), 349-350.

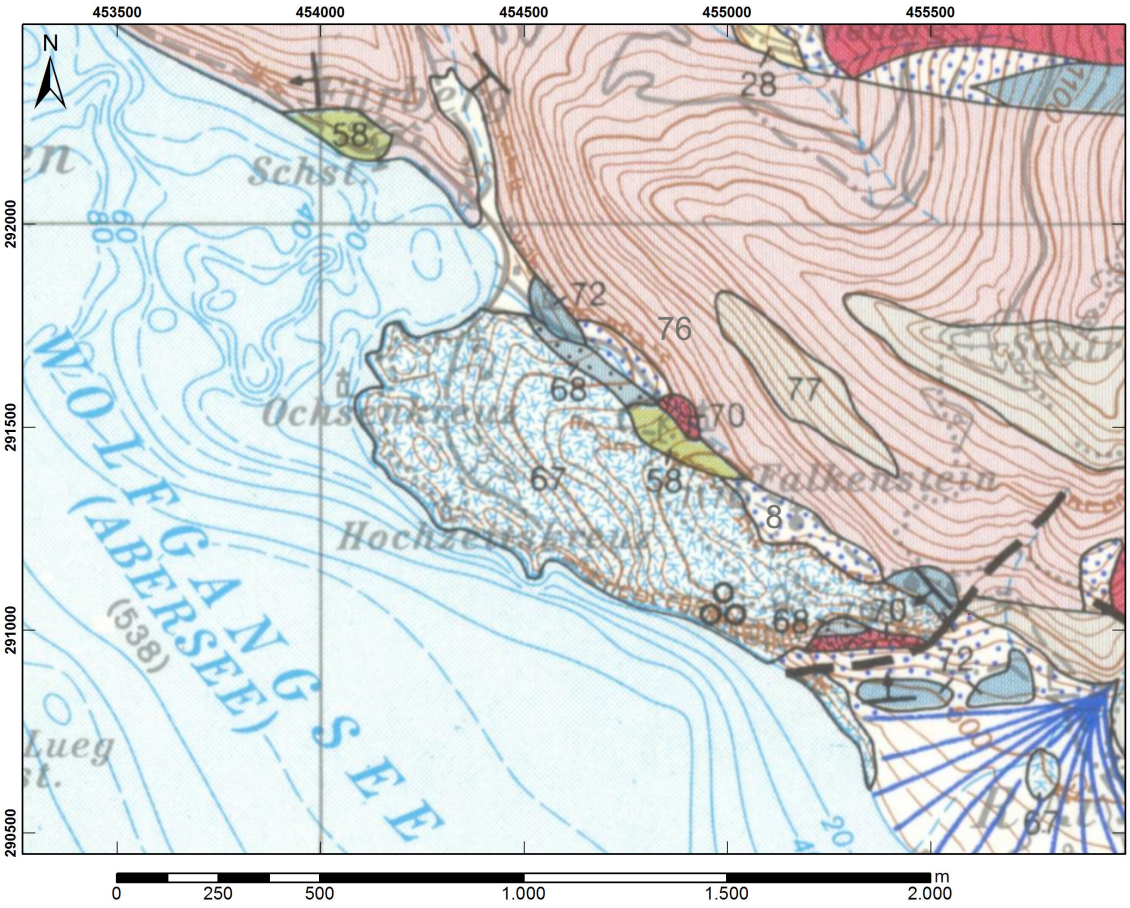

Fig. 2.2: Geological Map of the area around the Wolfgangsee 1:50000.
8 = scree and debris, 58 = colored deposits of the middle-Lias-Dogger age, 67 = Plassenkalk, 68 = colored pebble and radiolarite layers, 70 = limestone of lower Jurassic age, 72 = limestone with spongiae with transitions to crinoidal limestone, 76 = platy limestone, 77 = Hauptdolomit [14]

Geological and geomorphological situation

A short overview of the geological and geomorphological situation is summarized to provide insight into geomorphological development and the processes that shaped the local landscape. The area is situated within the Northern Calcareous Alps and is dominated by different carbonate sediments. Details of the local geology given are based on the local geological map[12] and its explanation[13].

The Falkenstein itself is comprised of so-called Plassenkalk (67) from the Upper Jurassic age (Tithonian). To the east, there are platy limestone (76) and Hauptdolomit (77) formations (late Karnium and Noriums) which form the Schafberg.

[12]Plöchlinger et al. 1989.

[13]D. van Husen & H. Egger (eds.), Erläuterungen zu Blatt 65 Mondsee. Geologische Karte der Republik Österreich 1 : 50.000, Geologische Bundesanstalt, Wien 2014.

[14]Plöchlinger et al. 1989

Smaller areas consist of limestone (70) of lower Jurassic age (Lias[15]) and colored deposits of the middle-Lias-Dogger age (58) as well as colored pebble and radiolarite layers (68) (Lias), limestone with spongiae with transitions to crinoidal limestone (72) (Lias) and highly-bioturbated marl/marlstone Liasfleckenmergel (73) (Fig.2.2). The area between the Falkenstein and the foothills of the Schafberg is comprised of mass movement deposits, scree and debris (8).[16] The occurrence of several different rocks of different ages, even Gosau lithologies, indicate that a tectonic fault most likely separates Falkenstein and Schafberg.

The geomorphological situation is dominated by karst processes.[17] Karst is defined as "terrain with distinctive hydrology and landforms that arise from a combination of high rock solubility and well-developed secondary (fracture) porosity."[18] Closed depressions are very typical for Karst areas[19]. The karst features in the study area are caused by the dissolution processes of water, which strongly affect the middle Triassic limestones and dolomites (Lias-limestone, Plassenkalk, colored Jurakalk, Plattenkalk, Hauptdolomit).[20] The solution is strongly influenced by the tectonic fracture pattern. There are only a few karst features visible on the surface in the area. There are some depressions on the Schafberg, which represent dolines (Fig. 6). They are circular depressions ranging from a few meters to approximately 1 km in diameter with gently sloping to vertical sides. They form by dissolution, collapse, and subsidence and can occur either as isolated features or groups. Dolines are considered a diagnostic karst landform, even though karst groundwater systems can also develop without doline formation.[21]

Karst forms were recorded using terrestrial laser scanning in the study area around the Falkenstein in October 2015. Therefore, the elevated plateau to the west of the Falkensteinkirche has been scanned with 13 scan positions. The scans were aligned and the vegetation filtered, both with predefined filters and manually, to get a digital terrain model of the surface. This digital terrain model was visualized in different ways to make the karst forms visible. A combination of a local relief model and a slope visualization yielded the best results (Fig.2.3). The blue areas show depressed areas, while the red areas comprise elevated areas. The structures can be identified as chasms and depressions resulting from karst formation. Two bigger areas might be addressed as dolines.

There is also a depression at the clearing itself, visible on the ground and in elevation

[15]Upper Triassic-Lower Jurassic; Rhaetian-Toarcian.
[16]Plöchlinger 1973, Geologische Karte des Wolfgangseegebietes 1:25000.
[17]Plöchinger 1973a, 7 (nach Trimmel 1967, 78).
[18]Ford & Williams 2007, 1.
[19]Ford & Williams 2007, 1.
[20]Plöchinger 1973a, 81.
[21]Ford & William 2007, 339.

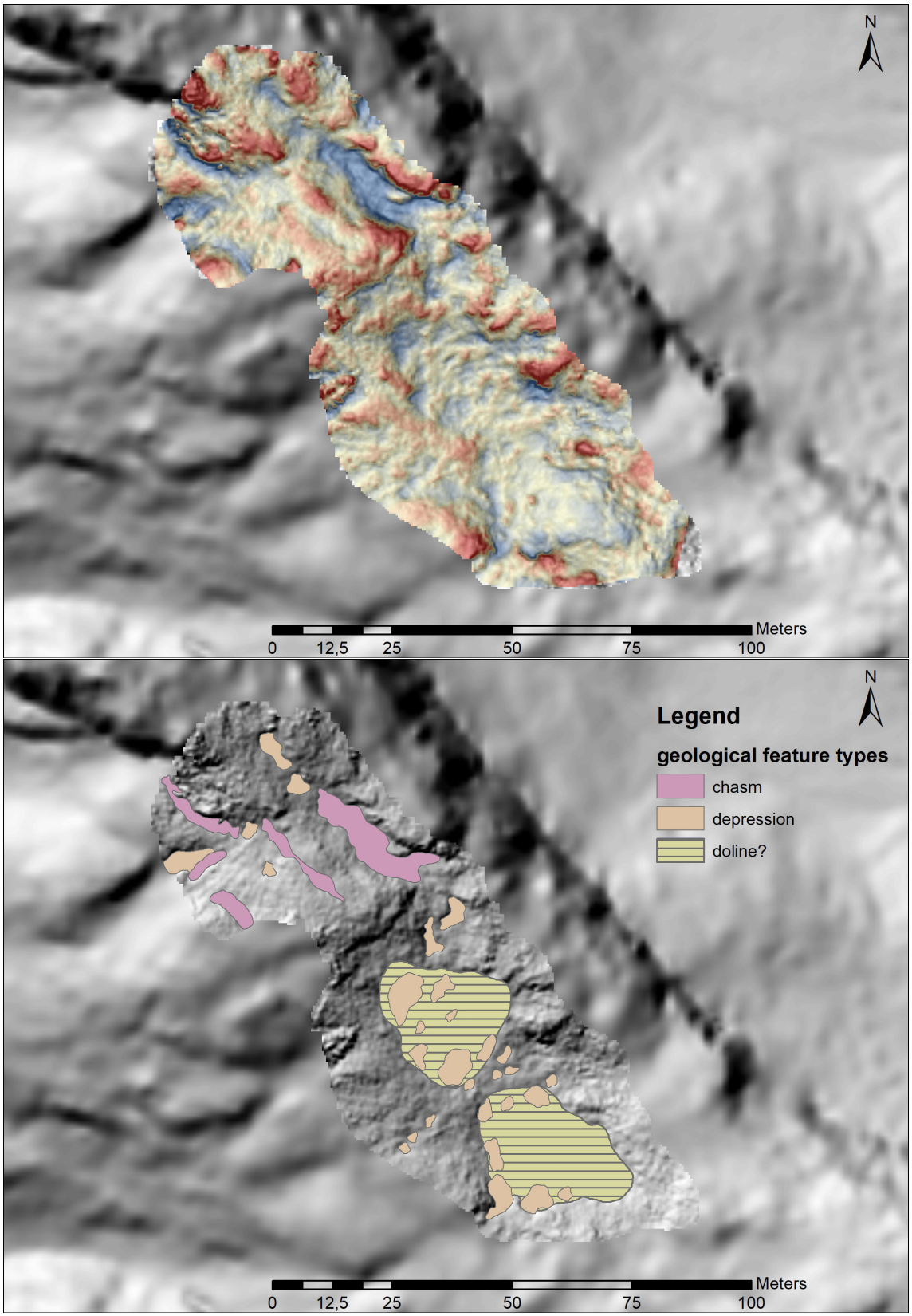

Fig. 2.3: Rockface southwest of the clearing at the Falkenstein formed by Karst processes – different visualizations of the TLS-data obtained in October 2015 on top of the ALS-data visualized as hillshade. Top: a combination of local relief model and slope; bottom: interpretation on local relief model and slope visualization.

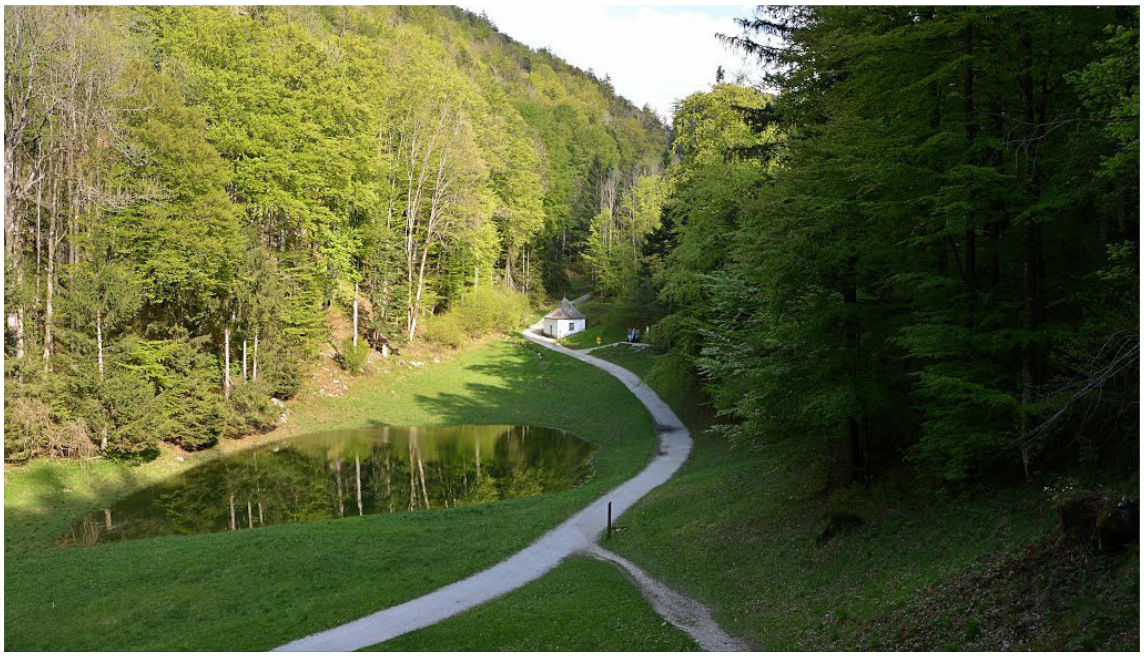

Fig. 2.4: Clearing at the Falkenstein after rain seen from the Falkensteinkirche (looking southeast).[22]

data; it is best visible in slope and contour visualization. Observations show that this depression fills with water after heavy rains and drains very slowly (Fig.2.4). This closed depression is a shallow basin with an ellipsoid shape and shallow floor, measuring about 50 x 30 m. As the whole area is prone to karst formation, the depression is most likely part of it, especially in the area where a fault can be expected.

Hydrological situation

In the area of the Falkenstein, most of the water drainage is underground, except for the little creek flowing down the canyon into the Wolfgangsee and the spring in the chapel at the clearing. This kind of underground drainage system, using boundaries of geological layers, faults, joints, and karst cavities, is typical for Karst areas. Springs may be the result of confining layers, which in the region of the Wolfgangsee are Permian evaporites (Haselgebirgston), Werfen Formation (Werfener Schiefer), slate (Tonschiefer), Kössen Formation (Kössener Mergel), spotted marlstone (Liasfleckenmergel), pebbly clay deposits of the Malmbasis, marls of the Gosau and Nekom (Neokom- und Gosaumergel), marls of the Ultrahelvetikum and Flysch units (Ultrahelvetikums- and Flyschmergel).In the study area of the Falkenstein,

[22]Photo ©Normann Steidl.

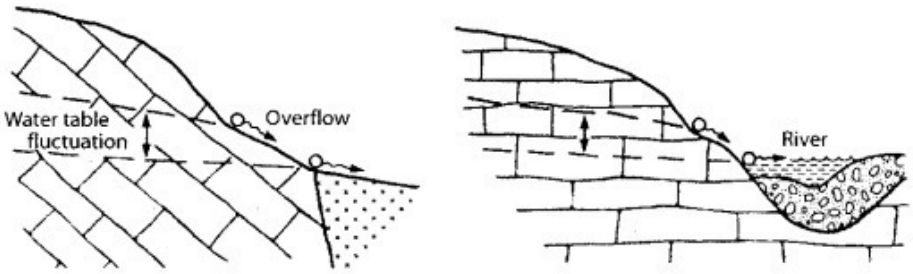

Fig. 2.5: Dammed springs. Left: Impounded, Right: Aggraded.[24]

Liasfleckenmergel occurs and acts most likely as a confining layer. (see Fig.2.1). Where there are layers with lower permeability (aquitards), the water tends to flow at this surface and arise as a spring at the base of rock debris accumulations.[23]
The area of the Wolfgangsee shows various springs on the geological map, indicated by blue rings. The karst plateau of the so-called Plattenkalk at the Ochsenberg and Königberg show almost no springs, whereas there are springs in different altitudes at the clayey layers at the limestones of the Oberalmer Kalke.[25] The spring at the Falkenstein, inside the Quellkapelle, is not marked as such in the geological map (see Fig.2.2). The karst hydrology is essential because of the legend of Saint Wolfgang arousing a spring from below a rock. Springs arising from below rocks in karstic areas are classified according to their hydrological control function. Dammed springs result from a major barrier like the aforementioned confining layer of Liasfleckenmergel. In response to high water tables, temporary overflow springs may form (see Fig.2.5).[26] The observation of this phenomenon at the Falkenstein might be the origin of the legend of Saint Wolfgang arousing a spring there.

[23]Plöchinger 1973, 81.
[24]Ford & Williams 2007, Fig. 5.17 c-d, 122.
[25]Plöchinger 1973, 83.
[26]Ford & Williams 2007, 120.

Chapter 3

Historical background

Life and legends of Saint Wolfgang

The site of Falkenstein is connected to the legend and resulting veneration of Saint Wolfgang of Regensburg (c. 934 – October 31st, 994), who was bishop of Regensburg in Bavaria from 972 until his death in 994.

Wolfgang was born in Swabia, Germany, and received a Christian education from his earliest studies through his attendance at a monastic school. Later on, he became a teacher and joined the Benedictine order in the Abbey of Maria Einsiedeln, Switzerland. He then was ordained priest in 968 and became bishop of Regensburg in 972. He is known for several reforms in monasteries whereby he supported a strict lifestyle of monks and nuns; he died in his service in 994.[27]

A connection between the Bishopric of Regensburg and the region around the Wolfgangsee had already been established long before Wolfgang was born; in 833, the Mondsee abbey and the forests around Wolfgangsee/Abersee had passed from Salzburg into the ownership of the Bishopric of Regensburg. There is historical documentation for a significant part of the life of Saint Wolfgang - a stay at the Mondsee abbey in 977, which at this time was part of the properties of his bishopric.[28] However, his visit at Falkenstein is mentioned only in a collection of legends about this episode in his life, which was first written down in about 1400[29], but not recorded historically. The most important thaumaturgic feats were presented in poems and songs, prevalent in the 18th century.[30]

There are many legends[31] about Saint Wolfgang, however, only those relevant for Falkenstein are mentioned here. According to some legends, Saint Wolfgang decided to withdraw as a hermit for penitence because he was given so much respect as a bishop that he feared there would be no honor left for the afterlife. This is why he decided to live in a cave at Falkenstein, above Wolfgangsee, surviving only from essentials provided by nature. Another Brother stayed with him but was not apt

[27] Zibermayr 1961, 2-14.
[28] Zibermayr, 1961, 2-14.
[29] Zibermayr 1961, 38.
[30] Ziller 1969, 48.
[31] comp. Zinnhobler 1976.

for the rough life at the Falkenstein. One day, this companion friar was desperate for water, so Wolfgang produced a spring from underneath the rocks by hitting his walking stick against the cliff and so provided water.[32] Until today, there is a spring at the Falkenstein, which is believed to be the result of this miracle. Its water is considered to have healing power and has been highly appreciated by pilgrims ever since.

Another legend tells that the devil himself tried to kill Saint Wolfgang by moving a rock face against him when walking down the Falkenstein. Saint Wolfgang stemmed his head and hands against the rocks, forming a cross, and inhibited his death that way. The marks of his head and hands are said to still be visible in the rock face.[33]

The best-known legend of Saint Wolfgang tells of the time he prayed to God and asked for a spot to build a place of worship. He then hurled an axe from the Falkenstein into the valley and appointed the spot where it landed as the spot God intended for him to build the church. He found the axe at the shores of the Wolfgangsee and erected the first church in this area.[34] Thus, the village of St. Wolfgang received its name and turned into a major place of pilgrimage.

The probability that Saint Wolfgang actually withdrew as a hermit is low because the record shows that there is no significant time span for such an episode; also, there is a total lack of contemporary sources.[35] In this context, Leopold Ziller mentions that the popularity of Saint Wolfgang (as bishop of Regensburg – the main rival concerning territorial claims of Salzburg) was increasing, and the legend of his escape into solitude needed a place in the narrative.[36] Salzburg had an interest in promoting the veneration of Saint Wolfgang because the Falkenstein had to be crossed by the pilgrims to get to St. Wolfgang.[37] The Falkenstein seemed to be the perfect place because a connection could quickly be established between a prominent cave in the rock face and the shelter of Saint Wolfgang. The spring, which never dries up at the Falkenstein, also supported a more extended stay at this lonely place.[38]

[32]Zinnhobler 1976, 57; Pfarl 2013, 20.
[33]Zinnhobler 1976, 57; Pfarl 2013, 21.
[34]Zinnhobler 1976, 57, Pfarl 2013, 21.
[35]Zibermayr 1961, 2-14.
[36]Ziller 1969, 46.
[37]Ziller 1969, 47.
[38]Ziller 1969, 46.

Pilgrimage to Falkenstein

The legends mentioned above led people to go on a pilgrimage to the Falkenstein and St. Wolfgang. Soon after the death of Wolfgang in 994, churches began to choose him as their patron saint, and various towns were named after him. Wolfgang was canonized in 1052 by Pope Leo IX.[39] The pilgrimage route leading from St. Gilgen across the Falkenstein to St. Wolfgang has been in existence since the 13th century. It can possibly be traced back to the second half of the 12th century[40]. It is part of the pilgrimage route – the Wolfgang Weg – from Regensburg to St. Wolfgang, covering a distance of about 270 kilometers.[41]

Fig. 3.1: Pilgrimage route from Regensburg to St. Wolfgang[42]

At the transition from the 15th to the 16th century, the Falkenstein was one of the most important places of pilgrimage in Europe, listed after Rome, Aachen, and Einsiedeln. However, the importance decreased later on, probably due to the reformation and the closure of the Mondsee Abbey in 1791.[43] In 1780, archbishop Hieronymus Graf Colloredo established prohibitive rules concerning cloisters and

[39] Medieval Germany: An Encyclopedia, 461.
[40] Assman 1976, 62.
[41] http://www.pilgerwege.at/pilgern-oesterreich/pilgerwege/wolfgangweg.php [15.02.2017]
[42] Wallfahrts- und Verkehrsbüro Altötting, Brochure "Wegbegleiter zum Wolfgangweg", 4.
[43] Assmann 1976, 63.

pilgrimage, which contributed to the decreasing influx of pilgrims.[44] Although, the Falkensteinkirche, and the spring in the Quellkapelle (spring chapel) are still visited as places of pilgrimage today.

The actual route leads from the city of Regensburg across Thalmassing – Pfakofen – Mallersdorf - Pfaffenberg – Greilsberg – Essenbach – Landshut – Geisenhausen – Vilsbiburg – Neumarkt-St.Veit – Engfurt – Altötting – Burghausen in Germany to Austria across Gilgenberg – Mattinghofen – Straßwalchen – Mondsee to the church in St. Wolfgang (Fig.8.13).[45] The starting point of Regensburg and the end destination of St. Wolfgang are sites of importance in the veneration of Saint Wolfgang. The route follows memorial places, statues, and legendary records. The pathway from St. Gilgen across the Falkenstein to St. Wolfgang is the last stage of the pilgrim's route. Although likely, Saint Wolfgang would probably have taken another route, even if he had visited the Falkenstein at some point. As Ziller[46] states, it is more likely that Saint Wolfgang chose the older, shorter way, which led across the Eisenau, through the Törl and following down the Dittelbach (Fig.8.13). However, when the pilgrimage started, the pathway across the Falkenstein was already easily accessible. The differences between the historic pilgrimage route and the current pathway are mapped and discussed later. (see page 178)

The Church

The first construction associated with this pilgrimage on the Falkenstein, as far as we know, was built in 1626 after Dr. Johann Wilhelm Lueger (Pfleger[47] of Hüttenstein 1622-1638) had requested its construction earlier that same year in a letter to the consistory of the archdiocese of Salzburg.[48] This church – the Falkensteinkirche (Fig.3.2) - was built next to the rock, hiding a little cave, which is said to be the former shelter of Saint Wolfgang.[49]

It is unknown whether there had been an earlier construction; a report of Hein-

[44] Ziller 1969, 53; Ziller 1975, 101.

[45] comp. Pfarl 2013, Bogner 2013.

[46] Ziller 1969, 46.

[47] the term Pfleger describes "a man appointed by the prince to exercise the prince's lordship rights over his subject peasants in the lands of his fisc. [...] with the idea of care (Pflege) for the persons or properties involved. [...] The Pfleger's jurisdiction was institutionalized in his court, the Pfleggericht [...]" - O. Brunner et al., Land and Lordship: Structures of Governance in Medieval Austria. University of Pennsylvania Press, 1992, 366-367.

[48] Filzwieser et al. 2016, 202. Filzwieser 2011, 8.

[49] Watteck, 1972, 43; Zinnhobler 1975, 63.; alternatively, it is mentioned that this cave respective to the tunnel in the rock was the one where devil fled after threatening St. Wolfgang in Ziller 1969, 499.

rich von Zedlitz from 1493 still mentions a cave but no construction.[50] A second argument against a prior construction is from Roland Filzwieser, who argues that the background of a woodcut from 1515 – displaying the scene of the legend of St. Wolfgang when he is arousing the spring at Falkenstein – shows a rock face with a ladder leading to a cave and no church (Fig.3.2). However, this is an illogical assumption, as the artist is depicting a scene from the time of Saint Wolfgang and not from 1515.

According to legend, the cave where Saint Wolfgang slept plays an important role in the pilgrim's tradition. The pilgrims used to crawl through the narrow opening into the cave in order to be absolved from sins, beg for mercy, and be healed of illness. This pilgrim's tradition of the "Schliefsteine"[51] is also known from other places where pilgrims crawl through crevices.

The church is double-naved with a small ridge turret in the west. The choir is separated by bars. Behind these bars, there is the altar, decorated with a Baroque wooden retable.[52] It has two windows shaped like segmental arches in the north and a small window connecting the choir with the cave. A stairway built of stone leads from the nave to the cave. There is a bell installed in the small tower.[53]

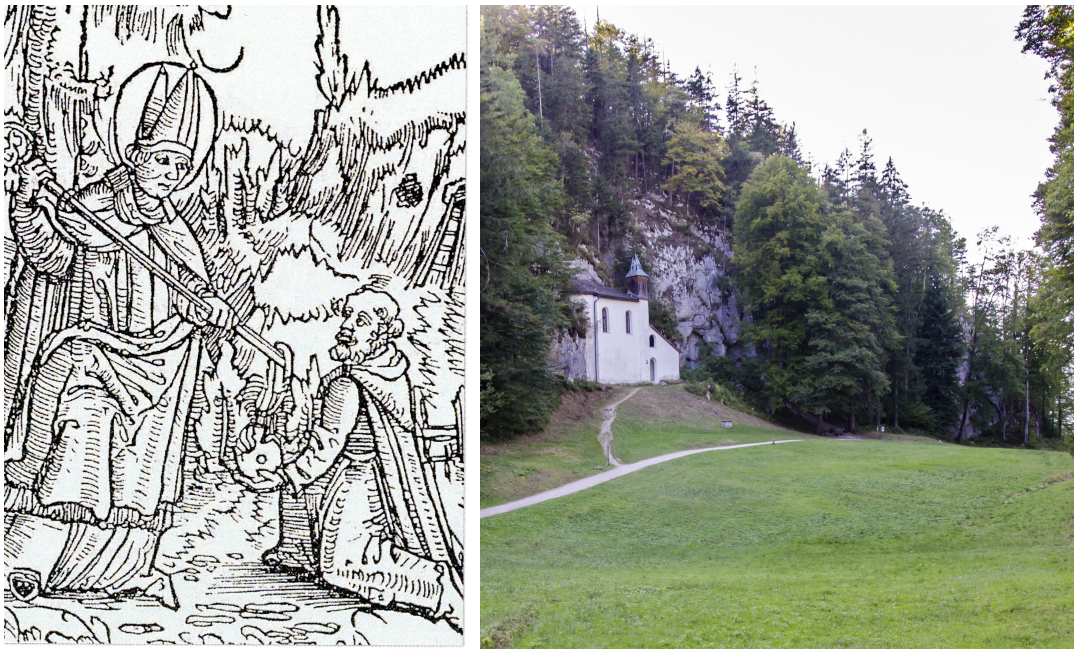

Fig. 3.2: left: Saint Wolfgang arousing the spring at the Falkenstein. Woodcut by Johannes Weyssenburger in 1515; right: The Falkeinsteinkirche on the clearing at the Falkenstein.[54]

[50]Filzwieser et al. 2016, 201.
[51]http://www.salzburg.com/wiki/index.php/Schliefstein [21.11.2018].
[52]Johannes Neuhardt, St. Gilgen am Abersee. Salzburg, p.14-15, 1982.
[53]Ziller 1969, 49.
[54]left:Bleibrunner 1967, 67, right:© Lisa Aldrian.

In 1667, some works were done at the Falkenstein church. This included facilities for praying which were installed, and shelters that were erected. The location of those is not specified.[55] The church itself was renovated for the first time in 1692.[56] In the time of one of the hermits, Nikolas Kaltenhauser (1720-1767), different renovation works were performed at the chapel, and the new Quellkapelle was constructed. For 1762 there is a record of the tower of the church being renewed.[57]

There is a record of a request from May 8th of 1798 for a renewal of the stairs, the wall next to the stairs, and the roof above the stairs. These repair works were either not allotted or not done properly, as there is another record from 1803 stating that the roof and shutters were rotting. The repairs then seem to have been done without permission as there is a record of a request for a subsequent assumption of costs written in 1804.[58]

The next records from 1872 and 1887 also requested subsequent reimbursements of expenses for repair works. A new roof was requested on July 16th of 1891, stating that a bad impression of the clergy might be obtained by pilgrims.[59] More recent restorations are documented for 1923, 1937, 1958[60] and 1993[61].

Pilgrims visiting the church ring the bell as it is said to fulfill wishes. The bell was cast in 1662, modified in 1740, and renewed in 1765. During World War I, it was transferred to the church in St. Gilgen in exchange since the ones there had to be handed in for their metal.

After World War II, the bell was stolen and shattered. The remains of the bell were discovered later, and a new one was cast from the remaining metal. Since 1960, the bell has been reinstalled in the church at Falkenstein.[62]

The church had been well attended by pilgrims, and the donations they made were left in an offertory box. However, due to recurring thievery and the need for maintenance of the church, the permanent presence of a caretaker was needed, and therefore in 1659, a hermitage was built.[63] The church has been maintained until today and is still a popular pilgrimage and hiking destination.

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[55] Ziller 1969, 51.
[56] http://www.kirchen.net/pfarre-stgilgen/kirchen-und-kapellen/falkenstein/ [06.11.2019], Ziller 1969, 50.
[57] Ziller 1969, 52 - 53.
[58] Filzwieser 2011, 18-19; AES, 10/36.
[59] Filzwieser 2011, 22-23; AES, 10/36.
[60] http://www.kirchen.net/pfarre-stgilgen/kirchen-und-kapellen/falkenstein/[02.03.2017].
[61] Personal communication with Augustin Kloiber.
[62] http://www.kirchen.net/pfarrverband-salzkammergut/page.asp?id=15054.
[63] Filzwieser 2011, 9-10; AES 10/36.

The hermits and the hermitage

The existence of the hermitage is documented in historical and recent bibliographies. However, the focus of these records lay primarily on the chapel and the hermits[64] or on general facts about hermitage and eremitism in this region[65], while mentions of the hermitage itself lack further descriptions. The hermitage was built in 1659 after a request of lay brother Adam Khimit to live there as an anchorite and build a housing structure from his own money. He was given permission to live there and therefore became the first anchorite of Salzburg. Twelve hermits successively took care of the Falkensteinkapelle and the pilgrims between 1659 and 1812.[66] Reports, letters, documents, and last wills document the succession of the hermits and the attendant circumstances in these 153 years.[67]

Name	Arrival	Departure	†
Adam Khimit	14.07.1659	-	† June 1672
Abraham Mayr	09.11.1672		?
Gregori Cäsar	09.11.1672	less than a year later	?
Matthias Knörzl	22.10. 1675	after 3 years	?
Wilhelm Buchberger	31.10.1678	-	† September 1684
Jacob Rieder	20.12.1684	~1715	†January 1717(elsewhere)
Michael Hueber	05.02.1700	-	† September 1731
Nikolaus Kaltenhauser	19.07.1720	-	† January 1767
Ludwig Priggl	28.07.1738	in 1762	?
Bonaventura Schmiedpichler	29.04.1763	-	† 1812
Antonius Thronner	02.05.1767	the same year	?
Seraphim Schmiedpichler	18.12.1767	-	† 1802

Table 3.1: Data of hermits living on the Falkenstein[68]

As already mentioned, the first hermit, Adam Khimit, came to the Falkenstein in 1659 and stayed there until he died in 1672. In the last year of his life, he was joined by Abraham Mayr, who took care of him and was accepted as the next hermit at the Falkenstein. In the same year, Gregorius Cäsar also came there, but he left less

[64] Ziller 1969, Watteck 1972.

[65] Joseph Dürlinger, Historisch-Statistisches Handbuch der Erzdiöcese Salzburg in ihren heutigen Grenzen. Erster Band: Ruraldecanate des Flachlandes (Salzburg 1862) 402; Ziller 1969.

[66] Filzwieser et al 2016, 202; Filzwieser 2011, 9-10; AES 10/36.

[67] a more profound analysis of these reports can be found in the chapter "Analysis of historical records and illustrations".

[68] Data from Ziller 1969, 51. The notation of the name Khimit appears in the forms Khimit, Kinert, Khimet, and Kimet. He himself signs with Khimit as well as Khimet.(Filzwieser 2011, 10)

than a year later. Neither the duration of the stay nor the fate of Abraham Mayr is known. In 1675, Michael Knörzl arrived and stayed as a single inhabitant for the following three years. When he left in 1678, Wilhelm Buchberger was allowed to take his place; he died there in 1684.[69]

Jacob Rieder followed Wilhelm Buchberger in 1684, and after requesting help, he was joined by Michael Hueber in 1700[70]. Rieder died in 1717 while he was away from the hermitage, and so Nikolaus Kaltenhauser took over in 1720.[71] Michael Hueber died in 1731[72]. In 1738, Ludwig Priggl moved to the Falkenstein but left in 1762 to live in another hermitage at the Sendelberg. He left one of the most interesting documents (see below). A year later, Johann Joseph Schmiedpichler was accepted as a secondary hermit with the name Brother Bonaventura to support Nikolas Kaltenhauser. Nikolas Kaltenhauser died in 1767; the documents on his inheritance mention his items listed by room.[73] In the lifetime of Brother Bonaventura, in 1767, Antonius Thronner moved in but left already in the same year. Afterward, Johann Gualbert Schmiedpichler, Brother Bonaventura's brother, moved in and called himself Brother Seraphim; he lived there until his death in 1802.[74]

The historical records of the end of the hermitage are not coherent. One source states that in 1808 there was a decision to close hermitages in Salzburg as in the rest of Austria, but it was delayed for the last Brother – Bonaventura Schmiedpichler – until his death in 1812 before actually closing it. Other documents state that in 1812 hermitages were legally banned, and the last Brother had to leave while the hermitage was left to fall into disrepair.[75] Years later, in 1831, Joseph Haim requested a place at the Falkenstein; however, his request was denied as authorities did not desire the re-establishment of the hermitage.[76]

The last known request of a brother wanting to live as a hermit at Falkenstein is from 1870. The request included the plan to build a new hermitage.[77] He received permission to build a new one but was recalled by his fraternity. It is not known if the construction works ever started. This marks the end of the history of hermits at the Falkenstein.[78]

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[69]Watteck, 43-59; Filzwieser et al 2016, 203; Filzwieser 2011, 12-13.
[70]Filzwieser 2011, 14.
[71]Filzwieser 2011, 15.
[72]Watteck, 43; Filzwieser 2011, 15; AES, 10/36.
[73]Filzwieser 2016, 202-203; Filzwieser 2011, 17; AES 10/36.
[74]Filzwieser 2011, 18.
[75]Ziller, 54. Filzwieser et al. 2016, 204-205; Filzwieser 2011, 20. (see also footnotes) comments more closely on the problem of quotations.
[76]Ziller 1969, 54; Filzwieser et al 2016, 205; Filzwieser 2011, 21; Aes 10/36.
[77]Ziller 1969, 54; Filzwieser 2011, 36.
[78]Ziller 1969, 54; Filzwieser et al, 2016, 205-206; Filzwieser 2011, 22.

Local transport network & the pilgrims' path

The region around the Wolfgangsee is interconnected via various routes apt for different means of transportation. The only overland connection from St. Gilgen to St. Wolfgang is the route above the Falkenstein. Otherwise, there is only the waterway across the Wolfgangsee.

Navigation on the lake was formerly performed by "Traunderln" or "Traunerl'. These are narrow box-shaped wooden boats without a keel and a lifted bow traditionally used in the Salzkammergut area. They were used to transport goods, for fishing, and transportation of passengers. It is steered with only one helm, similar to the Gondole in Venice.[79] During the florescence of the pilgrimage in the 15th to the 16th century, when the Falkenstein was one of the most important places of pilgrimage in Europe, "Traunerl" and "Plätten"[80] run between St. Gilgen, Fürberg, Strobl, Aigen and St. Wolfgang.[81]

In 1873 the first motorized ship began its service on the Wolfgangsee. The paddle steamer „Kaiser Franz Josef I.", named in honor of the then ruling monarch, has been navigating on the Wolfgangsee until now.[82]

The recent pilgrimage route is mostly only accessible by foot; walking slowly takes around four hours from St. Gilgen to St. Wolfgang. Partially navigation with cars is possible.

It was planned to make the Falkenstein accessible with a street and to create a direct connection from St. Wolfgang to the west in the fifties. Protests against the project inhibited the realization of this plan.[83] Today, the Falkenstein is accessible by car with restrictions. A further connection to St. Wolfgang does not exist. The course of the historical pilgrims' path was analyzed with ALS Data and a field survey. (see 178)

[79] http://www.traunerlfahren.at/

[80] The bigger equivalent of the small „Traunerl"

[81] http://www.traunerlfahren.at/ueber-uns.html[21.07.2015], Ziller 1975, 100.

[82] Geschichte und Geschichten von Wolfgangsee Schifffahrt und Schafberg Bahn 1873–2013, Broschüre zum Jubiläum 2013. Salzkammergutbahn GmbH, 6.

[83] Pfarl 2013, 22.

Chapter 4

Research project

4.1 Geophysical archaeological prospection surveys 2009 and 2011

Applied methods

The basis of the excavation was a geophysical prospection survey using a ground-penetrating radar (GPR) system conducted in 2009. Ground-penetrating radar is an active near-surface geophysical prospection method that uses electromagnetic pulses transmitted into the subsurface for imaging. An electromagnetic pulse with a certain mean frequency is transmitted into the subsurface and reflected at objects or interfaces of media with different physical properties, such as caused by anthropogenic or natural layers. The reflected signal is recorded as time series (consisting of several hundreds of samples with varying amplitude) by a receiver antenna, permitting the inference of conclusions on the physical properties of buried layers and structures. The most important physical parameter in this context is the variability of the dielectric permittivity of the soil. It affects the velocity of the GPR pulse in the ground and the strength of reflections occurring at interfaces between two different materials.[84] Furthermore, depending on the physical properties of the layer, a varying amount of the emitted electromagnetic GPR pulse is absorbed and the frequency content of the pulse altered. This is partly due to the electrical conductivity of the transmitted medium, as well as the distance covered due to geometrical spreading. Apart from the inhomogeneity of the soil, the recorded response is further influenced by the properties of the GPR system used.[85]

The vertical resolution of the GPR imaging method, i.e., the minimum vertical distance between two reflectors that still can be separated, primarily depends on the length of the transmitted GPR pulse signal and the relative dielectric permittivity. The electromagnetic GPR wave itself is determined by its frequency and velocity of the ground material. The vertical resolution is proportional to the frequency of the transmitted GPR pulse - the higher the frequency, the higher the vertical resolution.

[84] Leckebusch 2003, 214.
[85] Leckebusch 2003, 215.

In practice, a resolution of reflectors with a vertical distance equal to or larger than half the GPR pulse wavelength is achievable.
The horizontal GPR imaging resolution depends on the size and shape of the GPR antenna, the frequency of the transmitted and received GPR signal, the distance between the GPR reflector and the GPR antenna, and, in the case of 2.5D or 3D GPR imaging, of the horizontal in-line and cross-line spacing of the recorded GPR traces. Horizontal imaging resolution decreases with increasing depth.[86]
The GPR method can detect smaller structures than the horizontal resolution at a given depth, while it will image them corresponding to the horizontal imaging resolution. The penetration depth of the GPR pulse is inversely proportional to its frequency, i.e., for greater penetration depths, lower frequencies are required; GPR antennae with higher frequency spectra are used to obtain a higher resulting image resolution.[87]
The GPR measurements at Falkenstein were conducted manually with a PulseEKKO® PRO system of Sensors & Software mounted on a SmartCart (see Fig.4.1).
The system consists of three main components: The Digital Video Logger (DVL) control unit, the transmitter (Tx) and the receiver (Rx) antenna, and an odometer triggering the GPR measurements. The system is powered by a 12V battery. A 500 MHz Tx-Rx antenna set was used for the measurements. A 0.25 m cross-line and an in-line spacing of 0.02 - 0.05 meters were chosen. The surveyed area covered a total of 1,800 m^2 on both sides of the pathway below the chapel. The corner points of the surveyed area were measured with a Leica TPS 1200 total station to permit the georeferencing of relevant archaeological structures in the subsequent analysis of the GPR data.
Additional geophysical prospection surveys were conducted with the same system in parallel to the archaeological excavations in 2011. The survey covered the area to the east of the current path, with a total size of 1,200 m^2 (Fig.4.2).
The raw GPR sections do not show an easily understandable image of the subsurface, which is why they need to be processed first. The most common form of display of GPR data in archaeological prospection is so-called time- or depth-slices, GPR amplitude maps, or C-scans, which all correspond horizontal slices cut through a 3D GPR data volume parallel to the surface (Fig.4.3).[88]
In this case, the processing and visualization of the GPR data were realized with the

[86] I. Trinks, Bearbeitung und Visualisierung 4-dimensionaler Bodenradar-Daten, Diplomarbeit, Christian-Albrechts Universit, Kiel, 1999, 19-21. https://www.researchgate.net/publication/261403052_Bearbeitung_und_Visualisierung_4-dimensionaler_Bodenradar-Daten.
[87] Knapp 1990, Sheriff 1995, Møller & Vosgerau 2006, Neal 2004, Neubauer et al. 2002, 139.
[88] GPR-data ©LBI Archpro; Orthophoto: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, Swisstopo, and the GIS User Community.

Fig. 4.1: A 500 MHz Tx-Rx antenna from PulseEKKO® PRO system of Sensors & Software mounted on a SmartCart.

APRadar software developed by ZAMG Archeo Prospections® and the LBI ArchPro, which automatically performs necessary pre-processing of data and calculates time- or depth-slices, which were used as a basis for the subsequent archaeological interpretation.

4.2 Interpretation of GPR-data

The analysis of the data obtained by the GPR survey was carried out based on the 10 cm and 20 cm depth slices from 0-100 cm depth, creating interpretative maps for every 20 centimeters (Fig.4.3, 4.4). Relevant features were mapped using polygons and lines in ArcMap. An initial interpretation was done by Wolfgang Neubauer, the following interpretation was done in the course of this thesis.
In the upper 20 centimeters (Fig.4.3), an elongated reflective linear feature running from northwest to southeast can be easily attributed to the current path. In the northwestern corner of the prospected area, rock or loose material is visible as a reflective feature with a half ellipsoid shape. A little to the southeast, a distinctive

Fig. 4.2: Areas measured with GPR in 2009 and 2011 on the Falkenstein with the excavation areas 2011 (blue) and 2012 (orange).

reflective feature was interpreted as a stone layer. In the far south of this feature, another stone layer of a semicircular shape, which is getting more visible in the underlying depth slices, was distinguished and interpreted as a well. Further south, the area of the hermitage was identified. To the far west, there is a patch of reflective material interspersed with absorbing material, which was interpreted as debris material. The first traces of linear reflective features could be distinguished to the right of it. Only some iron parts and single stones were visible to the east of the current path.

The rock or loose material stays the same when getting deeper into the 20-40 cm depth slice (Fig. 4.4). While the circular feature interpreted as a well becomes more visible, it appears as a reflecting feature with absorbing material in the middle beginning at 20 centimeters. The surrounding material here was reinterpreted as an older pathway. Another east-northeast - west-southwest oriented linear reflecting feature appears while reflecting linear objects in the south disappear in favor of debris material. Some stones are clearly distinguishable in this debris material. To

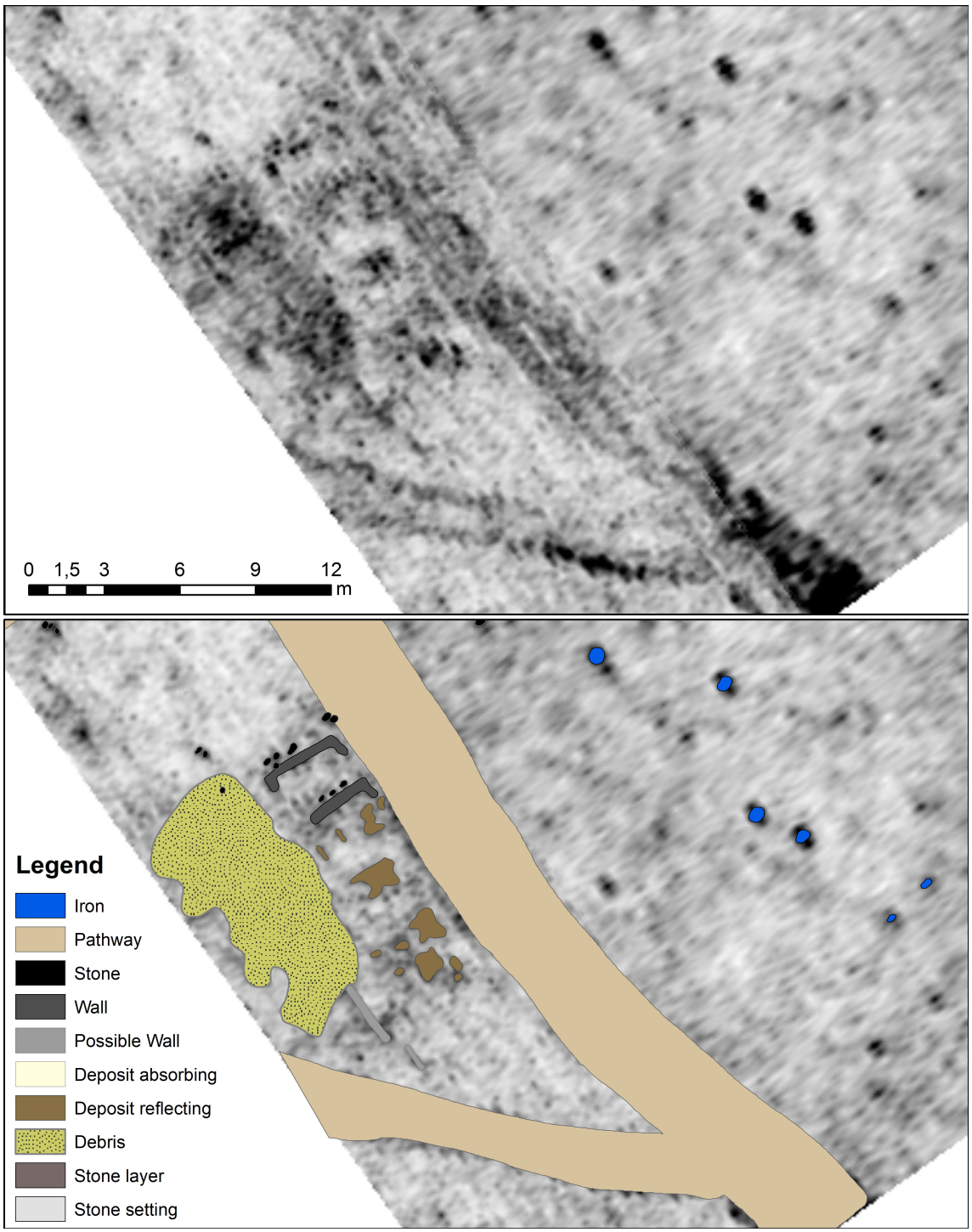


Fig. 4.3: Depth slice (top) and interpretation map (bottom) from 0-20 cm.

the southeast of the recent pathway, a curved reflecting feature was interpreted as debris.

This feature appears as a linear feature in the underlying depth slices (40-100 cm) and is consequently interpreted as a foundation. The foundations in the west of the pathway align to a rectangular feature beginning at the depth slice 40-60 cm (Fig.4.5). An alignment of linear foundations appears quadrangular to its south, whereas an irregular-shaped reflection is located to its east. The foundations are surrounded by debris material. The circular feature to the north is only visible in the 10cm depth slices but not in the summed 40-60 cm depth slice.

The 60-80 cm depth slice (Fig.4.6) shows more linear features. In the north, above the previous rectangular feature, another feature with the same orientation is already visible. In the west of the rectangular feature, which is interpreted as a room, there is a small quadrangular foundation, interpreted as an oven. The minor quadrangular feature in the south is no longer visible as such. Still, its northern delimitation prolongs to the west, forming another foundation wall delimited by yet another north-northwest - a south-southeast-oriented one. To the south, another linear feature is interpreted as a foundation; a reflecting feature with the shape of a semicircle is located between the connected foundations and the one standing alone in the south. All the foundations are surrounded by debris and some stones, which are distinguished in the debris material. There is an irregular-shaped reflective patch interpreted as a stone layer to the north. The elongated feature is still visible to the east of the current path.

The 80-100 cm depth slice (Fig.4.7), much like the above-lying depth slice, shows linear features which are parallel and perpendicular to each other. The interpretation was made differently by distinguishing single stones and not marking the whole linear feature as such. A linear foundation to the west is no longer visible; instead, some stones are between the two east-west oriented features running perpendicular to them. The stone layer to the north of the foundations appearing in the 60-80 cm depth slice is still visible, while the feature to the east of the current path appears shorter in this depth. However, other features start disappearing at this level, and nothing of the mentioned features is visible anymore at a depth of 180 cm.

The data obtained by the GPR survey led to the interpretation of building structures with stone foundations, which coincide very well with the historical record. Subsequently, the location of the hermitage, which previously could only be assumed by comparing historical drawings/images with the topography on the Falkenstein, could be fixed to an exact spot, and an evaluation of the state of preservation of the building was possible. The analysis of the GPR data was decisive for the placement of the excavation trenches in 2011 and 2012.

The radar images clearly show walls interpreted as three rooms and the quadran-

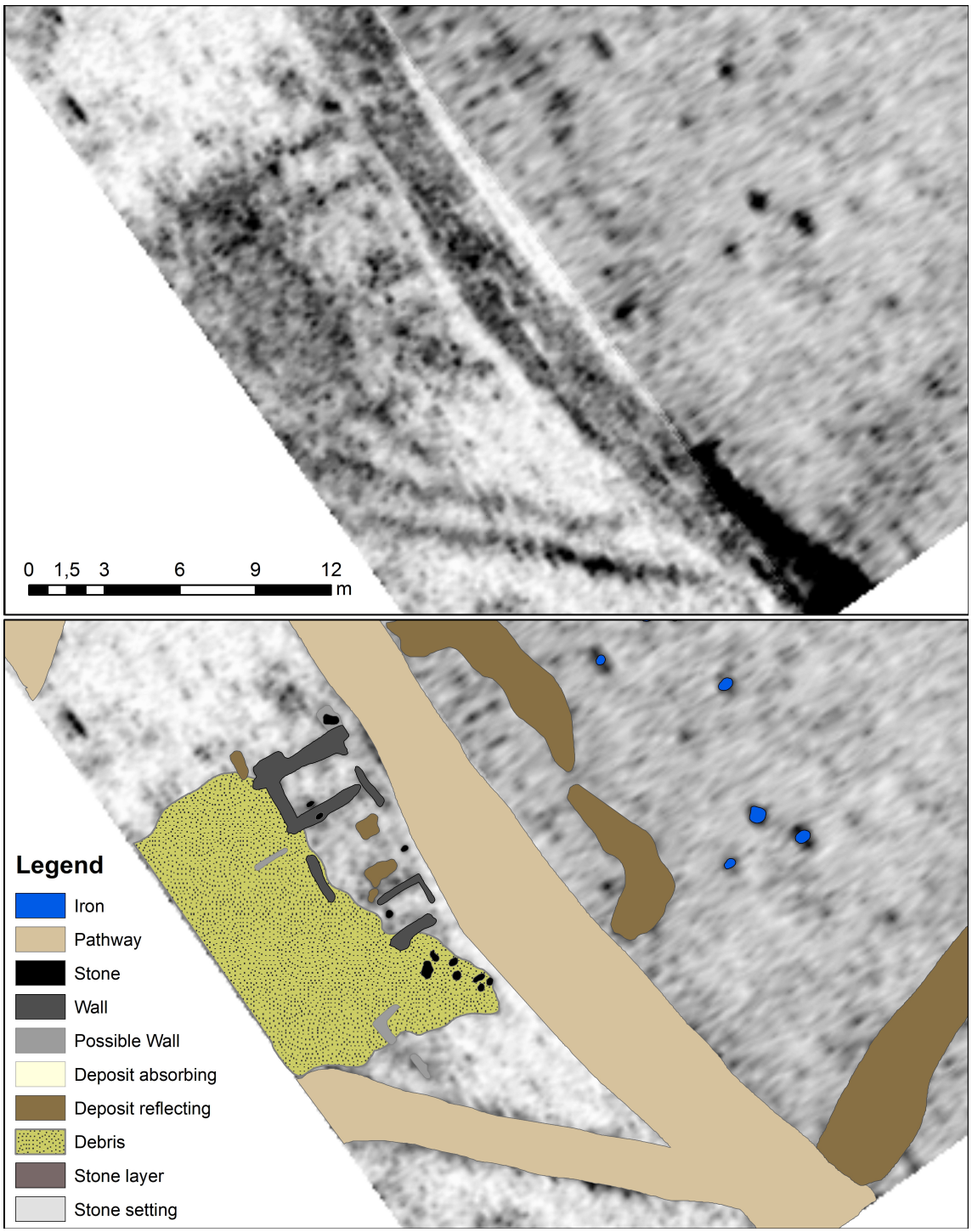


Fig. 4.4: Depth slice (top) and interpretation map (bottom) from 20-40 cm.

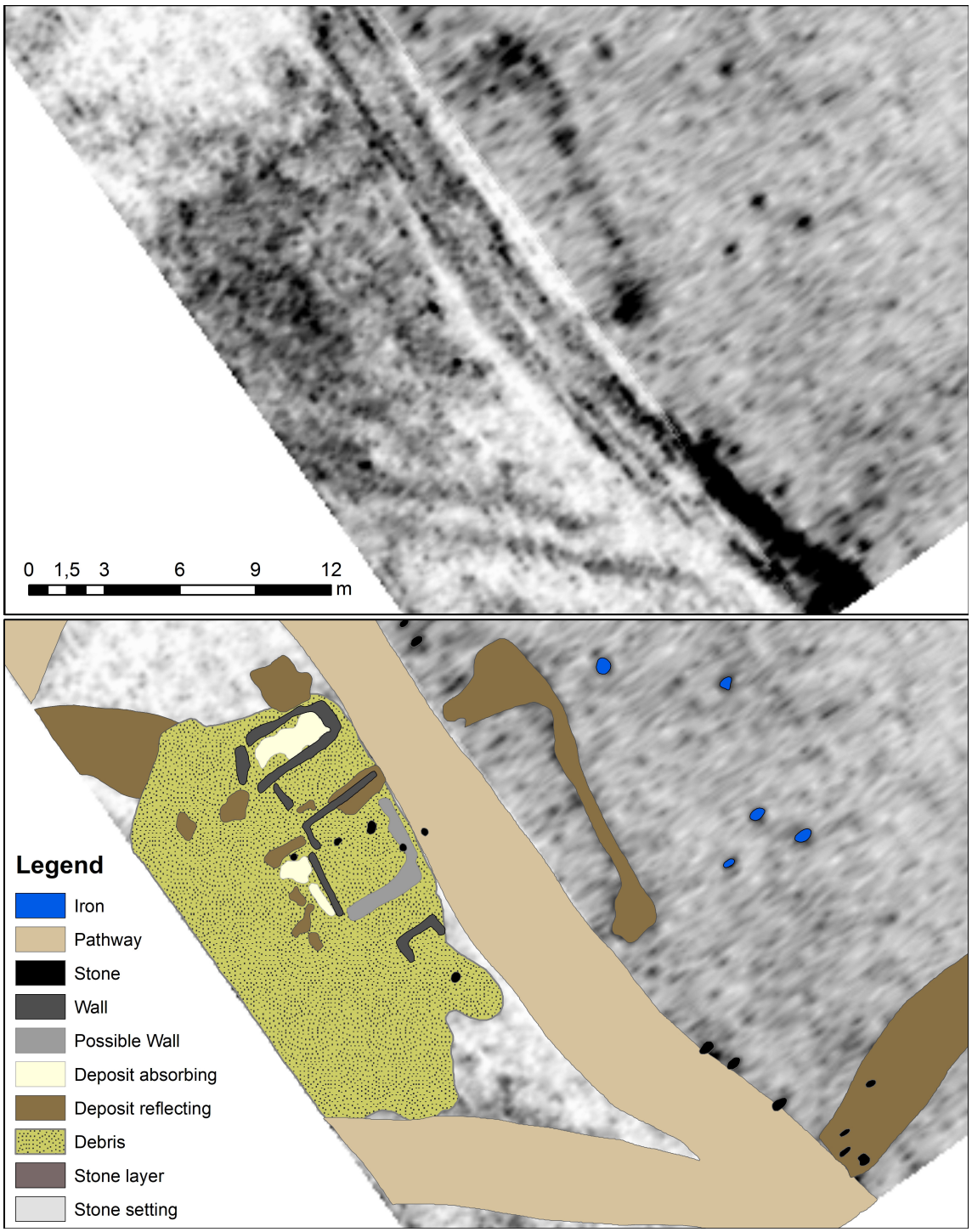


Fig. 4.5: Depth slice (top) and interpretation map (bottom) from 40-60 cm.

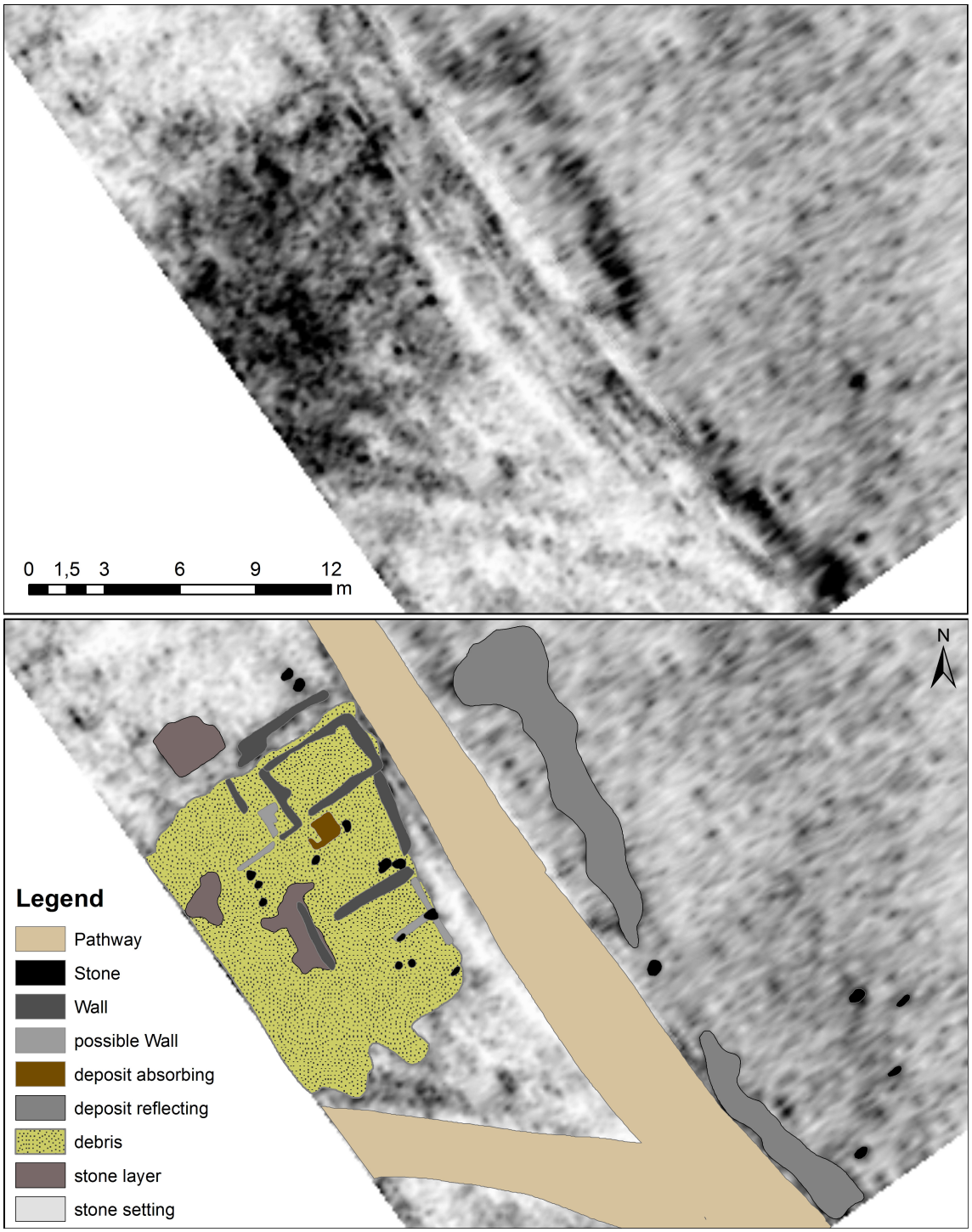


Fig. 4.6: Depth slice (top) and interpretation map (bottom) from 60-80 cm.

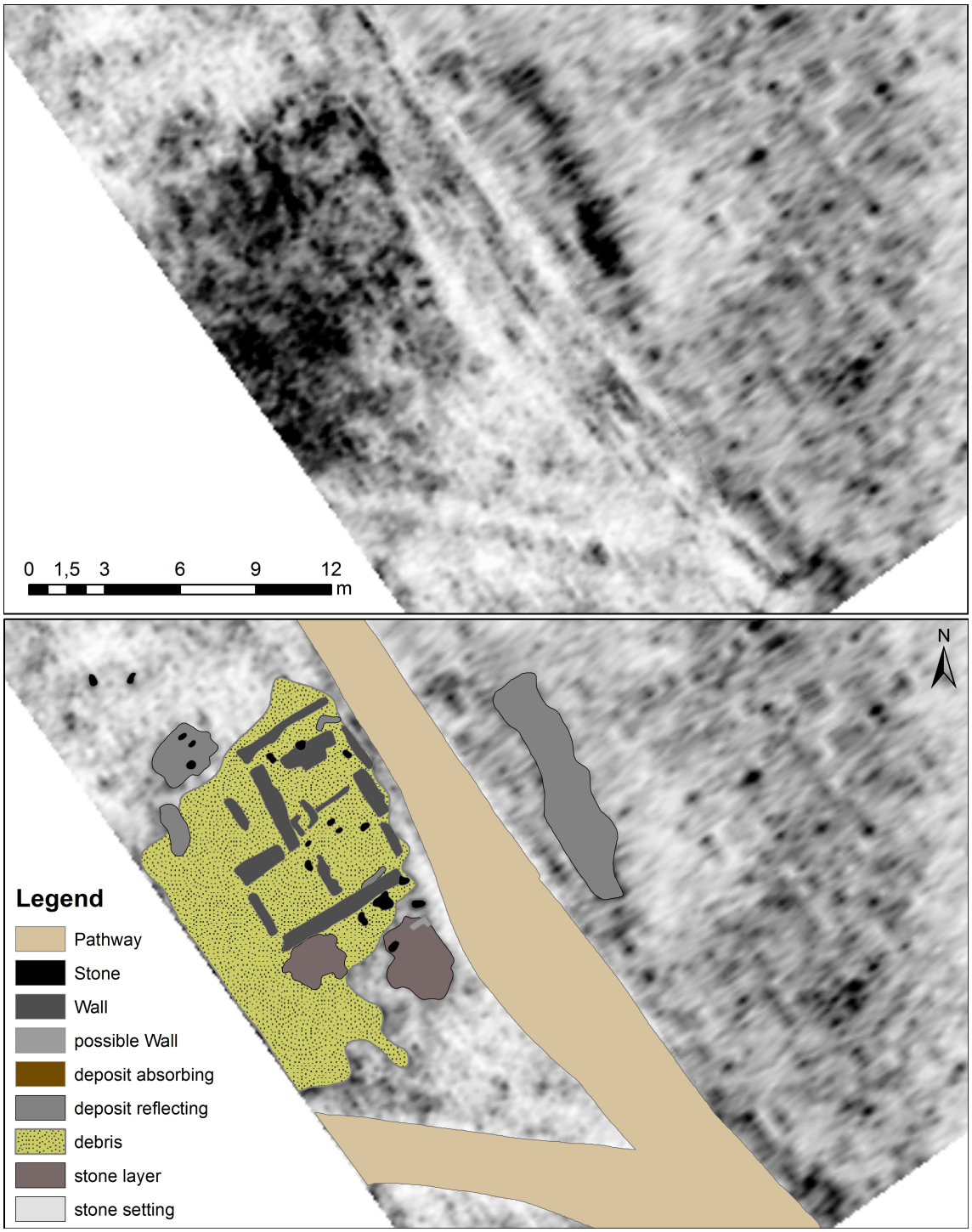


Fig. 4.7: Depth slice (top) and interpretation map (bottom) from 80-100 cm.

gular structure interpreted as an oven, and the pathway and numerous stone layers surrounded by a large amount of debris. The layout is very similar to the original pathway, which existed until the early years of the 20th century, as it went right beside the church, as proved by several drawings, pictures, and the Franciszäische Kataster. The radar images also show an elongate dark structure with orthogonal edges in the east of the path, which has to be caused by a structure of high/increased reflectivity and therefore was interpreted as a wall or stone layer.
The measurements of 2011 showed anomalies that were interpreted as basements of other buildings, which raise several interesting questions for future investigations.

4.3 Analysis of historical sources

Historical records

The existence of the hermitage has been mentioned in the historical and recent bibliography. For the most part, only its existence was stated, while there was a focus on the chapel and the hermits.[89] Other works deal with general facts about hermitage and eremitism in the region.[90] In 2011, the historian Roland Filzwieser performed research on written historical sources about the Falkenstein and illustrations of it, letters from the hermits themselves, and listings of their belongings which provide information about the building itself. These records were collected and summarized in 2011 as "Untersuchung der Quellenlage zu der Geschichte des Falkenstein am Wolfgangsee"[91]("Study of the existing sources about the history of the Falkenstein at the Wolfgangsee") which was partly published in an article in 2016[92]. The sources used were the "Archiv der Erzdiözese" (archive of the archdiocese) Salzburg St. Gilgen 10/36" (AES 10/36), the "Generalvisitationen" (general visitations) 11/77, "Visitationsbericht" (visitation report) Falkenstein of 1673 Folio 832, the AES "Kirchenrechnung" (church invoice) of St. Gilgen 24/98 and illustrations from the "Heimatkundliches Museum St. Gilgen" (Museum of local history St. Gilgen).

Interesting for the history of the building are references to the condition of the hermitage and modifications to the facilities and furniture, all of which give hints to the appearance of the hermitage in the past.

Historical records state that a first wooden building was constructed on the Falkenstein by the lay Brother Adam Khimits in 1659 or shortly after that. The written records evidence his request to build this housing for himself from his own money to live there as an anchorite (the first anchorite of Salzburg) and the permission granted to do so. The permission to build a hermitage and the permanent presence of Adam Khimits was probably also given because people robbed the offertory box at the Falkenstein periodically and maintenance for the church was needed.[93]

Unfortunately, the number of rooms, floors, and overall room layout of this building is unknown. However, a report from 1683, written at the time of the last years of Wilhelm Buchberger, gives the first insight of existing areas and facilities; it mentions a kitchen, garden, tile oven, chimney, and another room ("Cämerl") which

[89] Ziller 1969, Watteck 1972.

[90] Joseph Dürlinger, Historisch-Statistisches Handbuch der Erzdiöcese Salzburg in ihren heutigen Grenzen. Erster Band: Ruraldecanate des Flachlandes (Salzburg 1862) 402, Ziller 1969.

[91] This unpublished report is cited as Filzwieser 2011.

[92] Filzwieser et al. 2016.

[93] AES 10/36; Filzwieser 2011, 9-10., Ziller 1969, 51.

were decrepit at this time and in need of renovation. Also, a holy grave should get a new surrounding, and it was proposed to build a chapel attached to the hermitage[94], even though it is not clear at which time it had been built.
In 1701, Jacob Rieder states that he equipped the attached chapel with an altar[95], which is evidence that the erection of this chapel had happened between his arrival at the Falkenstein in 1684[96] and 1701. Additionally, he mentions that he had built a chapel near the forest in a letter.[97] When Michael Hueber died in 1731, an act was filed stating that the floor of the hermitage was once again rotting and contained the proposition to use part of the proceeds of the inheritance of Hueber (12 Gulden) repair works.[98] This proves that the floor in some portion of the hermitage was wooden, as was common at this time.

Ludwig Priggl leaves an interesting legacy regarding the question of how the ground plan of the hermitage might have looked. This legacy is a request from 1739 to build a shelter for himself, containing a plan of the suggested building, a list of construction materials, and an estimation of the expenses for these.[99] Ludwig Priggl also gives measurements for single planned rooms of the new hermitage. The measurements are given in “Schuech”, the Austrian foot, identical to the Greek "*pous metrios*", measuring 31.61 cm. Therefore, the information from his drawing gives us a small room of ca. 190 x 190 cm, a living room with ca. 221 x 316 cm, and a room, which is named “new house” with about 253 x 158 cm (Fig. 4.8).[100]
He received permission to build this house on the condition that he attach it to the already existing hermitage instead of building another one just a few steps away.[103]
The plan from 1739 for the new hermitage Ludwig Priggl proposed allows for an assumption of the layout of rooms. Supposedly, the plan shows the new hermitage he wanted to build, which was only approved as an attachment to the existing building and not as a separate one. As we know from GPR and excavation data, the drawing has a close resemblance to the actual existing building, but it is not clear if the approved annex was ever built.[104] Hübner, in his description of the Falkenstein

[94] Additionally, it mentions necessary repair works at the chapel and the path; AES, 10/36; Filzwieser 13-14; additionally, it mentions necessary repair works at the chapel and the path.
[95] AES, 10/36; Filzwieser 2011, 15.
[96] AES, 10/36; Watteck 1972, 55; Filzwieser 2011, 15.
[97] AES 10/36, Ziller 1969, 52. Nach Pfarrarchiv St. Gilgen, F 1, Filzwieser 2011, 15.
[98] AES, 10/36; Watteck, 55; Filzwieser 2011, 15.
[99] AES 10/36; Filzwieser 2011, 15-16.
[100] Ludwig Priggl 1739, in AES 10/36.
[101] Ludwig Priggl 1739, in AES 10/36.
[102] Ludwig Priggl 1739, in AES 10/36.
[103] AES 10/36; Filzwieser 2011, 17.
[104] Ziller 1969 (52) writes that a new hermitage was approved and that Ludwig Prückl moved in. He doesn't mention sources, though.

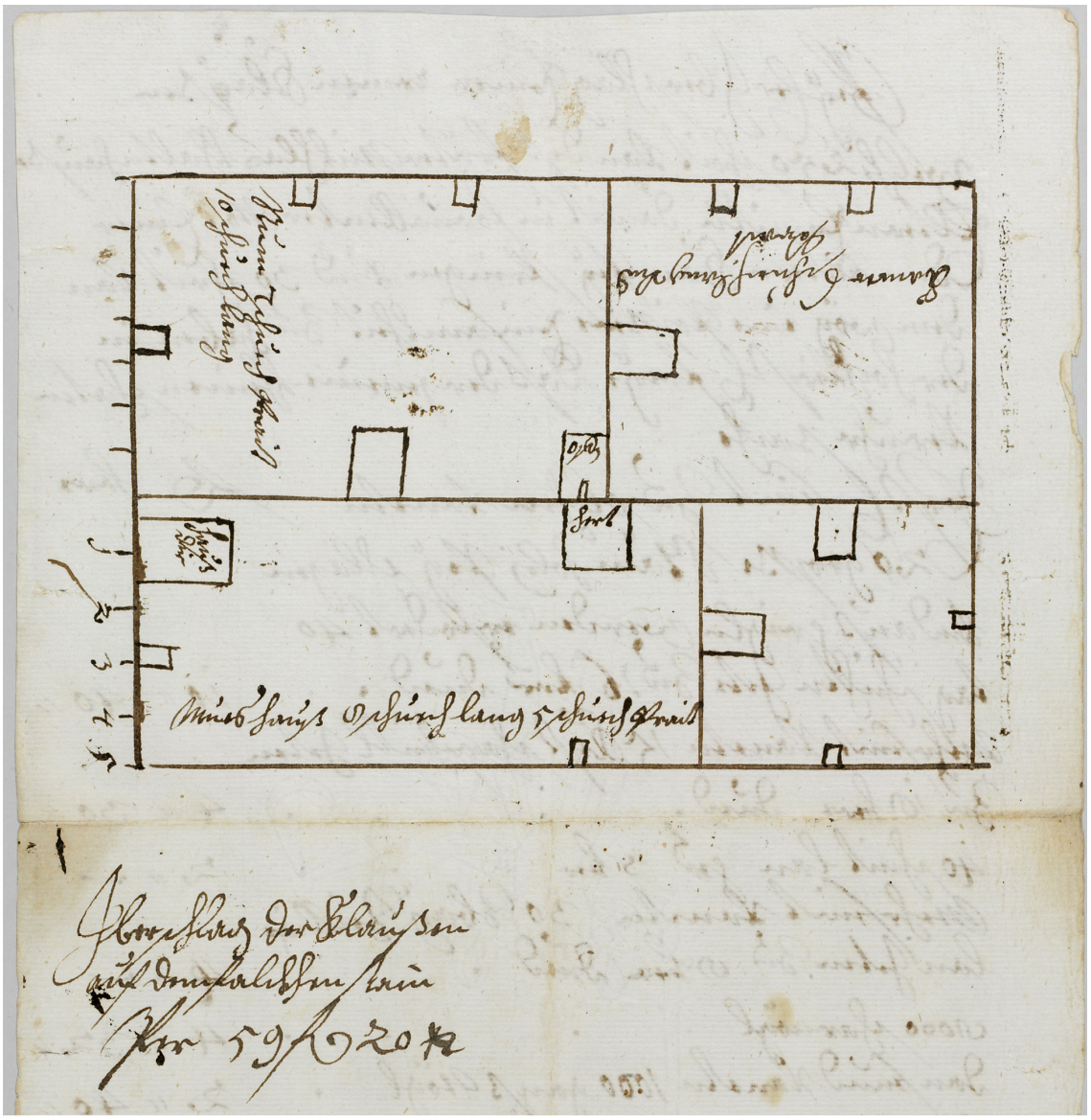


Fig. 4.8: Plan for a new building on the Falkenstein drawn by Ludwig Priggl[101].

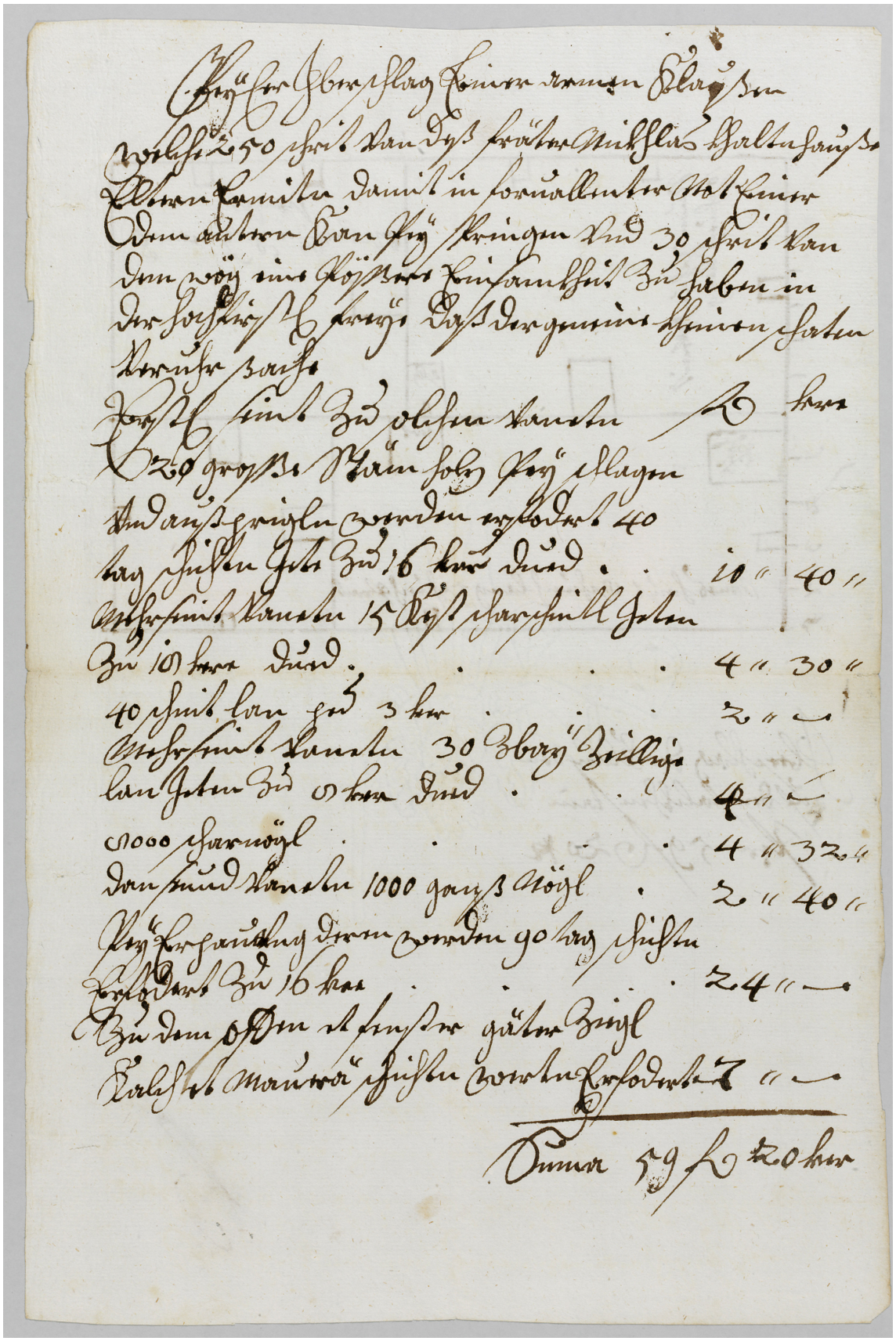


Fig. 4.9: List of materials and estimate of costs for the building[102].

in 1796, only mentions one building[105], which suggests that a second building had never been built. Also, the measurements noted by Ludwig Priggl do not correspond to the measurements of the rooms excavated. Starting from the simple assumption that a hermitage only needs a functional and simple layout with rooms for a simple life as a hermit, it is supposed that even before the remodeling, its appearance was similar[106].

Additionally, the estate of Kaltenhauser from 1767 mentions his items listed by room[107] and therefore presents a list of actually existing rooms in the first hermitage, which should have been present after completion of repairs that Buchberger requested in 1683. Supposedly, these rooms have been the same since their beginning. The estate of Kaltenhauser lists "Stübl" (Living room), "Camerl" (bedroom), "Kuchl" (kitchen), "Kamerl unterm Dach" (room under the roof) and another "Kämerl"[108]. In 1767, Brother Bonaventura mentioned that the hermitage was molded and needed to be restored. The description of Hübner from 1796 describes a "well-constructed hermitage", where two hermits lived in "idleness".[109] The last request of a Brother wanting to live as a hermit at the Falkenstein is from 1870 and included a plan to build a new hermitage. Most probably, the old hermitage was decayed in 1870, 57 years after the last recorded inhabitation.[110] He received permission to build a new one but was recalled by his fraternity before finishing it. It is not known how far the construction works were done at this time or if they even started.[111]

Historical illustrations

Various illustrations exist from the 19th century of the clearing at the Falkenstein with its chapel and hermitage. In addition to the written record described above, it will be used to reconstruct the scene of the Falkenstein at various points in time.
The illustrations depict the hermitage in different ways. These differences may be found in shape, orientation, size, detail, and characteristics. As they represent artistic expressions, it is supposed that the differences are to be attributed to the (personal) style used by the respective artist.
A colored engraving by C.A. Czichna dating to around 1800 shows a two-storied stone building (Fig. 4.10). It could also depict a building covered with wooden

[105]Hübner 1796, 280.
[106]Filzwieser 2011, 24.
[107]AES 10/36; Filzwieser 2011, 17.
[108]Filzwieser 2011, 24.
[109]Hübner 1796, 280.
[110]Ziller 1969, 54.
[111]Ziller 1969, 54; Filzwieser 2011, 22.

shingles like the aquarelle by O. J. Lentner (Fig. 4.16), but the color, which is the same as in the stone church, suggests that it depicts a building made of stone. The orientation of the building is NW-SE[112]. This building still shows chapel and hermitage as one complex, but the chapel is structurally separated and is depicted as a narrower annex.

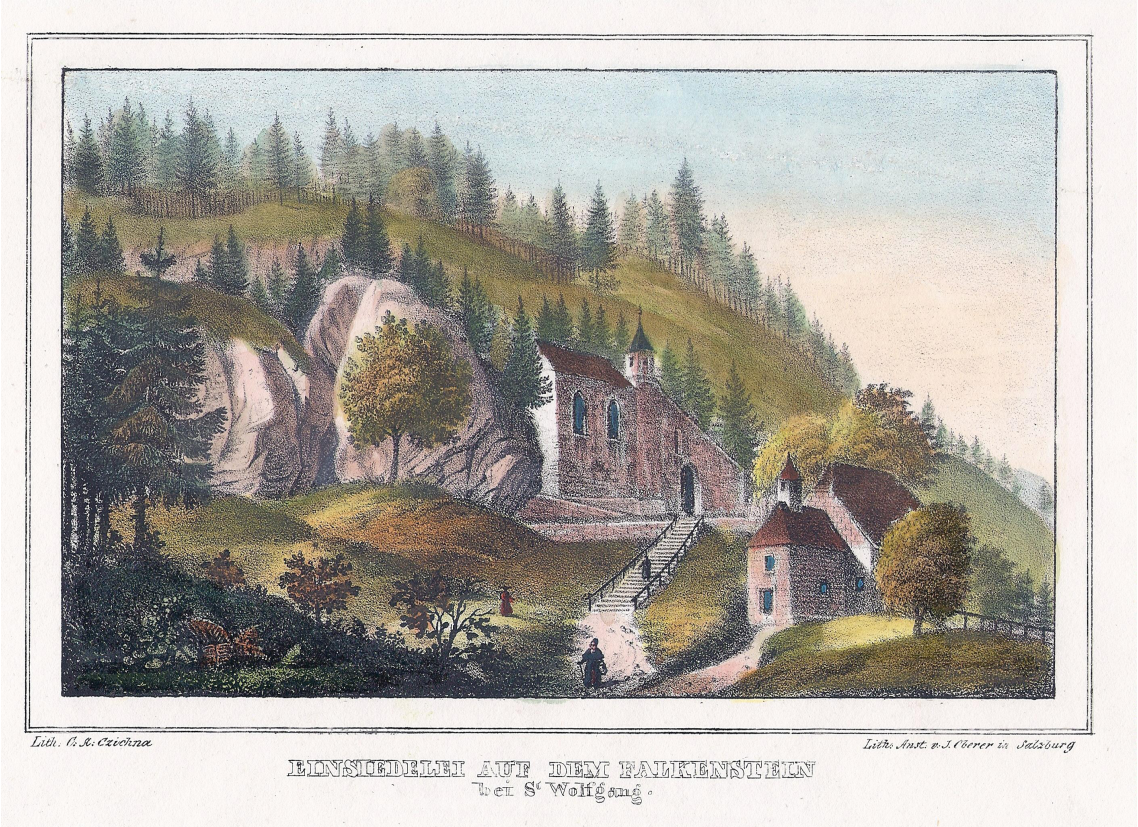


Fig. 4.10: Colored engraving by C.A. Czichna dating around 1800.

Another depiction from an unknown artist from around 1800 seems to be showing a wooden building (Fig. 4.11). The hermitage is depicted from the north (or NNO). The two-storied building is oriented NNW-SSE. The relationship of the chapel beneath the visible tower to the main building cannot be seen from this perspective.
An oil painting in the Quellkapelle by Wolfgang Spieß from the second quarter of the 18th century shows an NW-SE-oriented building with two stories and a possible attic (Fig. 4.12). A tower of the supposed chapel is visible at the SW-end. The painting shows the clearing from the northeast – therefore, it is impossible to make a statement about the chapel's constructional relation and the hermitage's main building.
The Franciszäische Kataster of 1829 shows two buildings – the Falkensteinkapelle as a stone building in pink and a wooden building, the hermitage, in yellow (Fig.

[112]For reasons of comparison of the orientation it is always assumed that the chapel is depicted in its correct NW-SE orientation.

Fig. 4.11: The chapel and the hermitage on the Falkenstein near St. Wolfgang, drawing from around 1800.

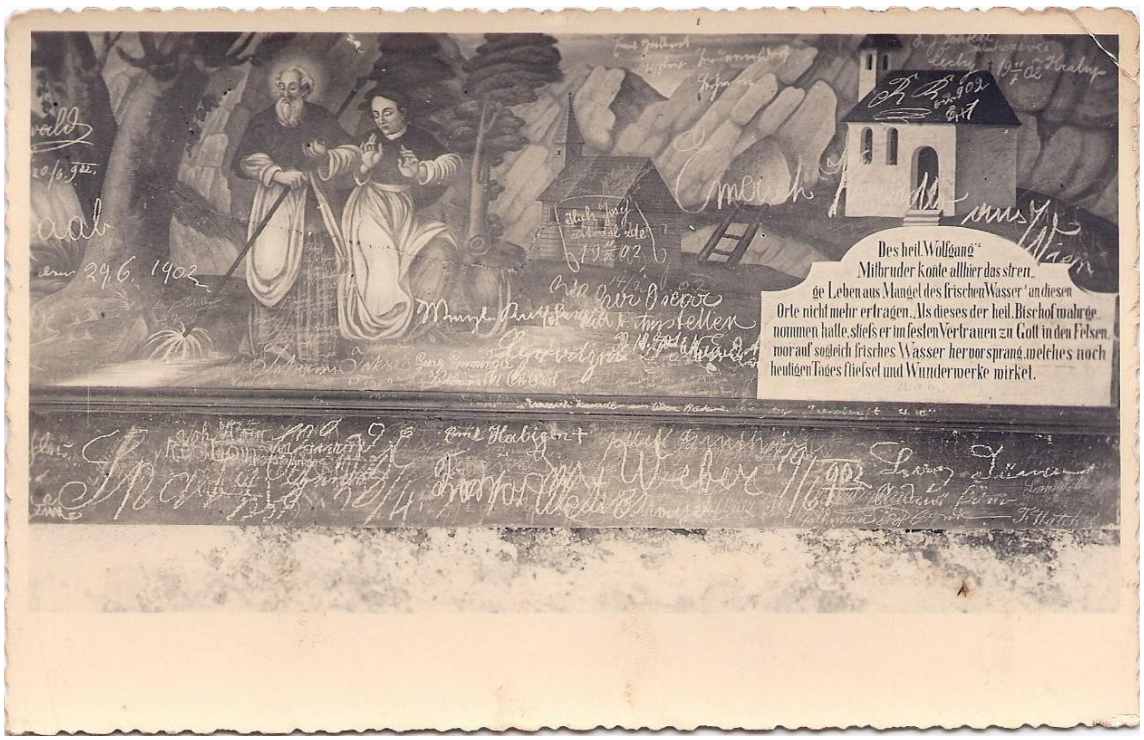


Fig. 4.12: Oil painting in the Quellkapelle by Wolfgang Spieß from the second quarter of the 18th century.

4.13).[113]

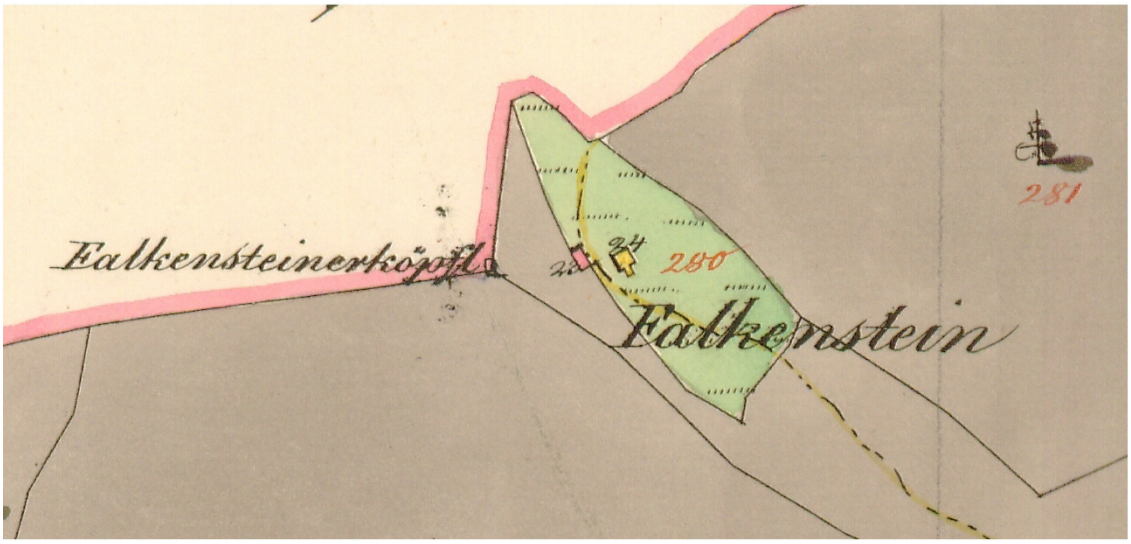


Fig. 4.13: Franziszäischer Kataster 1829, St. Gilgen / Ried Blatt II. Salzburger Landesarchiv.

Another engraving, done by Ignaz von Rode (1819-1859) after a drawing of Josef Hafner (1799-1891) from, at the latest, 1835 – again shows an NNW-SSO oriented wooden building with two stories, where the northern part resembling a chapel and the hermitage form an entity (Fig. 4.14).
A drawing from 1832 again shows a two-storied NNW-SSE-oriented wooden building. The chapel is an annex to the main building, being narrower and presenting a tower (Fig. 4.15).
A painting from 1864 shows a two-storied wooden building (whereas here it looks like a one-storied building with an attic, while other depictions seem to be higher and might depict two stories and an attic) with an NW-SE orientation (Fig. 4.15).
An aquarelle by Otto Josef Lenter from 1868 shows a wooden building that contains two stories plus an attic (Fig. 4.16). The chapel is not visible as the painting shows it from the NE but must be a narrower annex. Additionally, regarding the cross on the top of the chapel, there is also one at the other end of the roof. The planks are oriented horizontally in the lower part and vertically at the side walls beneath the roof. An illustration from 1880, rather than showing an NW-SE or NNW-SSE-oriented building, like all the ones mentioned before, shows a tiny one-storied E-W oriented building. The chapel, in this case, is facing the church to its west (Fig. 4.17).
Only two of the described illustrations may be attributed to the utilization period of the building as a hermitage (Fig. 4.10, 4.11). These two, dating to around 1800,

[113]AES 10/36; Ziller 1969, 54.Filzwieser 2011, 21.

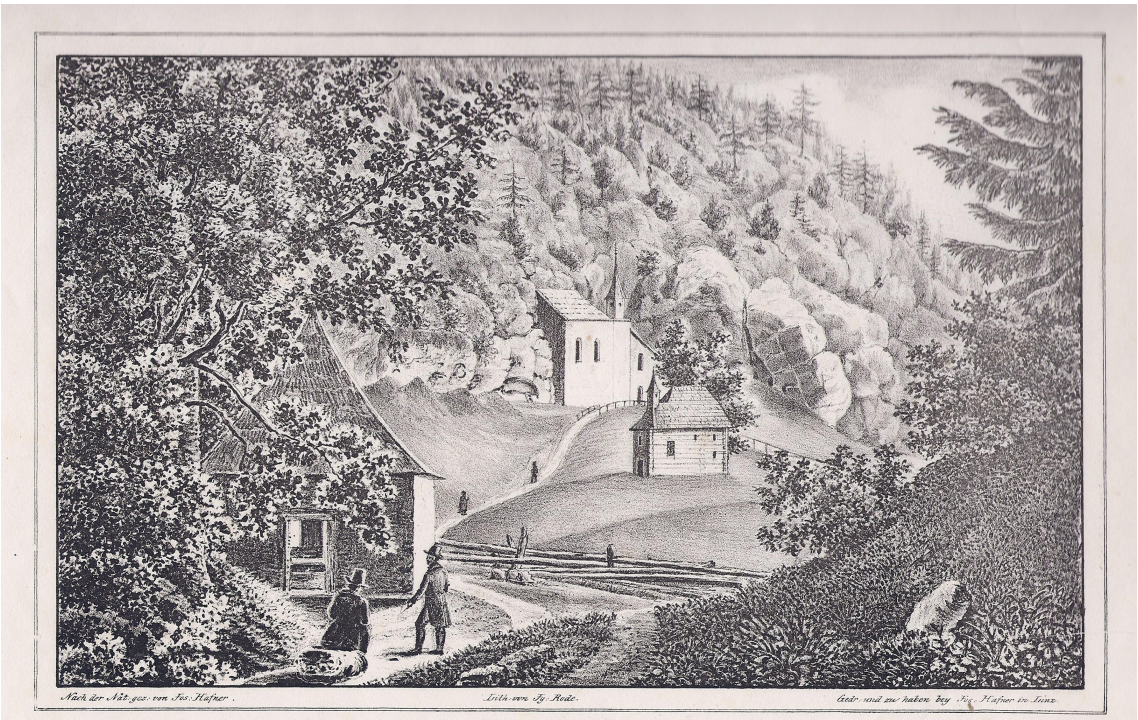


Fig. 4.14: The church and the hermitage on the Falkenstein near St.Wolfgang - engraving by Ignaz von Rode (1819-1859) after a drawing of Josef Hafner (1799-1891) from between 1829 and latest 1835.

Fig. 4.15: Left: Depiction of around 1832; right: Painting from 1864.

would show the hermitage in its last years of use. All the other illustrations were done much later and, considering the written records, show the building after its use as a hermitage. The earliest depictions from around 1800 refer to the hermitage as such in its title. This is also the case of the illustration from, at the latest, 1835

Fig. 4.16: Aquarelle by Otto Josef Lenter from 1868.

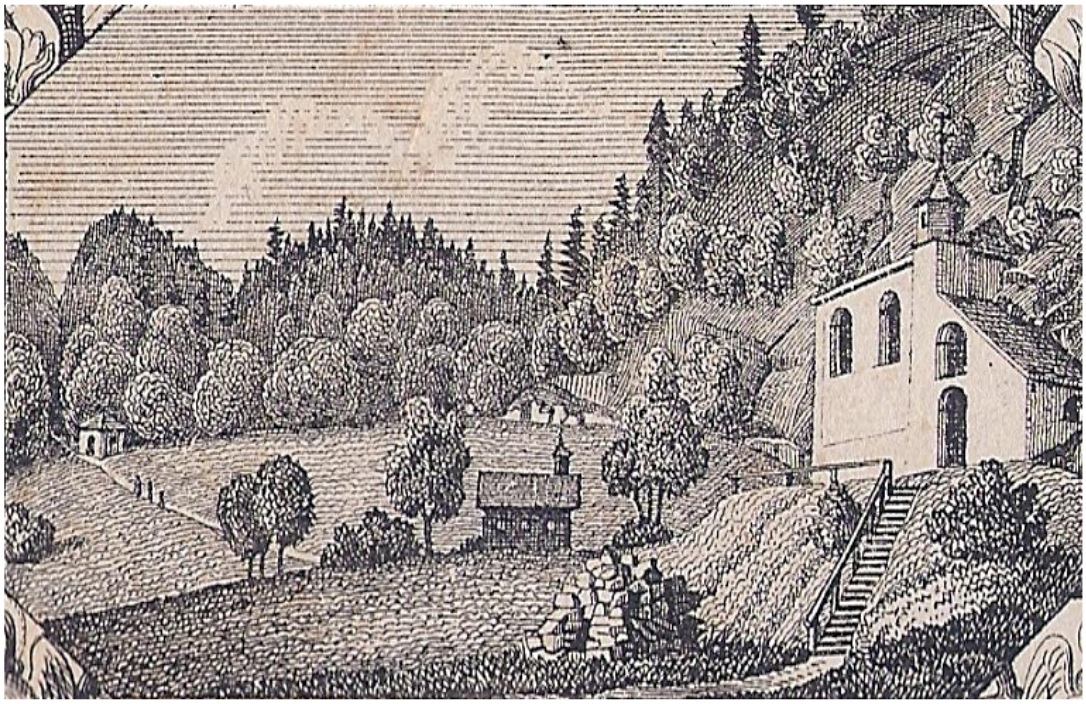


Fig. 4.17: Illustration of the Falkenstein by J.G. Kalchgruber from 1880.

by Ignaz von Rode. The two paintings done in the 1860s do not have a title but clearly show an intact building. The latest illustration from 1880 again refers to

a hermitage. It shows a much smaller building made of wood and with a different orientation. In front of the hermitage, a pile of stones - evidence of the pilgrimage tradition of carrying stones up to the Falkenstein in an act of penitence - is depicted. A postcard from around 1900 shows a photograph of the clearing taken from the northeast. It shows no building at the spot where the hermitage had been; instead, there is a small hay barn (Fig. 4.18).
On another postcard from around the same time (1902), a photo taken from the southeast shows the hay barn from the other side. This hay barn is still visible on a Postcard of 1920 (Fig. 4.19).
Comparing the illustration from 1880 with the more recent photos, the same orientation and size for the building with a tower referred to as hermitage, and the hay barn is visible. Around 1900, the hermitage had already vanished. It may be that even in 1880 when the illustration was done, the hermitage was already gone. The labeling as a hermitage might be attributed to the fact that the artist of the illustration knew that there had been a hermitage before and accordingly modified the existing hay barn to a hermitage to fit into the ecclesial illustration. The cadastral plan of 1829 shown above evidences an intact building at this time. The request of Haim in 1831 for a position as a hermit at the Falkenstein, which was denied as the re-establishment of the hermitage wasn't desired by authorities, backs the assumption of a building in good (modest) condition.[114]
The analysis of the historical sources will, later on, be compared and contrasted to the stratigraphic evidence. Some historical events should be visible in specific deposits and surfaces, and ideally, the historically-mentioned facts and the archaeological context thus can be correlated. This correlation will provide the basis for the periodization of the archaeological site.

[114]AES 10/36; Ziller 1969, 54.Filzwieser 2011, 21.

Fig. 4.18: Postcards from the 20th century. Above in the middle: a postcard from around 1900 showing the Falkensteinkirche and a small hay barn in the background; Below: from 1902 showing the scene from another angle.

Fig. 4.19: Postcard from 1920.

4.4 Stratigraphic excavations 2011 and 2012

Introduction

The excavation on the Falkenstein was carried out as a stratigraphic excavation according to the principles of archaeological stratigraphy first published by Edward C. Harris [115] and further developed by Wolfgang Neubauer. The approach chosen at the excavation furthermore aspired to record the situation in a way that makes it possible to reconstruct the stratification in its entirety, which is only possible with a full 3D record.

Stratigraphic Theory

Laws of stratification

As initially stated by E. C. Harris, every archaeological site is stratified and has its unique archaeological stratification.[116] Archaeological stratification is the sequence of deposits and surfaces created by human activities and/or natural processes. Archaeological stratigraphy refers to the study of archaeological stratification; It is defined as the description and interpretation of the stratification of an archaeological site. Stratigraphy studies the sequential relationships of deposits and surfaces and the interpretation of the origins of stratigraphic units. It, therefore, only exists through the interaction of the archaeologist with the existing stratification.[117] Archaeological stratigraphy is based on four laws; three are inherited from geology and adapted for archaeology; E. C. Harris proposed the fourth.[118]

1. The Law of superposition
2. The Law of original horizontality
3. The Law of original continuity
4. The Law of stratigraphic succession

Stratigraphic Units

Any archaeological stratification comprises two types of distinct entities: deposits and special surfaces referred to as stratigraphic units (SU). These two types of

[115] Harris, 1989².
[116] Harris 1974, 1989².
[117] Harris 1989, 155; Neubauer 2007b, 8.
[118] Harris 1989, 30-34.

entities reflect the material and immaterial aspects of stratification, which have to be recorded during the excavation process.[119]

A **deposit** is a three-dimensional body, which has been deposited onto an existing surface during a certain time interval. For the understanding of stratigraphic theory, it is important to note that every deposit consists of a material and its immaterial aspect: The entirety of the deposited material (including finds, stones, and soil) and the enveloping hull surrounding it in all directions as an immaterial three-dimensional boundary surface delimiting the extent of a deposit[120]. This three-dimensional volume is further separated into its top surface (TS), bottom surface (BS), and boundary polygon (BP). (see Fig.4.20) The importance of these surfaces is based on the fact that they restrict the deposits to be separated and are the only component of deposits that can be entirely recorded. The material aspect being excavated can be sampled and described but cannot be captured entirely.[121]

A **special surface** is an immaterial aspect of stratification. It represents a point in time or time interval associated with creating, using, or destroying a feature, structure, or entire site. Special surfaces are always the surface (or parts of it) of a single deposit or the sum of the surfaces of several deposits. They do not have a material aspect but are "units of stratification in their own right".[122] There are three categories of special surfaces: feature surfaces, phase surfaces, and period surfaces.

The importance of one category of special surfaces – named **feature surfaces**[123] – was first pointed out by E. C. Harris. Feature Interfaces are formed by the destruction or creation of stratification.[124]

The top and bottom surfaces of a feature surface are identical, but they differ in their aspect of time. The bottom surface of a feature (explained on page 51) surface represents the moment of creating it. The top surface represents the end of the feature as a feature[125]; the time between these two moments represents the use of the feature surface.

Phases and periods are defined intervals in archaeological stratigraphy. They exist as immaterial surfaces. **Phase surfaces** represent events, which were realized at the same time (time interval/phase). They are postulated upon structural relations, information obtained by the contents of deposits, and logical conclusions. A phase surface represents a site at a certain defined time interval at a local scale and

[119] Neubauer, 2007a.
[120] Neubauer, 2007a.
[121] Neubauer 2008, 33.
[122] Harris 1989, 44-4; Harris's statement about feature interfaces is here used for special surfaces in general.
[123] Commonly often referred to as (feature) interfaces.
[124] Harris 1989, 59-64.
[125] E.g., the end of a pit as a feature could be the moment when it is (partially) filled with material.

therefore is a discontinuous surface, limited to the extents of an excavation area.
Period surfaces are the sum of all the surfaces that are exposed at a certain defined time interval and form a common surface/ground level[126]. Although they represent a point in time on a global scale - individual surfaces adjoin each other and dissolve into a continuous surface spanning the whole world - period surfaces facilitate the correlation of different sites.
Periods are generally incorporated in the higher-level concept of time; phases are structured in relation to each other. A period may contain different phases; a period surface can be imagined like an invisible hull moving because of the different phases taking place, e.g., construction phases or different practices replacing each other. Phase surfaces and period surfaces also do have a TS and BS - they do not exist a priori but are defined by the researcher.
For documentation, it is necessary to separate the immaterial delimitation of a deposit into three elements (Fig.4.20).

1. The top surface of a deposit corresponds to the surface of a deposit that was exposed to the atmosphere after deposition. It has a three-dimensional boundary and has spatial and temporal attributes.

2. The boundary polygon is a discrete representation of the boundary line between the top surface and the bottom surface (see below) and corresponds to the superficially visible extent of the deposit.[127]

3. The bottom surface of a deposit corresponds to the part of a pre-existing surface that is covered by the deposit after deposition. Conceptually, it is in superposition to this pre-existing surface, representing a use period with a different time aspect than the overlying deposit and its bottom surface. It has a 3D boundary and has spatial and temporal attributes.[128]

The scan of the top surface of the deposit and the recording of its boundary polygon are obvious tasks. Still, the documentation of these two elements leaves a hole in the 3D model, which shows the indispensability of recording the bottom surface.
Consequently, for the complete three-dimensional documentation of a material stratigraphic unit (deposit), a minimum of three immaterial elements (top surface, boundary polygon, bottom surface) are necessary.[129] The introduction of those three immaterial elements is a relevant expansion of stratigraphic theory.

[126]Harris 1989, 66-68.
[127]Harris 1989, 50.
[128]Neubauer 2008, 33.
[129]Neubauer 2008, 33.

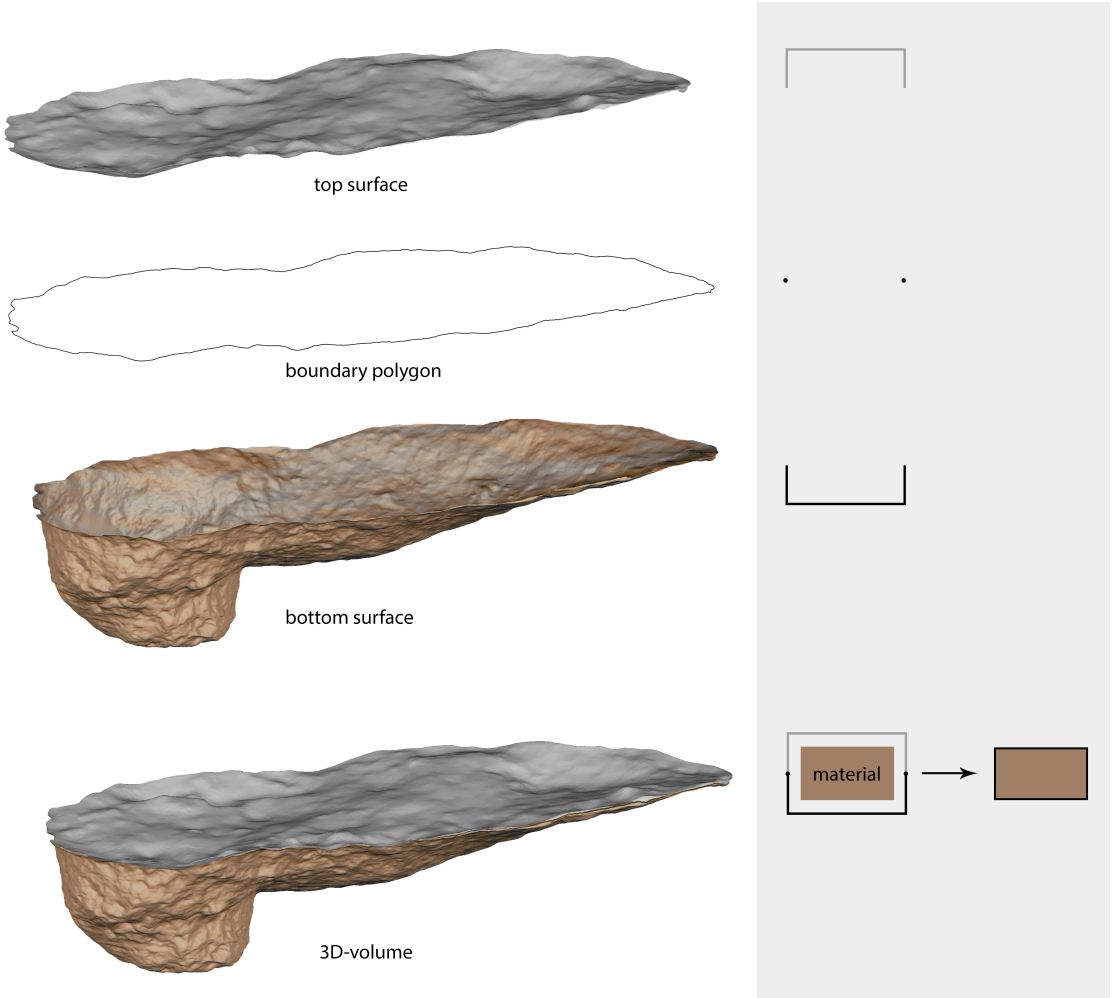


Fig. 4.20: Elements of a deposit and their notation in the Harris Matrix.

The top surface, bottom surface, and boundary polygon have the same unique identifier (e.g., SU 126) as the deposit (after excavation, they exist as models and lines), which links them to the stratigraphic sequence. The stratigraphic sequence shows the relations between stratigraphic units of an archaeological excavation.

The Harris Matrix

Deposits, surfaces, phases, and periods in their stratigraphic sequence are noted in the form of a Harris Matrix. The Harris Matrix is used to logically notate all uniquely numbered stratigraphic units in a sequential diagram. The notation represents the topological relationships as relative chronological/temporal succession of stratigraphic units. [130] This formal model makes it possible to represent complex spatiotemporal relations and is used as a processual postdictive modeling tool while also giving a graphical overview of the archaeological excavation. (Fig. 4.21)
The sequential diagram consists of individual elements - rectangle, ellipse, and the

[130]Harris 1975, 110, Roskams 2001, 157; Traxler, Neubauer 2008.

lines connecting them.[131] The rectangular box with the unique identifier in it means that it is a deposit consisting of a top surface, boundary polygon, bottom surface, and the material itself. This is symbolized by the upper line being the top surface and the lower line being the bottom surface. The two nodes where they meet are the boundary polygon, and the filled rectangle symbolizes the material itself and the time interval of deposition. This is a logical representation of the object which materializes the virtual immateriality in a Harris Matrix. This breakdown of the symbol elements, which may appear trivial, was not initially proposed but introduced by Wolfgang Neubauer (Fig. 4.22).

Feature surfaces can be recorded by their topography and boundary polygon. The notation in the case of feature surfaces is analogous to the notation of deposits. The ellipsoid with the unique identifier means that it is an interface consisting of a TS, BS, and BP of the interface. This is symbolized by the upper line being the TS, the lower line being the BS, the two points/nodes where they meet being the boundary polygon, and the filled ellipse symbolizing the time span of the interface.

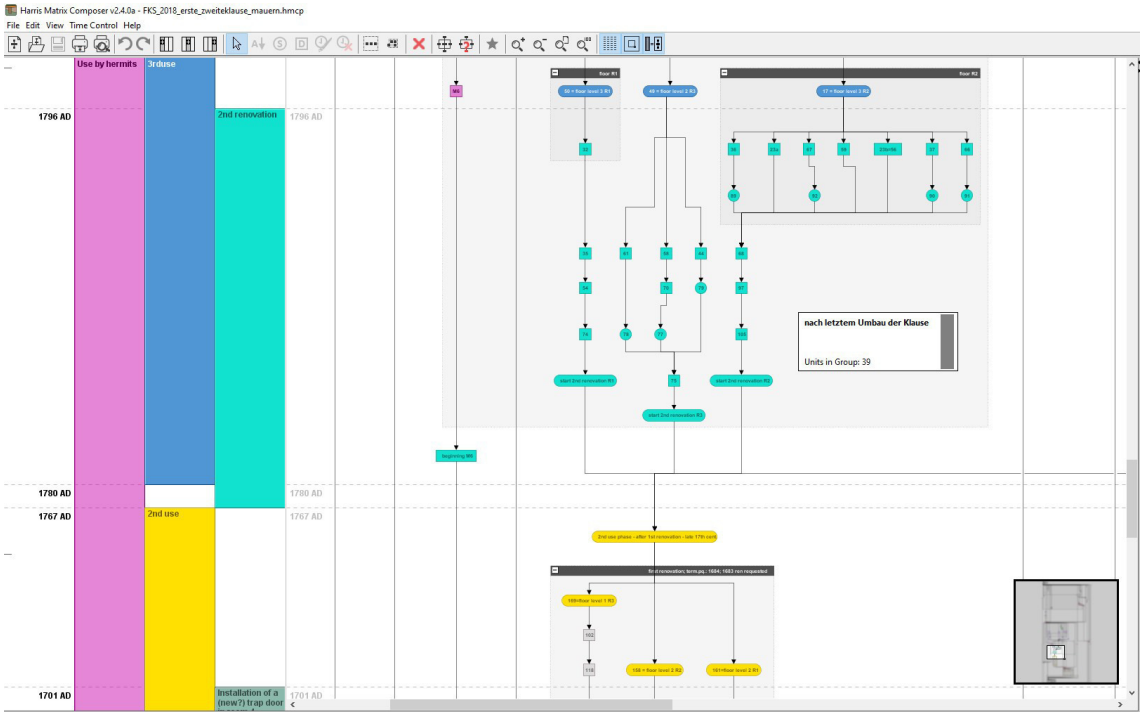


Fig. 4.21: The interface of the HMC+ software showing the stratigraphy as a sequential diagram.

[131] Traxler, Neubauer 2008.

[131] Traxler, Neubauer 2008, https://harrismatrixcomposer.com

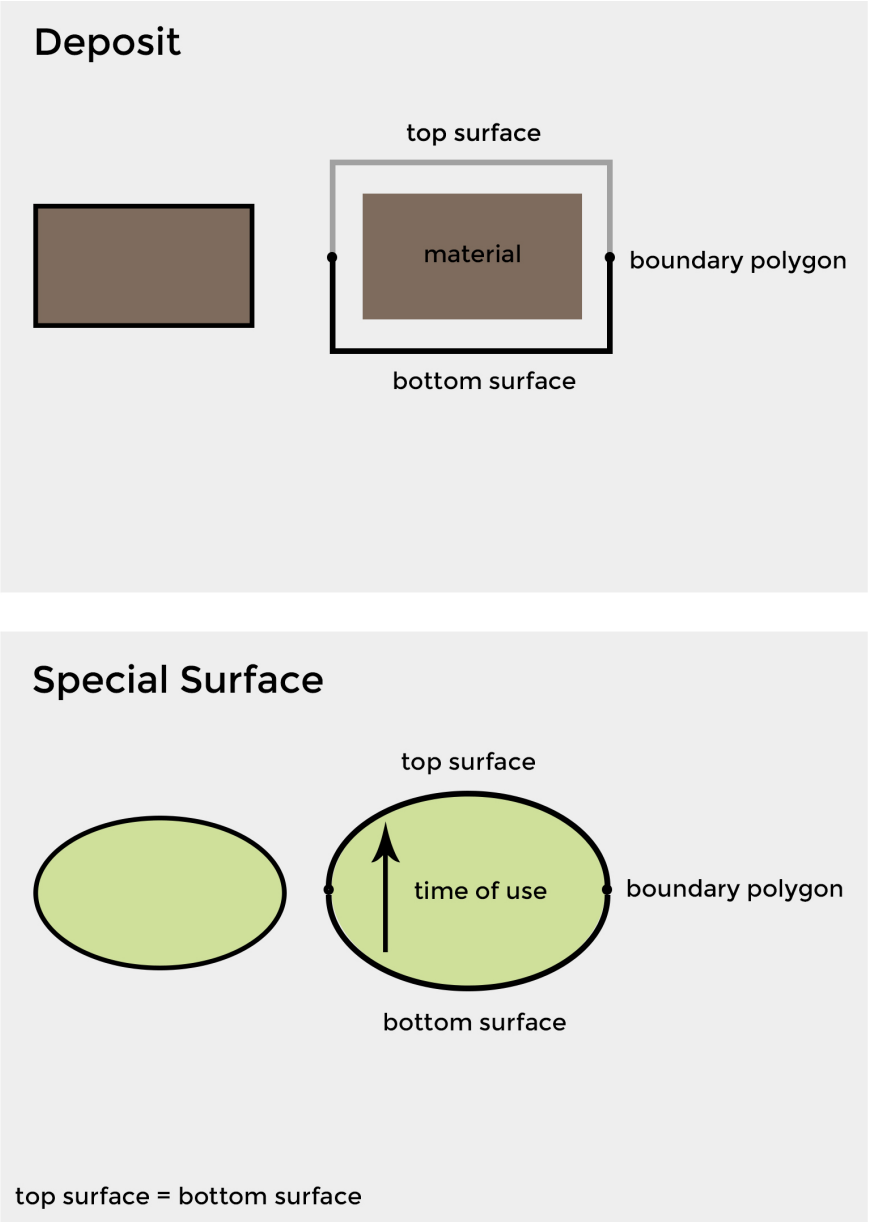


Fig. 4.22: Stratigraphic units and their notation in the Harris Matrix.

In practice, the following steps are repeated for every existing (recognized) deposit before, during, and after its excavation:

1. Define top surface/boundary polygon
2. Record top surface
3. Excavate deposit (take samples, record characteristics, recover finds)
4. Record bottom surface
5. Check for interface/surface

As proposed by Neubauer et al.[132] the method of single surface documentation (SSD) was used at the excavation at the Falkenstein to document every unit of stratification in 3D.
The documentation techniques used in the excavations of 2011 and 2012 are explained in detail in the following chapter.

[132]Doneus et al. 2003; Doneus & Neubauer 2004, 2005, 2008; Neubauer et al. 2007

Excavation 2011 & 2012 - method and documentation techniques

The excavation of the area, defined by the results of the ground-penetrating radar prospection from 2009, was conducted by the University of Vienna and VIAS (Vienna Institute for Archaeological Science) in two campaigns from August 2 to 31 in 2011 and July 2 to 20 in 2012. The aims were to verify the assumption that the visible anomalies in the GPR data and their archaeological interpretation represent the remains of the historically depicted and mentioned hermitage and add more detailed information about the site. The excavation was carried out as a stratigraphic excavation (based on stratigraphic theory) by removing single deposits in the reverse order of their deposition and documenting every single deposit and surface in 3D.

The area to be excavated was selected following the results of the ground-penetrating radar prospection and included the assumed structures and a portion of the area located north of it. In the campaign of 2011, trench 1-2011 with an extension of 90,37 m^2 was excavated. In 2012, trench 1-2012 was attached directly to the north of the trench of 2011 and comprised an area of 148,2 m^2, including an extension to the southeast made on July 9th. The total area excavated in the two field seasons amounts to 238,57 m^2 (see Fig.4.2). The stratigraphic units were removed manually with conventional tools adequate for the respective units (Fig.5.1).

The deposits were described concerning their location, extent, characteristics, and stratigraphic position. They were also sampled for magnetic susceptibility, color spectrometric analysis, and soil type analysis; 14C samples were taken for special deposits. Soil type analysis was done following the Önorm L 1050[133]. Soil is classified in terms of the grain size into fine material (<2 mm) and coarse material (>2 mm).[134]

Classification of soil type is done in terms of the percentage and distribution of the grain size of the fine material. This is the percentage of sand, silt, and clay in the composition. Loam contains portions of all three soil types. The classification was done on-site, identifying the soil texture by touch - referred to as the "feel method" or "Fingerprobe".[135]

For magnetic susceptibility analysis, unconsolidated samples (loose soil packed into small bags) were taken. Finds were separated by material and stratigraphic unit (SU), numbered consecutively, registered in a list, and categorically packed with a

[133]The Önorm L 1050 ("Soil as plant site – Definitions and test methods") is a national norm defined by the Austrian Standards Institute. It contains key terms of soil physics, chemistry, and biology and regulates the sampling procedures.

[134]Toriser et.al. 2011, Falkenstein, Vorbericht 2011; Heiß et al. 2012, Falkenstein, Vorbericht 2012.

[135]http://www.gd.nrw.de/zip/bo_Bestimmungsschluessel-Bodenart.pdf; Soil quality - Field tests - Part 2: Determination of soil texture - DIN 19682-2:2014-07.

[136]https://bfw.ac.at/300/pdf/Einfuehrung_Bodenkartierung.pdf,p.11.

Soil type / grain composition of the mineral material of the soil			
	diameter in mm	designation	
Fine material			
	< 0,002	clay	
	0,002 - < 0,063	silt	
	0,063 - < 2,0	sand	
Coarse material		edged	rounded
	2 bis < 63	grit	granular gravel (Kies)
	63 bis < 200	stone (debris)	pebble gravel (Schotter)
	> 200	edged blocks	rounded blocks

Table 4.1: Soil classification following Önorm L 1050.

finds label. Special finds and samples were recorded as three-dimensional points with the total station. Finds and samples, additional information, and observations are related to the corresponding deposits and surfaces in a database.

On the theoretical background of stratigraphy[137], the stratigraphic units were recorded manually on pre-printed sheets and by means of the software Harris Matrix Composer[138] throughout the entire ongoing excavation process. The result is the graphical representation of the stratification as a stratigraphic sequence or Harris Matrix - the "fundamental diagrammatic representation of time for an archaeological site"[139], which provides the basis for the further analysis carried out in this thesis.

The documentation of the excavation on the Falkenstein was done mainly digitally, following a standardized documentation method/process developed and enhanced for years by the Vienna Institute for Archaeological Science (VIAS)[140], now providing a complete 3D topographical record of the removed stratigraphic units. Therefore, every deposit and surface's boundary polygon and topography (see Chapter 4.2) were recorded with a total station. In contrast, the bottom and top surfaces of every single deposit were recorded with a 3D laser scanner as well as with digital photography. The devices used for this technique were: a digital camera (Nikon

[137]Harris 1989.

[138]http://www.harrismatrixcomposer.com [23.06.2017].

[139]http://vias-geo.univie.ac.at/research-fields/archaeological-stratigraphy/stratigraphic-recording/[23.06.2017].

[140]http://vias-geo.univie.ac.at/research-fields/archaeological-stratigraphy/[23.06.2017]; Doneus et al. 2003; Doneus & Neubauer 2004, 2005.

Soil type		Fine material		
following the Austrian Soil Map (=Österreichische Bodenkartierung)[27]		sand	silt	clay
		2,0 – 0,063 mm	0,063 – 0,002 mm	< 0,002 mm
		in %		
sandy	S	65 – 100	0 – 30	0 – 10
silty sand	zS	40 – 70	30 – 55	0 – 5
loamy sand	lS	30 – 80	10 – 55	5 – 15
sandy silt	sZ	10 – 45	55 – 75	0 – 15
silt	Z	0 – 25	75 – 100	0 – 25
clayey sand	tS	65 – 90	0 – 10	10 – 25
sandy loam	sL	20 – 75	10 – 55	15 – 25
loamy silt	lZ	0 – 30	55 – 75	15 – 25
sandy clay	sT	50 – 75	0 – 10	25 – 40
loam	L	5 – 65	10 – 55	25 – 40
silty loam	zL	0 – 20	55 – 75	25 – 45
loamy clay	lT	0 – 60	0 – 55	40 – 50
clay	T	0 – 50	0 – 50	50 – 100

Table 4.2: Soil type according to the Austrian Soil Map (=Österreichische Bodenkartierung)[136].

D7000), a total station (Leica TPS 1200), and a terrestrial laser scanner (Riegl LMS Z420i).

The documentation method named "single surface documentation" was utilized. This method uses 3D laser scanners and photogrammetry in a step-by-step procedure to document the stratigraphic units as single layers. This facilitates the virtual representation of the units of stratification destroyed during the excavation process as close to the excavated stratification as possible, thereby providing the option/opportunity to verify the observations of the excavation process and the defined relations in 3D.[141]

A stratigraphic excavation aims to record the situation to make it possible to reconstruct the stratification in its entirety. This refers to the stratigraphic relations and the entire stratigraphic units. The only possibility to do this is through a full

[141] Doneus & Neubauer 2005, https://vias.univie.ac.at/forschung/geopysikalische-prospektion/research-fields/archaeological-stratigraphy/.

3D record. This means that the digital documentation makes possible the construction of 3D volumes of every deposit and surface with its specific position in space and their relation to each other. In this way, the stratification can be virtually rejoined, represented, and analyzed. Profiles can be drawn at any point, at every stage of the excavation, every defined phase can be visualized in 3D and completed by archaeological reconstruction.

Although the significance and importance of 3D documentation are undeniable, it only makes the verification or falsification of interpretation (as which the excavation process with its irreversible actions is seen) but not of the original stratification possible. The application of 3D documentation techniques, without the awareness of fundamentals and the underlying theories, will not result in appropriate documentation. To excavate with consideration of this theory and the laws of archaeological stratigraphy[142] remains the task of the archaeologist.

Photographic documentation

Every single stratigraphic unit was photographed. At least four ground control points were included in each photo for the subsequent rectification. For rectification, the Software Monobild[143] was used. The Monobild algorithm creates a projective transformation on a plane using the coordinates of the measured ground control points. This simple method works well as long as the height differences do not differ too much. A world file containing the geographic parameters of the rectified picture is created. It enables the integration of the photo into any GIS-project with the correct position and true-to-scale size[144].

Rectified and georeferenced images of the texture of the stratigraphic units and the measured boundary polygons were integrated into a GIS (ArcMap) and combined. The result is a visualization of the excavation as a "Single Surface Map"(Fig. 4.23).

Terrestrial Laser Scanning

For the detailed topographical recording, all surfaces were documented three-dimensionally using a Riegl LMS Z420i terrestrial laser scanner, providing a higher spatial resolution than a total station for greater measurement speed. In standard documentation using a total station, the results are highly dependent on the skills of the persons handling the instrument and the decisions of where and how many points are measured. In contrast, the laser scanner systematically collects surface points, resulting

[142] Harris 1989, 29ff.

[143] http://www.idc-edv.at/geosi-software/monobild/.

[144] cf. Doneus et al. 2003; Doneus & Neubauer 2005, Neubauer 2008, Neubauer & Doneus 2008.

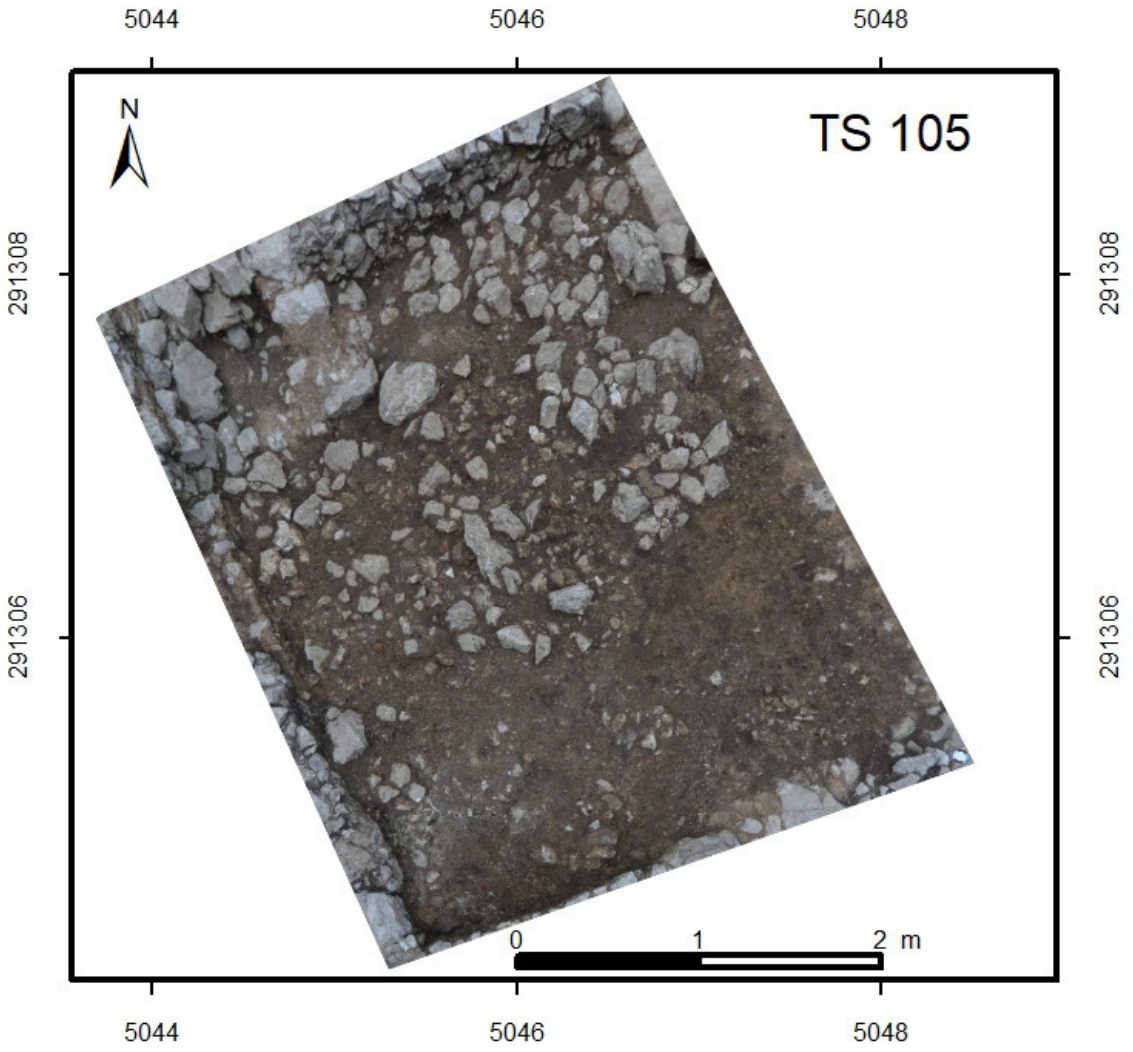


Fig. 4.23: Rectified and georeferenced photo of TS 105.

in a dense point cloud that can be transferred into a high-resolution topographic model of every stratigraphic unit.

Terrestrial laser scanning is an active sensing technique that allows for the acquisition of geometric data. Each point is registered by the position (X, Y, Z) and the intensity (i) of the returning signal. Two major ranging principles are applied in laser scanning: the pulsed ranging principle and the phase difference method. The phase difference method measures the difference between transmitted and received signals backscattered from the surface. The lasers used for the phase difference method are continuous-wave lasers that emit light constantly.

A short pulse is emitted towards the object in the pulse round trip measurements or time of flight procedure. The laser pulse is backscattered when reaching the surface of the object, and part of it returns to the detector. The backscattered portion is

[144]Neubauer 2002, Neubauer 2007, Neubauer 2008b.

detected, and it is sent to the time discriminator and stops the time measurement unit, which was initiated with a portion of the emitted pulse. The time interval between the emission and the reception is measured, and the range to the target is computed.[145] A laser scanner principally measures a point cloud by determining the distance to a point (range) and direction (orientation of the mirror). Therefore, this point cloud is acquired in the scanner's own coordinate system (SOCS).
The used TLS, LMS-Z420i, is manufactured by Riegl (Riegl LMS GmbH 2010) and is a pulsed time-of-flight laser scanner[146]. Nowadays a newer model is in use. The primary data obtained in the field are XYZ coordinates, which are visualized as high-resolution 3D point clouds with RGB values (Fig. 4.24).

Fig. 4.24: Colored point clouds were gathered with the LMS-Z420i.

Besides the 3D coordinates, the data stream contains each point's signal amplitude, range, and angle in a relative coordinate system (Scanner Own Coordinate System = SOCS). The used system has an accuracy of +- 1cm. Its vertical scanning range is up to 80° while the horizontal scanning range is 360°. The angular step width can be chosen between $0{,}004° \leq \Delta\delta \leq 0{,}2°$ in vertical and $0{,}004° \leq \Delta\phi \leq 0{,}75°$ in horizontal direction. The actual resolution depends on the distance to the measured surface. The distance measurement (range up to 1000 m) is calculated from the travel time of the laser pulse between signal transmission and reception.

[145] Wehr & Lohr 1999, Airborne laser scanning—an introduction and overview; Pfeifer & Briese 2007, 3-4; Shan et al. 2008, 15-19, Ullrich et al. 2002.

[146] Riegl LMS GmbH (2010): Datasheet LMS-Z420i. http://riegl.com/uploads/tx_pxpriegldownloads/10_DataSheet_Z420i_03-05-2010.pdf.

[147] Riegl LMS GmbH (2010): Datasheet LMS-Z420i.://riegl.com/uploads/tx_pxpriegldownloads/10_DataSheet_Z420i_03-05-2010.pdf.

Scanner Performance		
	Vertical (Line) Scan	**Horizontal (Frame) Scan**
Scan Angle Range	0° to 80°	0° to 360°
Scanning Mechanism	rotating/oscillating mirror	rotating optical head
Scan Speed	1 scan/sec to 20 sec @ 80° scanning rate	0,01°/sec to 15°/sec
Angular Step width between consecutive scan lines	0,004° ≤Δϑ≤0,2°	0,004° ≤Δϕ≤0,75°
Angle measurement resolution	0,002°	0,0025°

Table 4.3: Technical Data of the Riegl LMS Z420i Laser Scanner[147]

Irregular surfaces often present areas hidden from the scanner's current viewpoint. More than one scan position is usually necessary to cover the whole surface to avoid holes in the point cloud.

The different scan positions are registered into a coordinate project system (PRCS) by retro-reflective targets[148]. A total of 12 reflectors were placed in an asymmetrical layout in the surroundings of the excavation for the 2011 campaign; 17 were used for the campaign of 2012. The reflectors had fixed positions for the entire excavation campaign. While scanning, the reflectors were detected automatically (using the signal amplitude of the data stream[149]). A minimum of four reflectors per scan is required to reference its position in the Software RiSCAN Pro. The reflectors were surveyed with a Leica TPS 1200 total station. They served as ground control points to register the scans into the global coordinate system (GLCS), providing a georeferenced point cloud.

The scanner was used with a CANON EOS 450D camera mounted on it. The camera can be mounted and dismounted while its outer orientation is mainly preserved relative to the coordinate system. RiSCAN PRO facilitates the detection and optimization of the inner orientation („Camera Calibration“) and the outer orientation („Mounting Calibration“ and „Camera Orientation and Position“). [150]

Data acquisition typically implies a 360°horizontal scan, a sequence of pictures overlapping 10%. The number of required pictures depends on the aperture angle of the

[148]Cylindrical retroreflectors with a height and diameter of 50mm.

[149]For a more accurate registration, targets can be automatically finescanned, resulting in a more precise definition of the center of each reflector.

[150]compare with Studnicka, Riegl & Ullrich 2003; Ullrich et al. 2003.

camera. At the Falkenstein, a fixed 10 mm lense was used. RiSCAN PRO controlled data caption of the 3D laser scanner and the digital camera. It is then possible to create a mesh from the resulting point cloud by triangulation. The final product is typically a Digital Surface Model (DSM). An orthophoto can be generated from the DSM and the colored point cloud. The DSM, mesh, and other outputs displaying the terrain and/or different stages of the excavation are used for 3D visualizations and reconstructions.

Image-based modeling

Additionally, image-based modeling was applied, which back then was not common. This method is based on digital photography and estimates three-dimensional structures from two-dimensional images of an object taken from different perspectives. It uses photogrammetric and computer vision techniques to create a photorealistic 3D model of an existing object.[151] SfM-based applications started to find their way into archaeological recording research about 15-20 years ago.[152]
For the final documentation of the excavation site, more than 400 high-quality photos were taken. The alignment of the photos, calculation of the camera positions, and subsequent building of geometry and texturing were done with the Software Agisoft PhotoScan©, which uses a semi-automated process, resulting in a georeferenced texture-mapped 3D-model.

In the last years, both methods - laser scanners and image-based modeling - have been applied in many aspects of archaeology, predominantly for documentation of objects or in building research in archaeology, to document the final stage of an excavation or features such as walls.

In the last years, both methods - laser scanners and image-based modeling - have been applied in many aspects of archaeology, predominantly for documentation of objects or in building research in archaeology, to document the final stage of an excavation or features such as walls.

The specific approach used on the Falkenstein is lined out in the next chapter.

[151] Quan 2010, Verhoeven et al. 2012, Szeliski 2010 .
[152] E.g. El-Hakim et al. 2003; Pollefeys et al. 1998; Pollefeys, van Gool 2002; Pollefeys et al. 2003.

Chapter 5

Stratigraphic Analysis

The stratigraphic analysis was based on 246 digitally recorded stratigraphic units, consisting of 190 deposits and 56 feature surfaces recorded in the two excavation campaigns (Fig. 5.1). The stratigraphic analysis comprised the visualization, description, and interpretation of the deposits and surfaces and their stratigraphic relations.

The stratigraphic sequence of the units was created on-site with the Harris Matrix composer. The analysis of excavation records, 3D laser scans, and a matrix review led to the definition of additional special surfaces (see chapter 4.4) and allowed structuring into phases and periods. In a first step, the existing topographical data (TLS, total station) of the deposits were processed to 3D volumes by developing a workflow (see chapter 5.1). In a second step, this 3D data was imported into a GIS-project in ArcScene to verify and refine stratigraphic positions in the Harris Matrix. Visualizing the stratigraphic units in ArcGis, deposits can be either shown or hidden. Therefore, their position and stratigraphic relation to each other can be revised from all sides. The sequence of the excavated deposits recorded in the field was verified using this visualization of deposits and the information on SU sheets and protocols. Some relations had to be reversed, others added; missing surfaces were established. The result is a complete and valid matrix of the excavated and established units. This matrix is a multilinear stratigraphic sequence – with multiple threads running next to each other without having any superpositional links.[153] It represents the topographic and temporal relations of the units of the site.

The standardized description of the deposits and surfaces was based on the data recorded in the field (SU sheets and protocol) and the already mentioned 3D data. For the interpretation of the stratigraphic units, in addition to the three-dimensional volumes, measured finds were loaded into the GIS project, find lists, lists of cataloged finds, short descriptions, and sedimentological information were linked. The interpretation was based on the shape and position of the deposits and the description of the deposits, their composition, contents, quantity, and distribution of contents.

Phasing was done by analyzing structural relations and drawing logical connections between deposits and sequences in the individual rooms. The contemporaneity of

[153] Harris, 129.

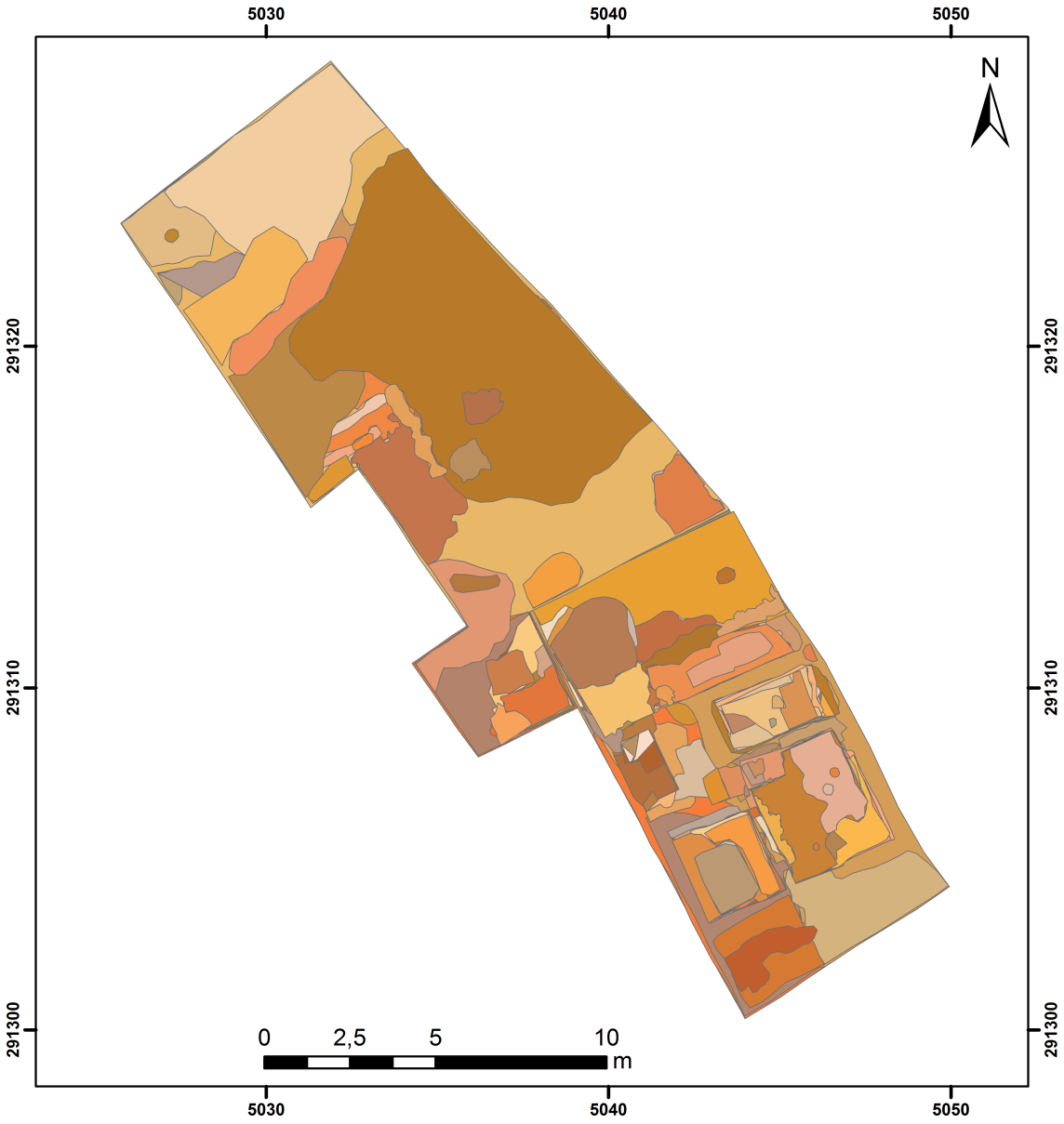


Fig. 5.1: Overview of all stratigraphic units from the excavation campaigns 2011/2012; the polygons are the visualization of the recorded total station data; the order of visualization does not represent the stratigraphic sequence of the deposits.

deposits in different rooms is made visible, and phases are established beyond the extent of one room.

A relative chronological order was established using non-stratigraphic data (dating of finds) and specific units' correlation.The chronological classification was done with the dating of the finds (Stephanie Helmel, Julia Mayr, and Katharina Vigl[154]) and historical data. Additionally, dendrochronological and C14 data were available of some objects of the excavation. Due to fragmentation of the finds, the long

[154]Vigl 2013.

lifespan of modern pottery, and the nature of some stratigraphic units (backfills with the material of waste heaps), a definite chronological classification was not always possible. The individual problems are described in relevant cases. Relative chronological relations and the comparison of events visible in the excavation data with historical data made it possible to date a good portion of the deposits and surfaces.

Interpretation and stratigraphic sequence are tightly connected—the positions of stratigraphic units to each other impact the interpretation of the individual stratigraphic units. The stratification observed in the field is given; the interpretation of individual stratigraphic units based on additional information can also influence the stratigraphic sequence. Errors made in the excavation process, relations that were not noted or recorded, and feature surfaces that were overlooked may be discovered in the interpretative process and lead to a rearrangement of relations.

Based on the method of 3D single surface documentation (see page 4.4), the obtained complete 3D record of stratification was analyzed using the following steps:

- Visualization of different data types in a 2D GIS
- 3D reconstruction of deposits
  3D reconstruction of feature surfaces
- Stratigraphic sequence in HMC+
- Database integration of all data types
- GIS-based stratigraphic analysis

Below, the developed workflow for processing the point clouds to 3D objects and the analysis of cataloged objects found in two and more concordant stratigraphic units is presented. The next chapter covers the archaeological units and their interpretation, starting with the oldest features to retrace building history and events related to the Falkenstein hermitage in time.

5.1 Stratigraphic 3D data processing

The method of 3D single surface documentation (see page 4.4) of the stratification of an archaeological site results in raw data that has to be processed to facilitate the subsequent stratigraphic analysis. Until now, overlapping point clouds or meshes have been shown as a result. My goal is to move beyond - to a 3D volume representation. There is no program providing an all-in-one solution now; RiSCAN Pro and Geomagic Studio were used as a license, and a trial license respectively was available. In the case of the Falkenstein, terrestrial laser scanning (TLS) data and photogrammetric data in the form of single rectified photos were the starting point for the following workflow. The described steps are specific to the used RiSCAN PRO and Geomagic Studio software but can also be done in open-source solutions like MeshLab and CloudCompare.

Point-cloud to 3D-Volume - Workflow

The processing of the laser scans aims to display the individual deposits and (feature) surfaces of the excavation as 3D models. In the end, it should be possible to realize an explorative analysis of the combination of all data, which will add valuable information and facilitate further post-excavation analysis.
The point clouds of top-and-bottom surfaces have to be meshed and combined to create volumetric models. The combination of the meshes of the top and bottom surface represents an exact reproduction of the excavated deposits. The top surfaces of the deposits are textured with the rectified, georeferenced photos. The completed 3D volumes of deposits and 3D surfaces of the feature interfaces will be stacked bottom up on the 3D model of the interface to geology (final stage of the excavation), providing a complete model of the stratification as excavated. Tests with Geomagic Studio 2014 showed that this program is specific to the requirements of the planned workflow and provides an intuitive and user-friendly interface.

Referencing and cleaning point clouds in RiSCAN PRO

The first data processing steps were already completed in the field during the ongoing excavation. These steps include importing the collected data into RiSCAN PRO, setting tie points, and georeferencing the data with the reflectors placed around the area.
As part of the work on this thesis, every registered raw point cloud was cleaned, eliminating flying points (outliers) and edge effects and clipped to the extent of the excavation trench. The data was filtered with a 0.01 m octree filter and exported as

an ASCII file in a project coordinate system for further processing with Geomagic Studio.

Processing point clouds to 3D surfaces in Geomagic Studio

Preparing top and bottom surface scans

(1) The point clouds of the top and bottom surface of a deposit are displayed with different colors to be able to differentiate them visually.
(2) The boundary polygon of the layer is defined based on the visible difference between the Top Surface and Bottom Surface; in the area where the soil has been removed, only the color of the top surface point cloud is visible. The measured boundary polygons of the total station served as a reference to locate the general area. Only in some instances – when the difference cannot be visually determined due to removal of soil in the whole area (e.g., cleaning after rain), the measured outline is used. The selection of this area without overlapping is made manually by marking the area and deleting the rest (Fig. 5.2).

Refining of the point cloud

Analyzing the point clouds, flying points above the scanned surface or points disconnected from the scanned surface can be observed. These points, not belonging to the surface of interest, derive from objects present in one of the scan positions or moving persons, plants, etc. Depending on the scanner, there is also a certain amount of noise in the data. Additional noise can result from the accuracy of the registration of a single scan position of one surface. Therefore, the point clouds need to be cleaned before they can be transformed into a surface. Removing disconnected components manually was mainly done in RiScan Pro but can also be done in Geomagic Studio afterward. Therefore, disconnected components not belonging to the area of interest and flying points are selected and deleted. After removing isolated components manually, the automatic outlier and noise removal tool can be used to optimize the point clouds. For archaeological deposits, the noise reduction algorithm "free-form shapes" in Geomagic Studio is used to avoid losing detail or affecting the accuracy.
(3) The data set point clouds are cleaned by removing flying points (outliers) and reducing noise[155] with a minimum smoothness level. A deviation limit of 0.01 m and one iteration was chosen. The iteration can be set higher to get better results without losing as much surface detail as it does when increasing the smoothness level. The settings differ from point cloud to point cloud, depending on the raw

[155]The noise level of the then used Z420i is much higher than the now used Z400i and requires postprocessing to obtain a qualitative mesh.

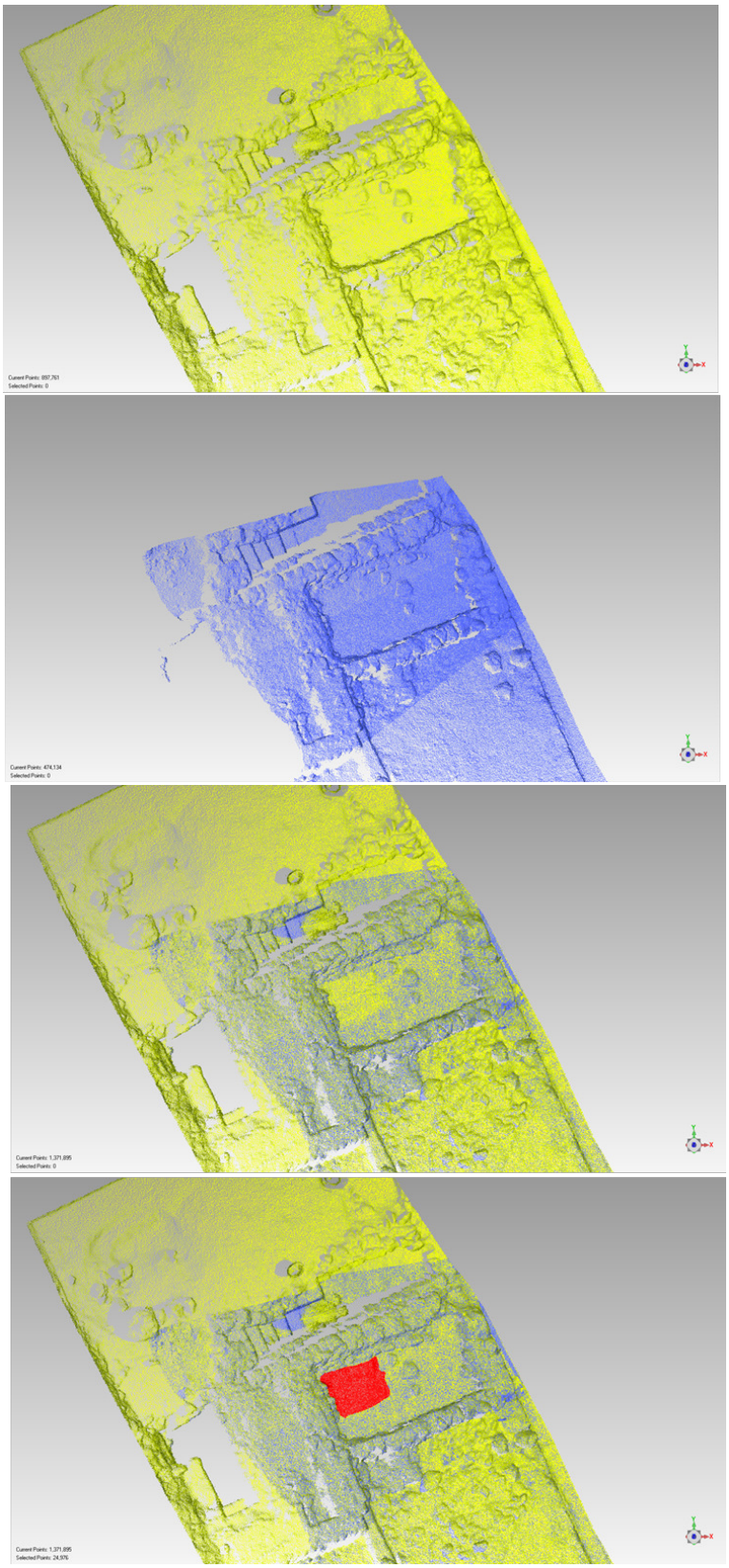


Fig. 5.2: Selection of the visible difference between the top surface and bottom surface.

data, surface type (e.g., rough, smooth), sharp edges at stone layers, etc. It is tried to achieve a result that keeps details without showing too much noise (Fig. 5.3).

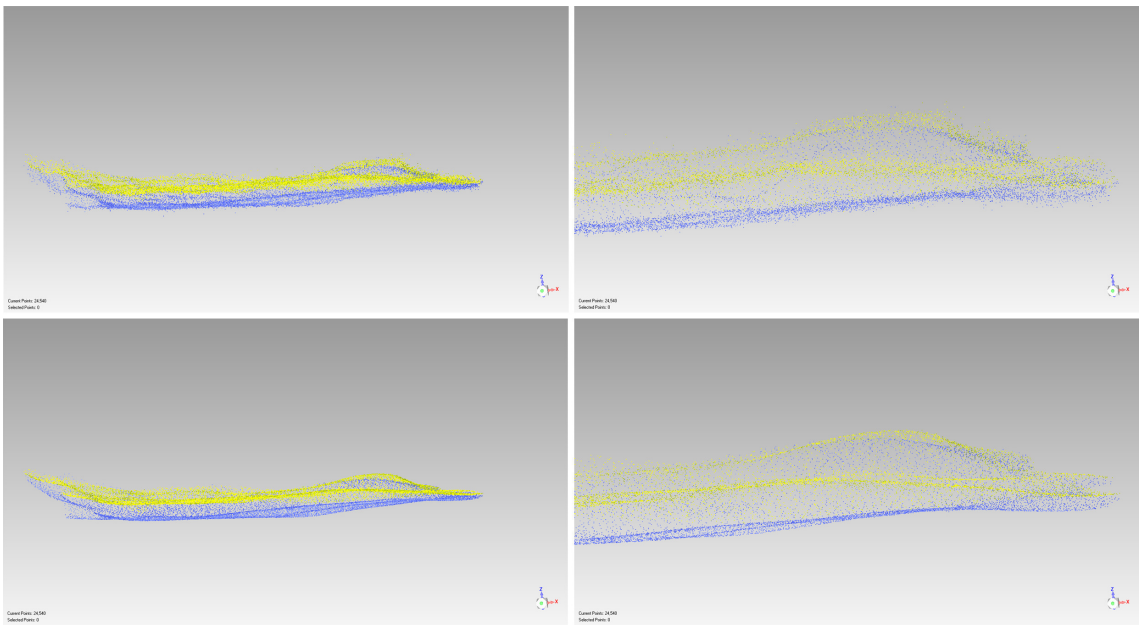


Fig. 5.3: Point cloud before (top) and after (bottom) clean-up.

Meshing

In the next step, the cleaned point cloud is ready to be converted into meshed volumes or surfaces. Meshing in Geomagic Studio is an automated process that allows you to choose the wrap type volume or surface and the option of noise reduction and a maximum polygon count. It is chosen to use the surface wrap type for each top and bottom surface by itself.

(4) The points are triangulated with minimum (or no) noise reduction generating a meshed surface. More noise reduction might be used depending on the roughness of the surface of the scanned deposit or feature interface, the number of combined scans, and the accuracy of the georeferencing of the single scans. Geomagic Studio finds the normal of each surface and colors the triangles accordingly (Fig. 5.4).

Mesh optimization

Errors in mesh-like areas with overlapping triangles or tiny holes due to noise in the raw data or from missing points due to a lack of scan positions - as some features are not covered from every angle and shadows occur - are common. These areas have to be optimized to get a watertight 3D surface.

(5) The mesh is cleaned up by eliminating non-manifold edges, self-intersections, highly creased edges, spikes, small components, tunnels, and holes. In some cases, manual hole-filling or removal of triangles is necessary (Fig. 5.5).

(6) To optimize the mesh for texturing, flat areas are thinned, and points are added to higher-curvature areas. The triangle count is increased or reduced according to

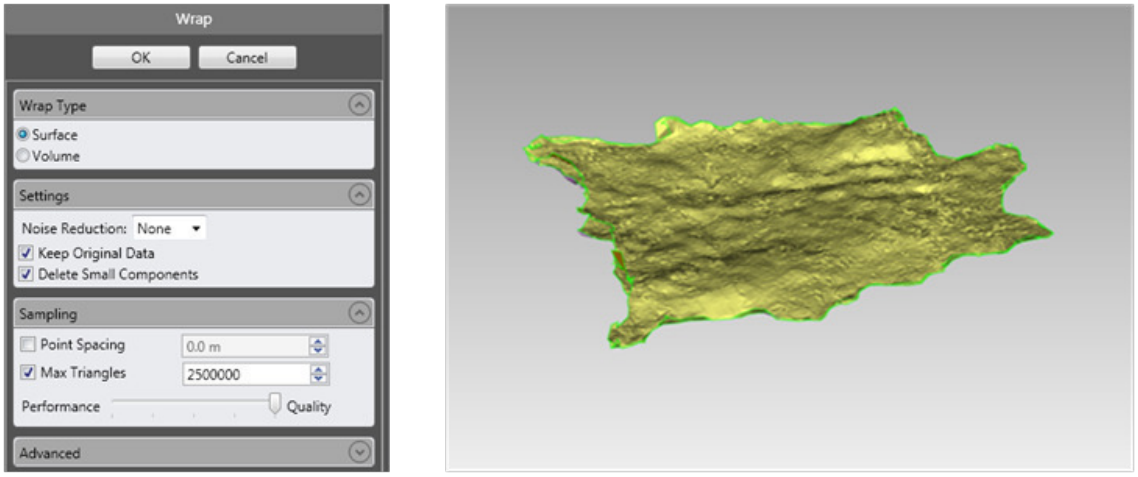


Fig. 5.4: Mesh before clean-up.

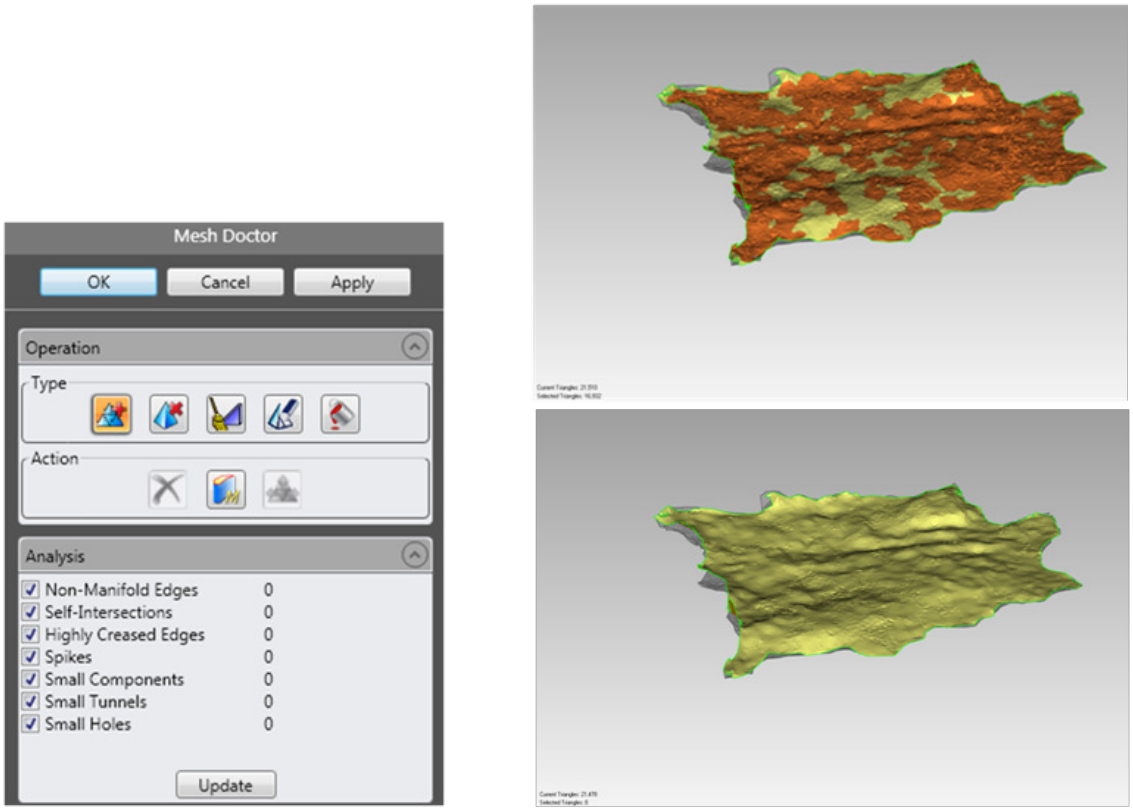


Fig. 5.5: Mesh clean-up.

requirements (the appearance of the mesh was taken as an indication), and spike reduction is applied (Fig. 5.6).

Merging top and bottom surface

To form a closed 3D surface of a deposit top and bottom surface have to be combined. (7) Combining the meshed top surface with the meshed bottom surface is done in two steps. First, the two surfaces are combined into one polygon object. It is essential to flip the meshes' normals so that the same sides (mostly represented in

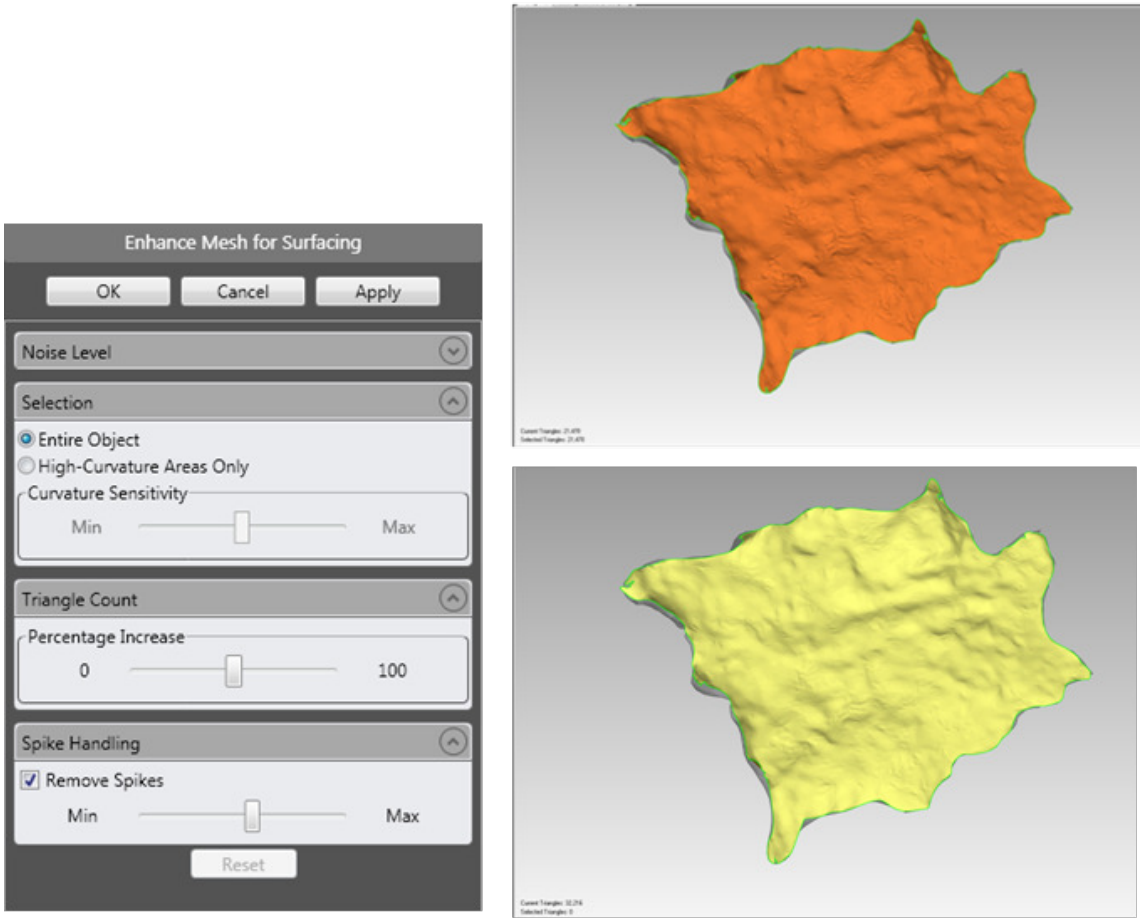


Fig. 5.6: Mesh enhancement.

the same color, here blue or yellow) face each other.

(8) Then bridges are created between those two surfaces, and the remaining holes are closed (Fig. 5.7). The result is a closed hollow 3D surface of a deposit. A filled/full 3D volume can be created from here.

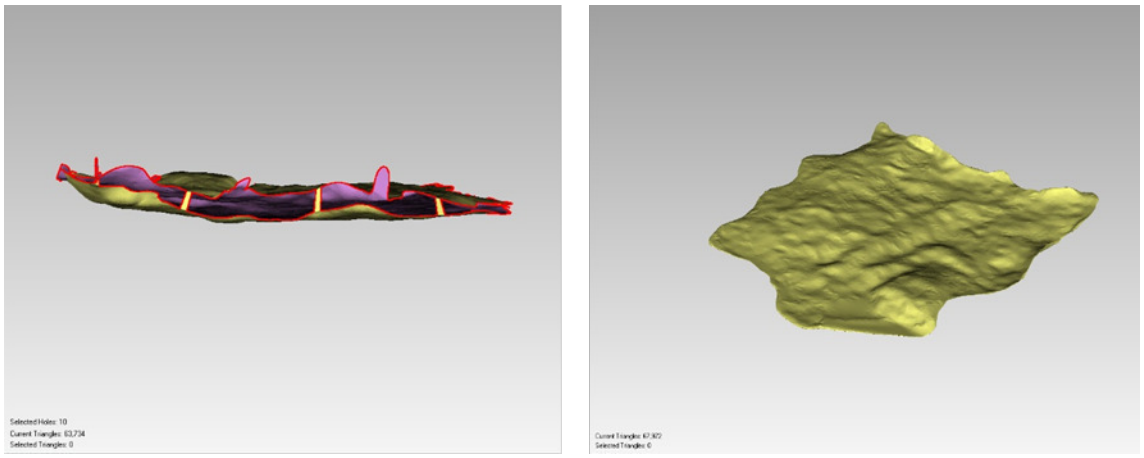


Fig. 5.7: Combined surfaces with bridges (left), 3d surface (right).

Texturing

If the goal is texturing the top surface, though, the closed surface has to be cut apart again. It is impossible within this workflow to texture the top surface - mesh before and combine it with the bottom surface mesh afterward, as the combination process changes triangles at the borders, which affects the texture as well.

(9) The separation of the bottom and the top surface is done with the "custom region" tool. The top surface is selected with this tool, and a new object is created from the selection. The results are two meshes with perfectly fitting borders and straight edges (Fig. 5.8).

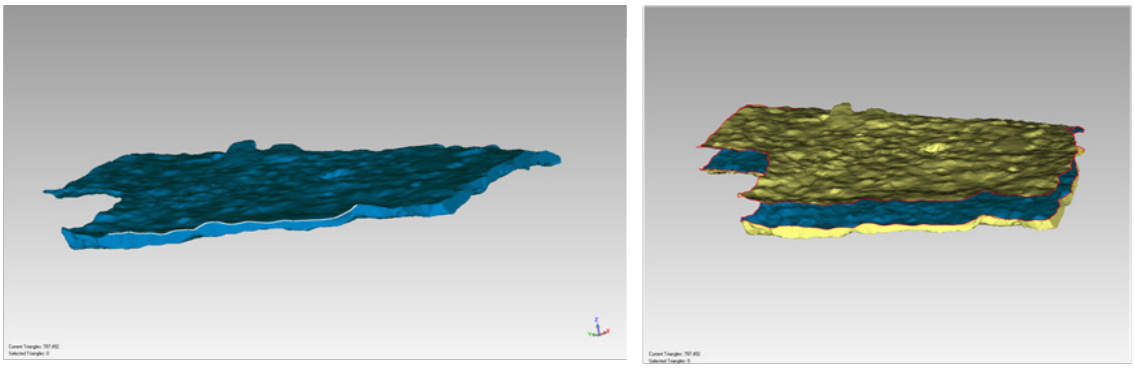


Fig. 5.8: Selecting custom region (left), separated surfaces (right).

The top surface can be textured using the "texture maps" tool in the next step. (10) A texture map is created for the specific surface. Then an image is loaded into the “project image” dialog and referenced with markers.

The outcome highly depends on the mesh’s surface and the photo’s quality. As mentioned above (see 4.4), the photo documentation typically consisted of one photo of the deposit taken from above. Only some surfaces are documented with more photos for an image-based modeling approach. Flat surfaces are logically easier to texture with one 2D image than more complex surfaces (Fig. 5.9). The outcome for flat surfaces is accordingly better, resulting in qualitative textured 3D surfaces. The results for the more complex surfaces – e.g., stone layers – are quite poor and need another approach.[156]

A combined approach with Agisoft Photoscan was tested on surfaces documented with more than one photo for texturing.

For this purpose, the top surfaces are exported from Geomagic Studio as .obj for texturing in Agisoft Photoscan. The photos were aligned in Agisoft Photoscan, and instead of creating a mesh (model) in the same software, the mesh created from the TLS point cloud with Geomagic Studio is imported. The surface is textured based

[156] In subsequent excavations, an image-based modeling approach was chosen to obtain textured 3D volumes.

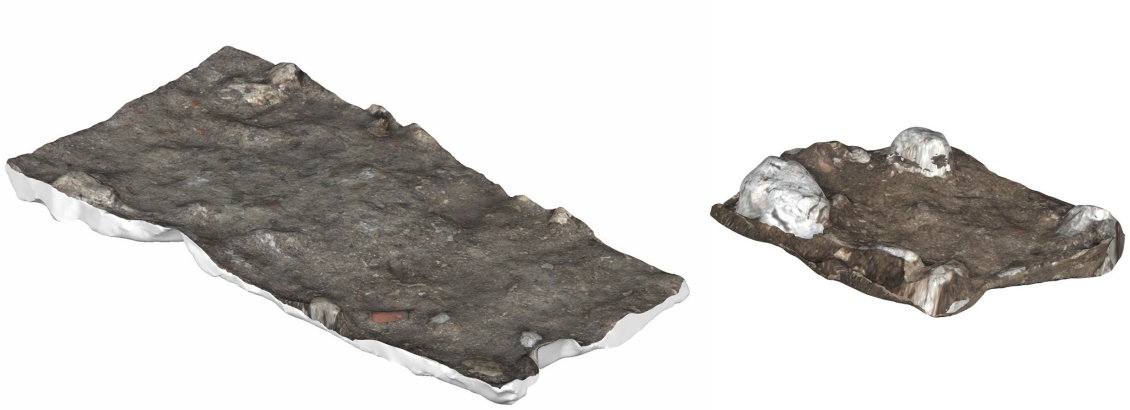


Fig. 5.9: Textured flat (left) vs. textured complex surface (right) colored from only one image.

on the alignment of the photos (in an object coordinate system; ground control points are transformed before referencing in Agisoft Photoscan). This results in a qualitative texture of every surface. This approach combining Geomagic Studio and Agisoft Photoscan for texturing 3D archaeological surfaces/volumes created with TLS-data was first used at the excavation of the gladiator school in Carnuntum in June 2014 after testing it on the data of the present master thesis. It was successfully used in the years afterward in Hornsburg, Rom (Schneidhofer et al. 2017), and Durrington Walls (Fig. 5.10).

The use of a newer laser scanner with nearly no noise makes some of the filtering steps of the workflow now obsolete. The rest of the process remains the same.

In the years after creating these volumes in 2014, a programmatic approach was developed in the Kaymakçı Archaeological Project (KAP). The developed phyton-based program can create a 3D point cloud from top and bottom point-cloud automatically[157], skipping the manual merging process presented here. The process is quicker, more comparable from stratigraphic unit to stratigraphic unit, but not available to everyone yet. The 3D volume, like in the workflow presented here, has to be created in standard 3D-modelling software.

Documentation is continued with TLS and IBM at excavations from the LBI ArchPro and VIA. Personally, I'd go with an IBM-only approach in the future. For analytic purposes of 3D volumes, a 3D reconstruction from total station measurements seems to be not inferior to TLS and IBM models[158], as the human being is

[157]Nobles & Roosevelt 2021.

[158]Emmitt, J.; Pillay, P.; Barrett, M.; Middleton, S.; Mackrell, T.; Floyd, B.; Ladefoged, T.N. A Comparison of Volumetric Reconstruction Methods of Archaeological Deposits Using Point-Cloud Data from Ahuahu, Aotearoa New Zealand. Remote Sens. 2021, 13, 4015.

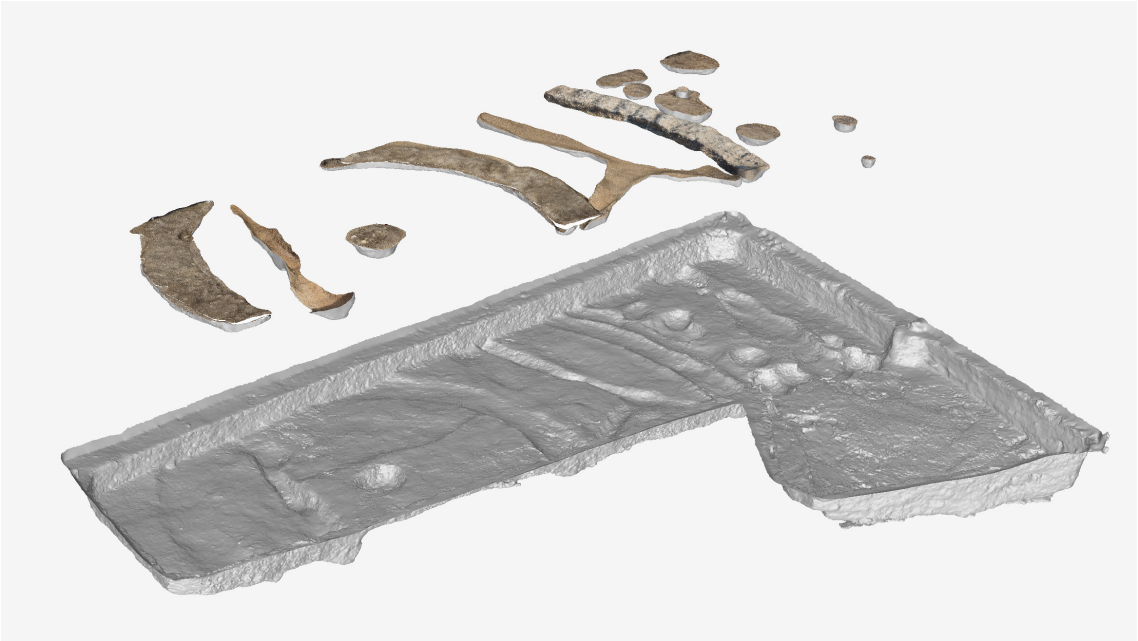


Fig. 5.10: Different colored 3D volumes of stratigraphic units in Carnuntum created by image-based modeling.

a visual one, though, I think a realistic visualization with pleasing texture will always be preferable. Not only for presentations to the public, which are undoubtedly important from an economic viewpoint, but also for the researcher to support the immersion into an interactive relationship with the study environment.

5.2 GIS-Integration of the data

A 2D ArcMap project and a 2.5D ArcScene project were created to visualize and analyze the stratigraphic data.
The GIS projects were created in the MGI Austria GK Central (31255 EPSG) coordinate system, as the primary data to be included was generated within this coordinate system. The data included in the project comprises

- orthophotos of the excavation area
- recent and historic maps of the area
- small scale topographical data (TLS-data from 2009/2011 and 2015 - DTM and deriving visualizations)
- large scale topographical data (ALS-data as DTM and deriving visualizations)
- GPR-data of 2009 and 2011 as raster data
- Interpretation of the GPR-data (shapefile)
- boundary polygons of all stratigraphic units
- find spots (coins, metal, glass, special ceramic finds)
- rectified and georeferenced photos of the top surface of the stratigraphic units.

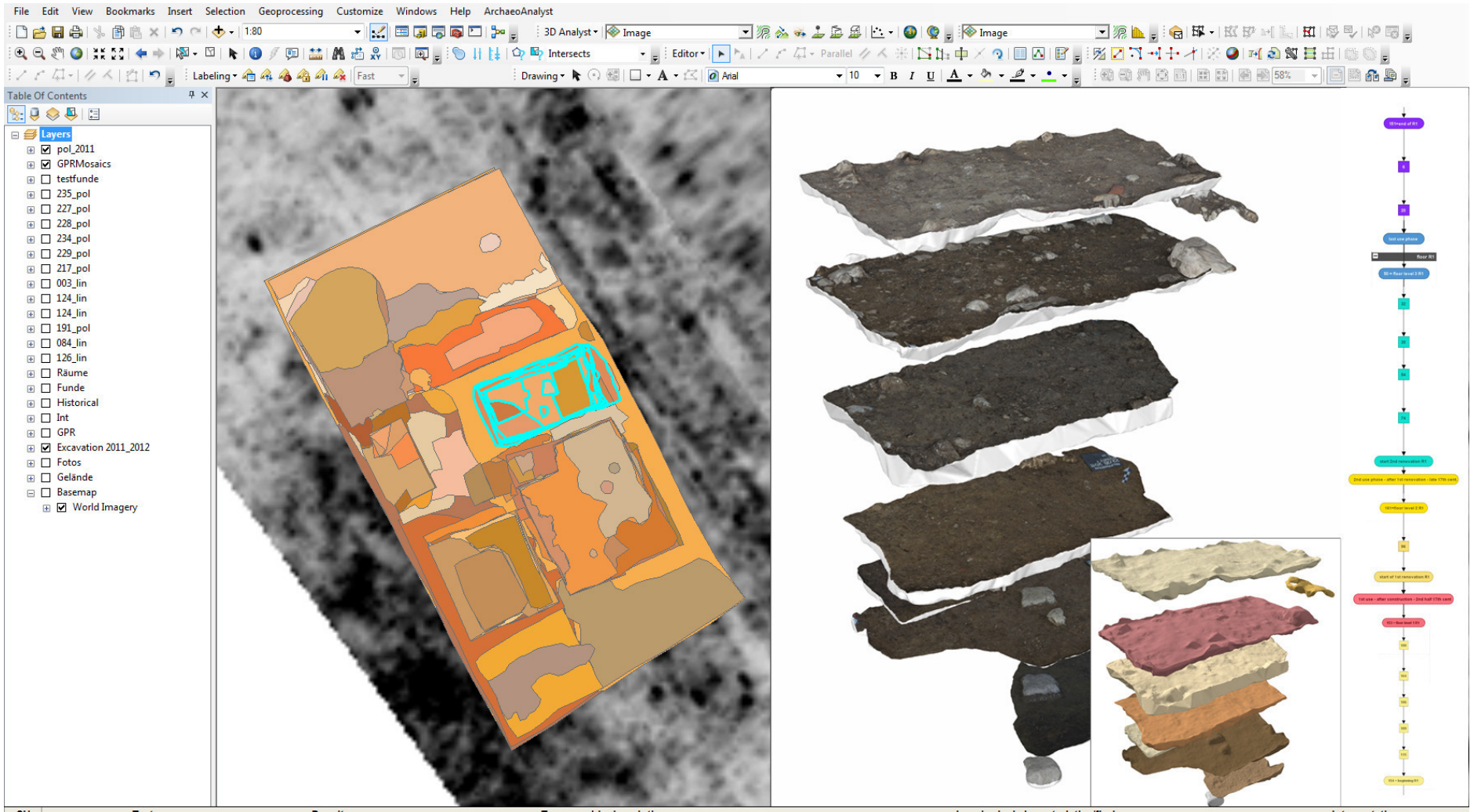
The 2.5D ArcScene project additionally contains

- topographically corrected GPR-data
- 3D volumes of every single deposit[159]
- 3D model representing the final situation of the excavation

For the integration of the 3D data (meshes) into ArcScene georeferenced 3D volumes in VRML format were used. [160] The data were imported as 3D objects into ArcScene 10.1. The 3D volumes were created in an object coordinate system in Geomagic Studio to avoid problems with huge coordinates; a corresponding custom coordinate system was generated in ArcGIS. The 3D volumes were defined with this custom coordinate system and, in this way, shifted back to their correct position in the

[159] Only stratigraphic units of 2011 and units necessary for the correlation of 2011 and 2012 units of 2012 were processed.

[160] ArcScene supports 3D Studio Max (*.3ds), VRML and GeoVRML 2.0 (*.wrl), Sketch Up 6.0 (*.skp), OpenFlight 15.8 (*.flt), COLLADA (*.dae), and billboards (PNG, JPEG, BMP, TIFF, GIF, etc.).



SU	Texture	Density (very low=1/low=2/medium dense=3/dense=4/very	Topographic description	archaeological characteristics/finds	interpretation
172	hardly any roots, homogeneous	humid, 3	irregular; ca. 2x 1.5 m; irregular surface	filling of pit with brown loam, rich in finds	filling of latrine pit, waste
173	homogeneous, no rooting	humid, 2	in the northwest of the trench; irregular; ca. 3x1m; even surface; cut by trench limits	yellowish grey gritt deposit; finds: plastics, glass, aluminium foil	recent fill
174	no Bodenprobe-->humusrest	dry, 3	above of pathway east to the altar; nearly circular	no finds	rest of topsoil
175	roots	humid, 3	above of rubble in the center of the trench; circular	humic sediment; finds: recent nails, glass, charcoal flitter, pottery	rest of topsoil
176	relativ heavy rooting	dry, 2	in the north of the trench; nearly elliptical; depth 5-10cm	bigger stone layer with grit; no finds	deposit
177	flockig, inhomogeneous, hardly any roots		grayish-brown SU; in the southeast of the trench; loamy	not very thick; SU underneath is lighter; finds:, pottery, glass, metall	waste area
178	heavy mit feinen roots durchzogen	humid, 3	dark-humic, semicircular SU at the southern trench limits (southern third)	differentiation to the nex SU was done by contents	rest of topsoil
179	heavy rooting , humus, very many große stones	humid, 2	semicircular SU at the northwestern trenchlimit; rests of humus - lots of stones	no finds	rest of topsoil
180	medium rooting , homogeneous	humid,4	longitudinal SU until the northern trench limits	difference to next SU: no grit, more loam, darker, partially loam concentrations; finds: mainly recen	gravel path?

Fig. 5.11: GIS-Interface linked with the Harris Matrix Composer, SU database, and 3D-volume database.

global coordinate system. The encountered challenges - the need to truncate the coordinates in the 3D software and then convert it back, as well as with importing complex meshes into a GIS environment, were also mentioned by the KAP team with their approach.[161]
The above-listed data in the GIS project is linked with a database containing information to every stratigraphic unit. This information comprises short descriptions and sedimentological information of the stratigraphic units, find lists, cataloged finds, dating, etc.
Integrating all the data in the GIS projects provides the base for an integrated analysis.

5.3 Correlation of units of the excavation campaigns of 2011-2012

The deposits and surfaces of the two excavation campaigns were recorded following the concepts of the single surface documentation[162]. Every single excavated and recorded surface got a single number. (see section 4.2) As the excavation trenches of the two years were adjacent, the deposits and feature surfaces reaching across this artificial border have to be correlated.
The initially by Dr. Edward Harris proposed „equals to"-relation was abandoned later.[163] $\boxed{x} = \boxed{y}$ is now represented as $\boxed{x{=}y}$
The artificial separation of the layers would be represented in the matrix with an interface (excavation 2011) lying above the whole excavation of 2012. Even though, to connect the two campaigns and a clear, informative picture of the context, it was tried to equate the adjoining units. This was done using:

1. the outlines in the GIS Project to determine the units to be correlated at the trench limits,

2. the created 3D volumes to see the topographic layout and positioning and

3. the photos and descriptions to secure an equal consistency, content, and appearance of the deposits and a similar shape (and point in the sequence of deposits) of the surfaces in question.

There is no exact correspondence of the single units. The differences in description and excavation style/method are results of environmental/outer circumstances like

[161] Nobles & Roosevelt 2021, 595, 603.
[162] Neubauer 2008, Doneus & Neubauer 2004.
[163] Harris 1989, 36.

the humidity of the soil, lighting conditions (sun, shadow, tent, or other sun protectors above) which affect the visibility of differences in color and consistence of the soil and inner circumstances like decision making depending on persons in charge, pressure of time, etc.. The units which could be correlated are:
1=170=180
8=171
131=249
125=237-239
33=224
51=177=215
The reasons for equating them are described with the stratigraphic units in question in the following chapter.

5.4 Find analysis

Finds were analyzed according to their affinity to a particular deposit category and, in the case of coin findings, according to their topographic location within the stratigraphic unit.
In many cases, fragments of one single cataloged object were scattered in various stratigraphic units. To explain this, the units which contained fragments of one single object were analyzed. It resulted that objects were present in multiple stratigraphic units for different reasons. The stratigraphic units in question had other characteristics. Based on these characteristics, they already had a functional interpretation, or the interpretation could be achieved by looking at the contents.
The following four categories were established.

1. surfaces of former floors
2. dumping location(s)
3. leveling layers for a floor
4. deposits lying above each other

The first category comprises parts of objects that remained where they broke or passed into disuse. (This is referred to as primary refuse by Michael B. Schiffer[164].) The second category is dumping locations, where objects from activity areas were discarded. (referred to as secondary refuse by Schiffer[165]). The presence of fragments in both - category 1 and 2-layers - may be explained by the fact that parts were left

[164]Schiffer 1996, 59-64.
[165]Schiffer 1996, 59-64.

at the place where the object broke (primary refuse), and the rest was brought to a general dumping location/waste heap (secondary refuse).
The third category comprises leveling layers in different rooms which are topographically not touching each other. The material for the leveling layers was taken from an area where abundant material to create a leveling layer was present and brought to another location. As a lot of material was taken from dumping locations with secondary refuse, the leveling layers present tertiary refuse[166]. The presence of fragments from one object in categories 2 and 3 or only 3 may be explained by the fact that sometimes all fragments ended up in the leveling layers; sometimes, parts remained at the dumping location.
The fourth category refers to objects found in deposits lying above each other. This is primarily the case in leveling layers for a floor; it is assumed that this is since the differentiation of leveling layers is was done even though they were deposited in one event.

In the case of the Falkenstein, it seems that the area north of the hermitage to the east of the latrine pit was used as an area to discard objects. Matching fragments of broken and discarded pottery and glass were found in this specific area, leveling layers, backfills, and to a minimal degree on floor levels. Leveling layers in different rooms which contain fragments of the same objects might date similarly as it is assumed that broken objects did not spread in a big area of the waste heap.

[166]Scarborough 1989, 415.

Chapter 6

Stratigraphy of the Hermitage

6.1 Description and interpretation of stratigraphic units

The stratigraphy of the hermitage is presented from bottom to top, starting with the earliest activities on the excavated site.

First construction activities

The first visible action in the trench area is the removal of the preexisting humic topsoil to create a leveled surface for the construction of the building. This surface is addressed as **SU 165** - removal of the preexisting topsoil; its extent is not known and therefore defined by the excavation trench.
Some post holes and pits were dug from this surface: Four post holes were recorded in the area of rooms 2 and 3. The post holes SU 130 and SU 141 are both located in Room 2; SU 142 and SU 143 are located in Room 3.
Deposit 129, the filling of IF 130 consists of dull yellowish-brown (10YR5/4) clay[167] with a circular shape of 30 cm in diameter. Its preserved depth is about 15 cm since it is cut by a recent interface (IF 120). **Deposit 139**, the filling of IF 143 is located 50 cm to the southeast of deposit 129. It consists of similar materials and has a diameter of about 20 cm.
Deposit 132 and 135, the filling of IF 141 and IF 142 respectively are located in the east of Room 2. The former has a diameter of 25 cm and a depth of 50 cm. The latter is located 25 cm to the southeast of the first one and has the same diameter and depth. The fillings are not described but visually correspond to the above lying SU 126, which is described as dull yellowish-brown (10YR5/4) sandy clay. It is presumed that the postholes were part of some kind of construction aid – maybe a scaffold - which facilitated the erection of the (wooden) walls on top of the foundations. The arrangement of these four postholes though is not conclusive and does not indicate their purpose.

[167] Also described as sandy loam in the SU description.

Fig. 6.1: Overview showing the floor plan and walls of the hermitage.

In the northeast of the trench **SU 85** represents another interface of a posthole, which was supposedly dug into the surface 165, which had been cleared for the construction of the hermitage. The posthole has a diameter of 53 cm and had the stones **SU 84** inside of it. The stones with a size of approximately 5-10 cm are interpreted as stones that fixed a post of unknown use. **SU 81** is a later filling of the posthole. It contains two flint stones and a pottery fragment of a vessel. Sherds from the same vessel are also present in the above lying SU 51 and in other stratigraphic units. Therefore, it is supposed that the posthole was filled with waste

in the use time of the hermitage.

A flat pit **SU 198** was dug into the surface 165, which was created to construct the hermitage. The interface is a flat pit of 2 x 1.6 m. It was filled with **SU 191** which consists of very dark gray sandy clay with pebbles and stones from 2 mm to 63 mm. It is described as homogeneous sediment with charcoal. Above it, **SU 185**, dark greyish brown sandy clay with pebbles from 2-20 mm (10 %) was deposited, filling the pit. The boundary polygon of this pit, filled by the stratigraphic units 191 and 185, was measured with the total station until the southern limits of the trench of 2012. Nevertheless, no corresponding outlines were taken in that area in the initial excavation of 2011. The photos confirm that the distinctive elements of 185 and 191 – the charcoal and darker areas - are not reaching the trench limits. The pit was very flat towards the trench limits and may not have even reached the area excavated in 2011.

The most prominent deposit, which is part of the hermitage, is a linear setting of stones, which was already visible after removing the topsoil. This setting was recognized as the remains of a foundation wall (Fig. 6.2). Walls did not get SU numbers in the excavation process but were addressed as walls 1-5. The setting, addressed as **Foundation Wall 1**, is done in a construction technique, using irregularly shaped and randomly placed partially dressed and undressed stones of different sizes. The size of the stones ranges from filling stones of about 10 cm in diameter to stones with a length of about 60 cm. There are partially cut stones up to 60 cm in length and 50 cm in width. The longitudinal faces are dressed straight and form the outer and inner edge of the wall. The broadside and upper faces are also cut but do not form a straight face. Smaller irregular stones were placed between these big stones; these serve as interlocking stones. The foundation was bonded with mortar of yellow color and grey color. The used stones are, without any exceptions, limestone. The surroundings consist of limestone formations, so they are probably of local origin, even though the quarry is unknown.

Fig. 6.2: Foundation Wall 1 building the outline of the hermitage.

The wall addressed as **Foundation Wall 1** in the excavation confines the east of Room 1 and 2, the south of Room 2 and 3, the north of Room 1 and Room 4, the west of room 4, and separates Room 3 and Room 4. Only the parts confining rooms 1 and 2 are done with yellow mortar; the other stretches are constructed with grey mortar. This, and the fact construction seems are visible, strongly suggest that it was not built in one step. (see chapter 7) Therefore, the parts done with grey mortar are referred to as Foundation Wall 1a from here on.
The foundation walls 1 and 1a form the external wall of the hermitage. It runs NNW-SSE on the long and orthogonal from ENE-WSW on the short sides. The purpose of the wall is a foundation for the building erected on top of it.
No cut for the foundation trench of Foundation Wall 1 or 4 was recognized. It is assumed that to build the foundation, vegetation and topsoil were removed; otherwise, no alteration of the natural ground could be recognized.

Cellar 1

Cellar 1 is located north of Room 1 and represents the northernmost room of the hermitage. It is rectangular and measures 2 x 0.8 meters (not including the staircase). The staircase measures 2 x 0.65 m. Seven steps, each 20-25 cm high and 20-25 cm deep, are leading down into the cellar (see Fig. 6.3, 6.4).
The northern wall presents six rectangular niches of 10 x 10 cm; three are located in the east lying 25 cm above each other; the other three, arranged in the exact same heights, in the west (see Fig. 6.3). It is assumed that these accommodated wooden squared timbers, which supported three shelves for storage purposes and probably also to accommodate some kind of illumination.
In the eastern wall, there is a rectangular window measuring 45 x 50 cm (see Fig. 6.4), which for its purpose was above the surface at least while the cellar was being used. Parts of the wooden window frame were still preserved. The building material for the walls of the cellar – **SU 156** – is the same as for Foundation Wall 1, but its stones are considerably smaller in size. The stones are arranged in irregular layers; spaces between bigger stones are filled with smaller ones. The mortar used for the cellar differs in color from the mortar used for Foundation Wall 1[168]. It is possible that a different composition for the mortar of the cellar was chosen to prevent humidity. Without an analysis of the mortar, a simple coincidental difference due to the choice of available material cannot be ruled out either. Except for the area on both sides of the stairs, the side walls are solidified roughly with mortar. Stratigraphically SU 156 lies below Foundation wall 1, which was built after the erection of the cellar vault. The cellar, therefore, is the first room being built.

[168]Mortar samples have not been analyzed so far.

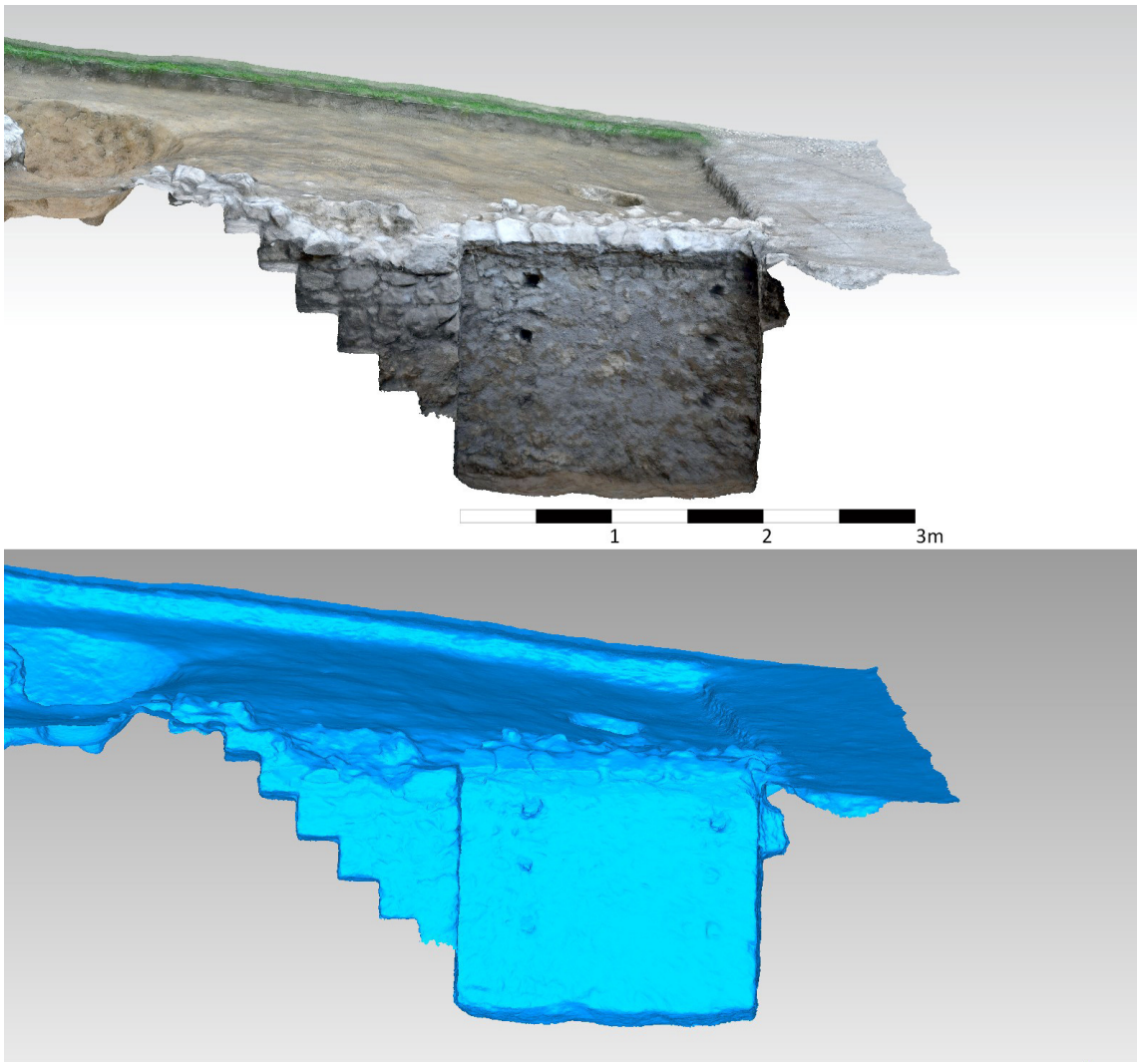


Fig. 6.3: Section through Cellar 1 showing the Northern wall with the six niches probably for the installation of shelves.

As the walls remained in situ, the construction pit of the wall **SU 156** was not excavated. It is, however, evidenced by the longitudinal **SU 133** alongside the northern wall of Cellar 1 consisting of dark sediment with loam and gravel, which is interpreted as the filling of the construction pit **SU 252**. The pit is only visible in the northwestern part of the cellar. The stones of wall 156 are most probably set directly against the walls of the construction pit dug into the clayey subsoil. Anyway, the feature would only be visible in the upper parts, where parts of the vertical construction pit might have collapsed. The first deposit in the refill of Cellar 1 (see Fig. 6.5) is **deposit 116**, which is characterized by loamy sediment, including small fragments of limestones (2 - 6,3 mm – 10 %, 6.4 - 20 mm – 2 %) and wooden fragments. It has a rectangular shape, is only some centimeters thick, and covers the entire area of the cellar. The wooden fragments might be interpreted as remnants of former shelves installed at the sidewalls of the cellar serving as storing space for

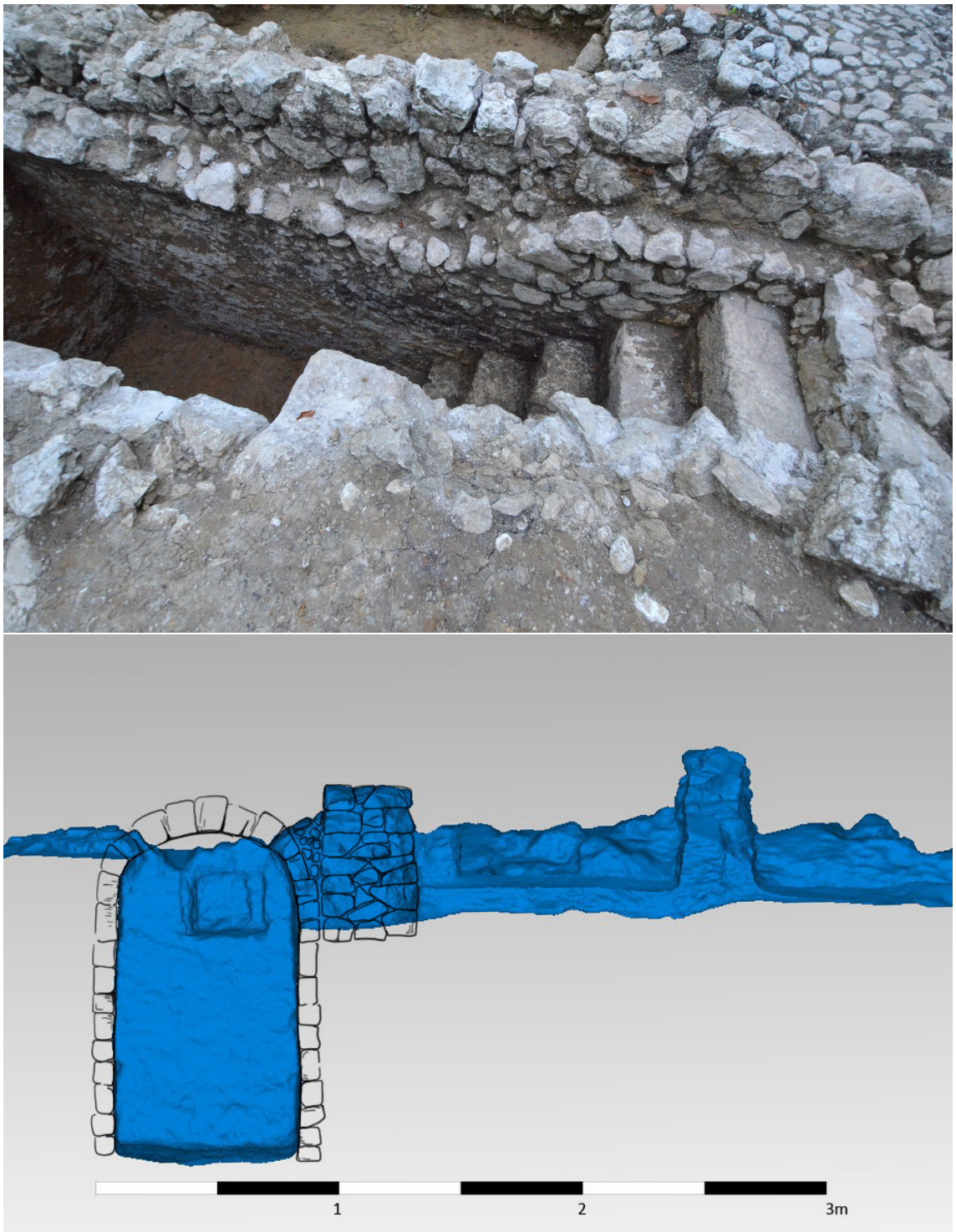


Fig. 6.4: Section through Cellar 1 showing the Northern wall with the six niches probably for the installation of shelves. Above: Cellar 1 photographed from the north with the remnants of the cellar vault. Below: Profile of the last stage of the excavation showing the walls of Cellar 1 - SU 156 – with the adjacent later built Foundation Wall 1.

food and other items. An alternative for the presence of the wood is a wooden

floor, which, however, is quite improbable since the construction technique of the stairways does not show any traces of recesses for wooden planking like it can be seen in Cellar 2 (see below). It is interpreted as an earthen floor made of rammed earth.

A surface is introduced here – this **surface SU 123** represents the floor level during the time of use of the cellar and might lie, according to the interpretation of SU 116, below (if deposit 116 are the remains of shelves) or above (if it is the remains of a wooden floor) of it.

SU 103 marks the end of use for the cellar and consists of dull yellowish-orange sandy clay mixed with little limestones (6.4-20 mm). It is a homogenous deposit that seems to have settled during a longer time span inside the cellar or resulted from an intentional refilling of the room. It shows a maximum z-extension of nearly 1.5 meters in the east; in the west, its depth features only about 0.9 m generating a slope from east to west, which might be explained by sedimentation/refilling from the east due to a partly collapsed vault or through the window. Its homogenous composition suggests an intentional back-filling of the cellar. For its thickness, it contains only a few finds. As the back-fill material presumably consists of discarded objects, it dates after 1850.

Find Number	SU	Material	Description	Comment	Catalogue Number	Dating
675	103	bone	bone			
676	103	metal	metal fragments			
674	103	pottery	pottery fragments	handle fragment	51	first half of 17th c.
674	103	pottery	pottery fragments	bowl with handles, in various stratigraphic units	157	19th c.
674	103	pottery	pottery fragments	bowl, in various stratigraphic units	171	1850-1900
678	103	stone	Silex	granite?		
677	103	wood	wood fragment			

Table 6.1: Finds in SU 103.

This possible intentional filling could be explained by the instability of the wall of the hermitage on the southern side of the hermitage. Filling the cellar would have stabilized the wall. However, there is no visual or other evidence for this theory. Above SU 103 is a deposit, filling out most of the cellar. This **deposit 87** consists of dull yellowish-brown sandy clay with small stones and some bigger stones. The bigger stones appear to be debris of the collapsed vault. The deposit is thicker in the eastern part. This can be explained as a result of the underlying deposit having a slope towards this side. The next SU, which was deposited after the collapse of the vault, creates a more or less horizontal plane. The deposit contains many finds (it has the highest number of finds in total), mainly pottery and metal fragments.

Find Number	SU	Material	Description	Comment	Cat. Number	Dating
699	87	bone	bone			
775	87	bone	bone, fish vertebrae	spoil		
784	87	bone	button		3003	14th-19th c.
594	87	glass	bottle neck	flask	1022	second half of 19th c.
597	87	glass	glass fragment			
602	87	glass	drinking glass fragment			
701	87	glass	glass fragments	flask	1026	~ 1700?
701	87	glass	glass fragments	flask, in two SU	1043	~ 1700?
702	87	glass	2 base sherds	flask	1026	~ 1700?
778	87	glass	glass fragments	spoil		
591	87	horns	button	button with four holes	3006	14th-19th c.
606	87	iron	metal fragments			
583	87	metal	ring oval	fire striker?	2081	14th-19th c.
584	87	metal	metal fragments			
586	87	metal	belt buckle	brass?	2017	14th-19th c.
590	87	metal	badge IML			
596	87	metal	fitting			
604	87	metal	2 buttons	tin?, button with hole	2007	14th-19th c.
608	87	metal	metal fragments			
698	87	metal	metal fragments			
703	87	metal	nonferrous fragment			
705	87	metal		fragment of buckle	2020	14th-19th c.
776	87	metal	metal fragments	spoil		
785	87	metal, cork	metal spiral, corkscrew in cork?		2098	14th-19th c.
582	87	pottery	base sherd	bowl	122	19th c.
589	87	pottery	base sherd, rim sherd, body sherd	holy water basin, in var. SU	178	18th c. (W. Kessel/Kathi)
592	87	pottery	lid	hollow lid	241	~ 1650
593	87	pottery	bowl with handle and metal ring	bowl with handles, copper ring for hanging	245	1775- 1800 (after 1700!)
598	87	pottery	2 base sherds			
599	87	pottery	bead	slate mould?	348	14th-19th c.
600	87	pottery	pottery fragments	jar, in var. SU	185	(~ 1820-comparable find); 8.-early 19th c.
600	87	pottery	pottery fragments	jar, in var. SU	186	17th-18th c.
601	87	pottery	shank/stem of a pipe?			
603	87	pottery	vessel fragments			
605	87	pottery	vessel fragments + patterned handle	bowl with handles, copper ring for hanging	245	1775- 1800 (after 1700!)
700	87	pottery	pottery fragments	pot with handles	19	16th c. (1419?-comparable nd)
700	87	pottery	pottery fragments	pot, in var. SU (catalogue:	49	middle of 15. - 16th c.

Table 6.2: Finds in SU 103.

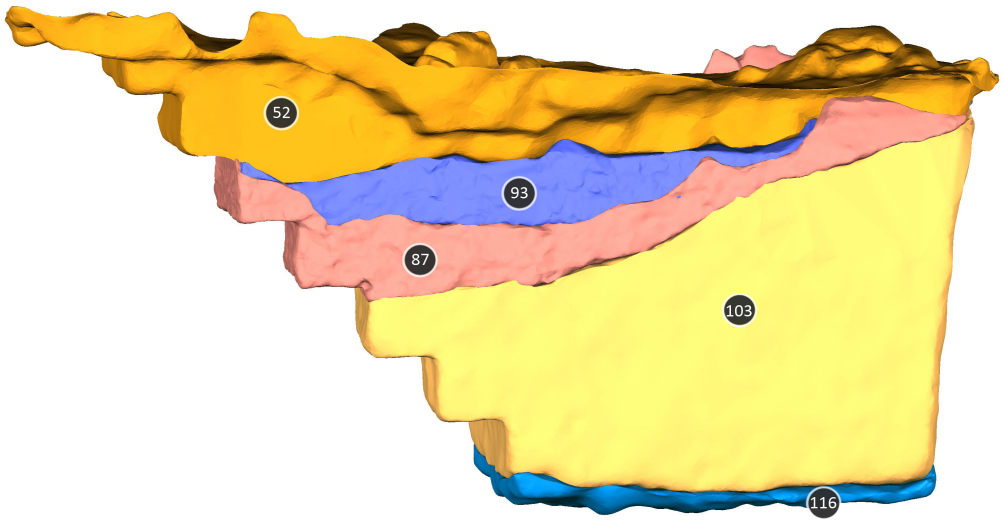


Fig. 6.5: Deposits in Cellar 1.

Deposit 93 (see Fig. 6.5) levels the ground in Cellar 1 and forms a horizontal plane. It is a sandy mortar grit with splits of bricks and small limestones. The consistency and layout suggest that it had been the top surface for quite some time. Both deposits 87 and 93 contain fragments of the same cataloged find - Cat. Nr. 180, 185, 204, 207, and 105; this suggests that both deposits result from one event and can be summarized as one. The collapsed vault area was possibly leveled with discarded materials after it collapsed.

Find Number	SU	Material	Description	Comment	Catalogue Number	Dating
574	93	bone	bone fragments			
575	93	glass	glass fragments			
573	93	iron	iron fragment			
572	93	mortar	mortar fragments			
570	93	nonferrous	clothing clasp/closure		2001	17th-19. c.
569	93	pottery	pottery fragments	bowl, in two SU	105	19th c.
569	93	pottery	pottery fragments	jar, in var. SU	180	17th-18Jh.?
569	93	pottery	pottery fragments	jar, in var. SU	185	(~ 1820-comparable find); 18.-early 19th c.
569	93	pottery	pottery fragments	jar, in var. SU	186	17th-18th c.
569	93	pottery	pottery fragments	hollow lid	342	~1650
571	93	wood	wooden nail			

Table 6.3: Finds in SU 93.

Cellar 2

Cellar 2 is located in the west of room 4 or rather embedded into the room. As the edge of the trench cuts the westernmost part, its ground plot and extension are unknown. Including the stairs, the excavated part has an L-shaped ground plot. The building material of the cellar walls – defined as **SU 157** – is limestone – the same as for Cellar 1 and the other walls. However, compared to Foundation Wall 1, the used stones are considerably smaller, and the cellar walls do not contain large stones. The walls are erected with irregular layers; spaces between bigger stones are filled with smaller ones. The mortar used for the cellar is grayish. The side walls are solidified roughly with mortar. The staircase measures 1.75 x 0.65 m, and eight steps lead down into the cellar. The first six are straight steps, 20 cm high; the last two steps turn in a 90° angle around the corner to the left, leading to the cellar room in the west; their height is only about 13 cm (Fig. 6.6). The walls and the stairs were built in one construction step. The recesses for the wooden cover of the steps are embedded in this construction, implying the planks were placed step after step while erecting the wall.

Fig. 6.6: Stairs with recesses for wooden covers in Cellar 2.

The time of the construction of Cellar 2 in relation to the erection of the hermitage is not apparent from the stratigraphic evidence as the area was not excavated entirely due to overlaying debris. The building of Cellar 2 after the construction of the hermitage and the stone floor in Room 4 is unlikely thinking of statics and the necessary effort to demolish an outer wall that would have been on the west side of room 4 running across the western part of the cellar. The only indication for the later construction of the cellar is the irregular edge of the **stone setting/paving 41**, which looks like it could have been taken away in the area of the cellar to build it. These edges, though, could also result from the excavation process. It could also be that the stones of the edge have fallen into the cellar after the trap door SU 99 (see p. 94), and the vault had already vanished. The former can be negated as photos of SU

22, 31, and 41 show that the irregular edges are visible in the process of excavating deposit after deposit and were not created accidentally removing them (Fig. 6.7). The edge could as well have been destroyed when the hermitage collapsed, and the area was flattened for another use – which seems like the most probable explanation. Therefore, it is assumed that Cellar 2 was built before the construction of Room 4.

The steps executed in the masonry were covered with wooden planks. **Deposit 114** is the rest of the plank, which covered the last step (step eight) of the stairs (Fig. 6.7). The analysis of the wood carried out by the University of Natural Resources and Life Sciences (Vienna) identified the wooden fragments as oak. They could not be dated, but the report states a "non-significant evidence for the late 16th century".[169] As the cellar was one of the first parts of the hermitage to be concluded, the "non-significant evidence" of the samples predate the historically recorded building date of 1659 by less than 100 years. The tree supplying the wood was most probably cut some years after the documented date, considering the missing wane. It is most likely that the wood has been used as the original planking in the construction of the cellar in 1659 after it had dried. The plank then remained in its place for the lifetime of the hermitage. The wooden planks are the level on which the cellar was used. Therefore, an interface of use (SU 113) was introduced, representing the time of use.

At the bottom of the cellar, a sandy deposit - **deposit 145** - was found. Excavating this layer, water was emerging from below. It was initially thought that the recent groundwater table was cut, but it resulted that water was also sputtering out of a wooden pipe in the lowermost part of the trench wall east of this deposit. As the excavation was stopped at this point, only rough references to the appearance/complexion of the pipe can be made. The pipe is visible as a longish wooden element leading from northwest to southeast at the deepest point of the eastern trench limit. Due to the emerging water and the fact that the pipe is located precisely at the trench limit, it is barely visible - only one long side could be seen. It seems to have an irregular quadrangular shape.

This pipe may evidence the presence of a spring in the cellar at the time of its use, which consequently can be linked to the legend of St. Wolfgang, which locates a medicinal spring underneath the rocks. Based on historical and archaeological evidence, we know that the healing water of the spring was sold as devotional objects in white and blue bottles, produced in local glass kilns in Aich[170] as well as in its branches in Zinkenbach[171] and Hüttenstein[172]. A theory is that the cellar was built

[169]Michael Grabner, Institute Wood Technology and Renewable Materials, Boku Wien 2012.
[170]Stopfer 2007-4, 132.
[171]Lipp 1976, 75, 79; Stopfer 2007-4, 132.
[172]Stopfer 2007-3, 105.

Fig. 6.7: Irregular edge (in red) of paving SU 41 in Room 4. Above: before removing SU 31; below: after totally exposing SU 41.

at this place to secure the hermit's/church exclusive access to the healing water and allowed them to tap and fill the bottles inside the hermitage and sell it to the passing pilgrims. It is possible that the erection of the hermitage partly served the purpose of securing access to the water added to the purpose of stopping the thievery from

Fig. 6.8: Left: Wooden plank – deposit 114 - on the last step of the stair of Cellar 2. Right: Plank after recovery.

Fig. 6.9: Wooden pipe at the bottom of Cellar 2.

Find Number	SU	Material	Description	Comment	Catalogue Number	Dating
574	93	bone	bone fragments			
575	93	glass	glass fragments			
573	93	iron	iron fragment			
572	93	mortar	mortar fragments			
570	93	nonferrous	clothing clasp/closure		2001	17th-19. c.
569	93	pottery	pottery fragments	bowl, in two SU	105	19th c.
569	93	pottery	pottery fragments	jar, in var. SU	180	17th-18Jh.?
569	93	pottery	pottery fragments	jar, in var. SU	185	(~ 1820-comparable find); 18.-early 19th c.
569	93	pottery	pottery fragments	jar, in var. SU	186	17th-18th c.
569	93	pottery	pottery fragments	hollow lid	342	~1650
571	93	wood	wooden nail			

Table 6.4: Finds in SU 145.

the offering box. As these findings emerged at the edge of the trench, the mentioned interpretation remains an assumption. Further excavations – the opening of a trench

to completely investigate Cellar 2 and among it the western extent of the hermitage – may clarify the context of the wooden pipe and its function.

Deposit 99 consists of partially decayed wood and brown clay. The deposit is L-shaped and limited by the walls and steps. The removal of the underlying deposit 145 had to be stopped due to a constant water flow. The wooden fragments could be the last preserved part of the masonry steps' wooden cover or the rest of a trap door, which covered the cellar. Indications for the latter are found in the following layer, containing a stone weight, which is interpreted as a counterweight for the trap door. (see Fig. 6.10) The counterweight system for the trap door would have consisted of a rope attached to the trap door. This rope would have led to a fixed pulley on the ceiling and had a counterweight fixed on its end. This facilitated the opening of the cellar door (see Fig. 6.11). Trapdoors help maximize floor space and are relatively easy to install requiring little carpentry experience. The brown clay beside the pieces of wood contained various finds, including glass fragments, a knife, a wooden handle, and pottery. An alternative interpretation of the wood as covering plank for the steps, comparable with SU 44, is possible. Due to its location, the interpretation as trap door is favored. Analysis of the wood undertaken by the University of Natural Resources and Life Sciences, Vienna, provided information on the type and age of the wood. The fragments were identified as spruce; dendrochronological analysis resulted in a date of 1696 without wane. The only dated pottery fragment (Cat.Nr.153) dates to the second half of the 17th century. The dendrochronological date suggests that the wood was used in the early 18th century.

Find Number	SU	Material	Description	Comment	Catalogue Number	Dating
565	99	glass	glass fragment			
566	99	pottery	pottery fragments, base sherd of a flower pot	plate (same set as Cat.Nr.:154)?, glazed (green, blue), in var. SU	153	second half of 17th c.
567	99	wood	wood fragments			1696
568	99	wood	wood fragments			
580	99	wood, metal	knife + wooden handle			

Table 6.5: Finds in SU 99.

At some point, Cellar 2 was partially filled with debris. **Deposit 95** is dull yellowish-orange clayey sand of which 60 % are bigger stones (bigger than 20 cm), 30 % are small components (2-6,3 mm), and 10 % pebbles (6,4-20 mm). The bigger stones resemble the stones at the walls in the north and east of the cellar. The deposit fills the lower part of the cellar, leaving five steps uncovered. Due to the restrictions of the wall, it is L-shaped and measures 1,3 x 1 m. The materials contained include the stone weight, metal fragments, and a basin fragment - a possible part of a holy

water stoup or baptismal font. The stone weight mentioned above as part of the counterweight system of the trap door is about 20 cm in diameter and has the shape of a hemisphere. Located on its top is a metal loop, allowing the attachment of the rope for the counterweight system for the trap door.

Fig. 6.10: Stone weight found in SU 95. It is about 20 cm in diameter and has the roman number XXIII encraved.

Fig. 6.11: Possible trap door covering Cellar 2. The found stone weight might have been part of a pulley system with a counterweight to operate the trap door.

On one side of the stone, the roman number XXIII is engraved. Another interesting find is the fragment of a basin made of marble; it is white with reddish spots, measuring 11.7 x 11 cm and a wall thickness of 2.2 cm. It might have been a basin

to collect the water from a spring, like the one now used in the Quellkapelle, or a stoup in the church replaced by another one at some point.

Fig. 6.12: Left: Possible marble basin or stoup fragments Cat.Nr. 4006; right: Current stoup in the Falkensteinkirche.

Above it, an inhomogeneous layer, consisting of dark humic sediment with bigger stones, was deposited. **Deposit 63** consists of 45 % small components (2-6,3 mm), 45 % bigger stones (>200 mm) and 10 % pebbles (6.4-200 mm). The sediment creates an even surface. The big, partially dressed stones stand out of this plane and are placed without any order. The stones (except the two biggest ones) seem to be the evidence for the collapse of the hermitage's walls or the vault of the cellar. The deposit is very thick, measuring approximately 90 cm at its thickest point. It fills the whole area of the cellar, exceeding its limits in the uppermost part in an irregular shape. It is assumed that it is an intentional filling. The debris contained a large quantity of pottery, brick, and glass fragments as well as a glass bead, wooden nails, lime, metal fragments, a possible casting mold of stone, and a piece of flintstone.
Above **SU 42** is deposited, which is brownish-black sandy clay with 40 % of stones (64-200 mm). It seems to be mixed with modern construction debris. The deposit contains lots of bigger, partially dressed stones. Therefore, it is interpreted as wall debris. The finds include pottery, glass, bones, and metal.
The uppermost infill in cellar 2 is **deposit 31**. It was described as odorous brownish-black sandy clay with 20 % pebbles (<20 mm). The dark filling contains brick debris, stones, glass, a crown cap, and pottery. The presence of catalog number 1058, a bottle that dates to 1920-1930, suggests that the filling event continued until more than 100 years after the use of the hermitage by hermits. This might be explained because the cellar vault may not have collapsed at once but little by little.
The **stratigraphic units 63, 42 and 31** are part of the same process of deterioration of the hermitage after its use. The accumulating debris could have broken the trap door (SU 95) with its weight while still intact or had already been damaged

Find Number	SU	Material	Description	Comment	Catalogue Number	Dating
562	95	glass	glass fragments			
563	95	marble	part of a stoup or baptismal font?	immured?	4006	
561	95	metal	metal fragments			
560	95	pottery	pottery fragments	bowl, in var. SU	171	1850-1900
563	95	pottery		spout, in var. SU	239	17th c.
524	95	stone	weight IIIXX		4005	
564	95	wood	wood fragments + wooden nail			

Table 6.6: Finds in SU 95.

and fallen down before. This **Interface 147** marks the end of the filling of Cellar 2. More debris accumulated above; however, this is attributed to other collapsing events. Due to the location of the excavation trench, the full extension of cellar 2 was not recorded. It was accessible from Room 4 (kitchen) without leaving the building. This would primarily suggest the function of a storage room for food. The water sputtering out of the wooden tube in the north wall is a phenomenon of karst hydrology. The historical evidence that healing water was sold on the Falkenstein and probable fragments of Wolfgangiflascherl (Fig. 6.13, Cat. Nr. 1006) led to the conclusion that the water healing water was retrieved from this point in the cellar beneath the hermitage.

Fig. 6.13: Left: possible fragment of a Wolfgangiflascherl found in SU 106 (Cat. Nr. 1006[173].). Right: Wolfgangiflascherl displaying Saint Wolfgang with a church model on a cloud; cobalt-blue, mould-blown glass; height: 12.2 cm, width; 8.9 cm.

As the cellars were probably built as one of the first constructions of the hermitage

Find Number	SU	Material	Description	Comment	Catalogue Number	Dating
543	63	bone	bone			
420	63	glass	bead			
550	63	glass	glass fragments	?	1027	18th c.?
452	63	lime	lime			
544	63	metal	metal fragments			
376	63	pottery	tiles of tiled oven			
542	63	pottery	base sherd, rim sherd, body sherd	holy water basin, in var. SU	178	18th c. (W. Kessel/Kathi)
542	63	pottery	pottery fragments	jar, in var. SU	185	(~ 1820-comparable find); 18.-early 19th c.
547	63	pottery	brick/tile fragments			
548	63	pottery	pottery fragments			
637	63	potter	potter fragments		48	
540	63	stone	casting mould?			
545	63	stone	pl. flintstone			
541	63	wood	wooden nails			

Table 6.7: Finds in SU 63.

(see p. 84, 90), it seems likely that the cellar was built at this location just because of the spring arising there. Building a cellar above the spring ensured that access to the healing water was limited to the hermits, which could fill them into bottles and sell them to the pilgrims.

Room 1

The layers in Room 1 present a unilinear sequence of stratigraphic units.

After the construction of Foundation Wall 1 (M1) and wall 4 (M4), which separates Room 1 and Room 2, the first activities can be seen in Room 1.

Deposit 115 is stone with a dimension of 40 x 30 cm in the east of the room. Deposit 109 consists of grayish-brown loamy sediment (Munsell color chart was not used in this case) with 10 % of small pebbles (2-6,3 mm) and is also located in the eastern third of the room. Its maximum depth is about 10 cm, and it is significantly thicker in the east than in the west. As the two deposits 115 and 109 create a nearly horizontal area, they are interpreted as leveling layers to even the natural underground. The leveling layer 109 contains pottery, bone, two metal nails, and an undated silver coin.

Find Number	SU	Material	Description	Comment	Dating
345	42	glass	preserving jar/glass		
368	42	glass	glass fragments		
367	42	wood	wooden fragments		
370	42	pottery	pottery sherds		
371	42	bone	bone		
369	42	metal	metal fragments		

Table 6.8: Finds in SU 42.

Find Number	SU	Material	Description	Comment	Dating
669	109	pottery	sherds		
671	109	bone	bone		
672	109	metal	2 nails	forged	
655	109	silver	coin		undated

Table 6.10: Finds in SU 109.

Deposit 106 is described as dull yellowish-brown sandy clay (and as middle brown loamy sediment), which covers the whole room except for the southern corner. Additionally to the sandy clay, it contains 5% pebbles (20-63 mm) and 5% stones (63-200 mm); this consistency indicates that it could be a bedding/foundation for the floor construction 100.

The photos of **SU 109** and 106 show very similar sediment in color and are in the same area of the room. It seems possible that these two stratigraphic units are one. The differentiation probably happened because the part assigned the number 109 is sloping down in the east, and it was cautiously tried not to mix up two deposits. A further indication that 109 and 106 form one unit is given by the presence of some fragments of cataloged finds (80, 211) in both SUs. 115, 109, and 106 are therefore seen as one event and are grouped as a leveling layer for a floor in the matrix.

Additionally, SU 106 contains a cataloged blue glass base sherd and a cataloged spout, pottery, bone, and uncategorized metal pieces. The blue glass base sherd might have been part of a “Wolfgangiflascherl”, the devotional flasks filled with the healing water originating at the Falkenstein.

Find Number	SU	Material	Description	Catalogue Number	Dating
683	106	glass	base sherd, blue	Cat.Nr. 1006/T65	
681	106	pottery	spout	Cat.Nr.0235/T28	1610/20-1650
685	106	pottery	sherds		
682	106	bone	bone		
684	106	metal	metal pieces		

Table 6.11: Finds in SU 106.

Find Number	SU	Material	Description	Comment	Dating
311	31	glass	glass fragments	1058	1920-1930
312	31	pottery	pottery fragments		
314	31	pottery	bowl of a pipe		
315	31	pottery	bottle cap „Gastgewerbe Grosseinkauf Salzburg“		
313	31	metal	metal fragments		
316	31	bitumen	bitumen		

Table 6.9: Finds in SU 31.

Deposit 164 is a stone setting inside of Room 1, alongside the western part of the northern wall. It consists of limestones from 10-35 cm without any mortar binding. Its stratigraphic relation was not recorded but established afterward by analyzing the photos. As darker sediment was visible between the geological underground and the stone setting, it was set above deposit 106. The stone setting is therefore interpreted as padstones for the above lying floor. The lack of stones alongside the other limits might be explained by the reuse of the stones when replacing the floor or the use of perishable materials which did not leave a trace. The former assumption is more probable since the wooden floor was partly preserved, and if wooden beams were used, they should have too. Following this interpretation, the underlying deposit 106 might contain material that fell through the above lying floor in the upper part.

Deposit 100 consists of wooden planks and beams, which are preserved in an area of approximately 1 m^2 in the northwest of the room. The wood is moldered and surrounded by loamy sediment. There are north-south oriented planks and east-west oriented timber beams to be distinguished. The former is 3 cm thick, the latter 7-10 cm. This layout makes it possible to address the deposit as a wooden floor, which initially covered the whole room. The timber beams would have been placed within the foundation/leveling layer 106, and the planks would have been fixed with nails on top of them (Fig. 6.17). The finds assigned to this layer, except the iron nails, are things that fell through the wooden floor while it was in use. The iron nails might be part of the floor construction or might have been deposited later while constructing the next floor. The only find which provides a date is a silver Kreuzer of Leopold I coined in 1700. This find probably came into the layer during the time of use of the floor level.

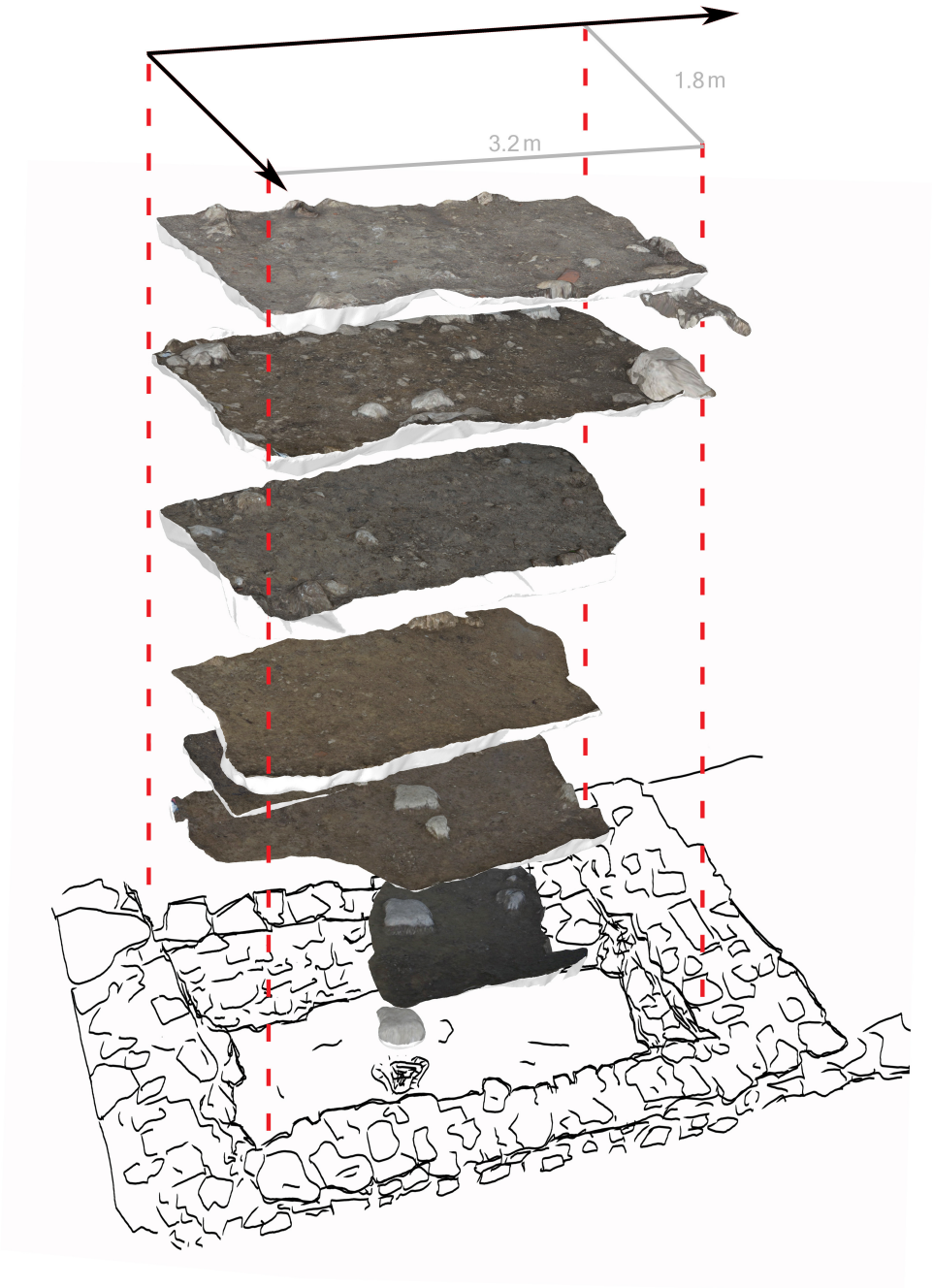


Fig. 6.14: Exploded-view of the 3D volumes created from the terrestrial laser scans of Room 1 with texture.

Find Number	SU	Material	Description	Comment	Dating
633	100	wood	wooden fragment		
636	100	pottery	sherds		
635	100	bone	bone		
634	100	metal	metal fragments		
581	100	silver	1 Kreuzer, Leopold I, 1700		1700
588	100	silver	coin		app. 1700?

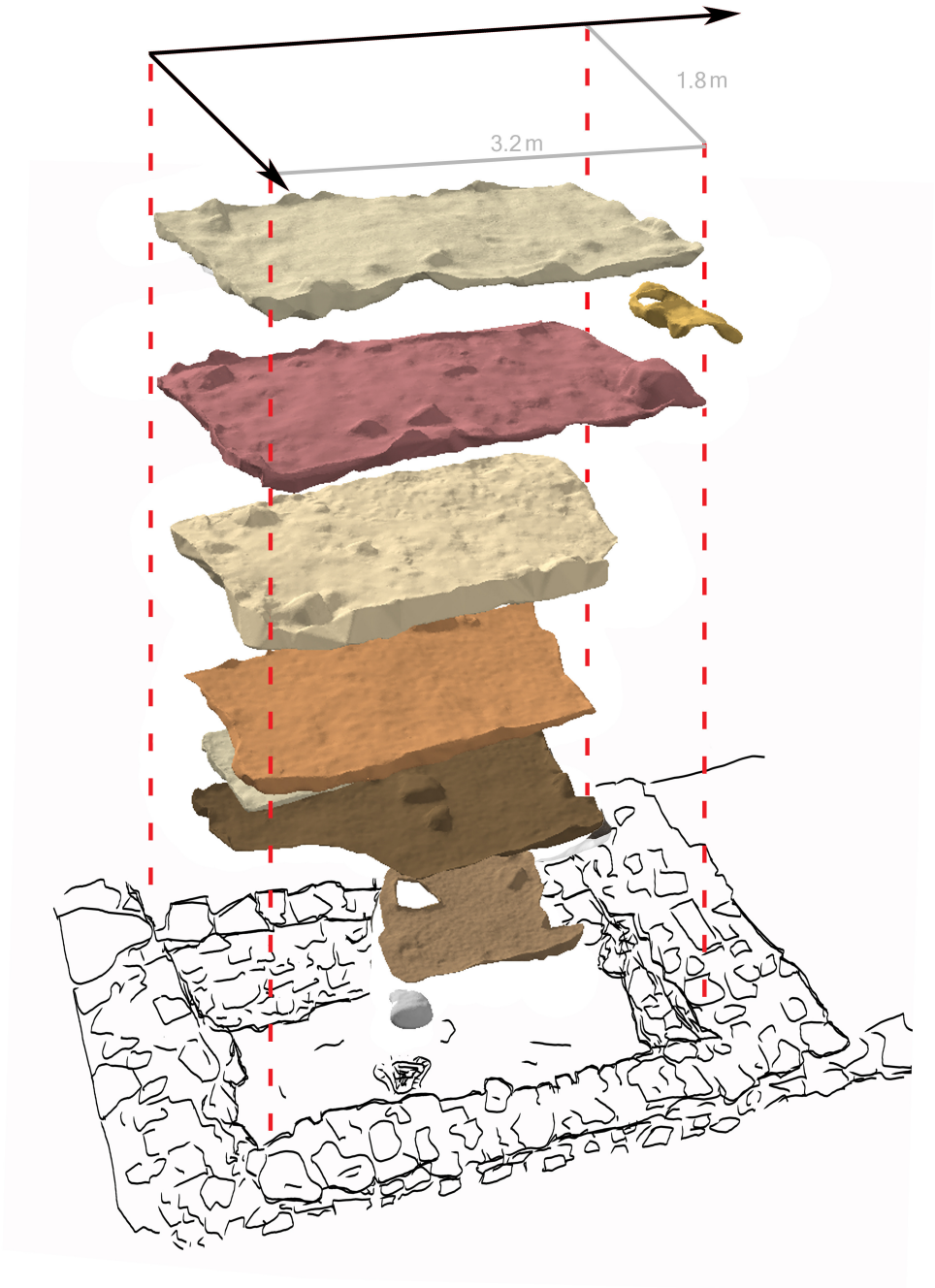


Fig. 6.15: Exploded-view of the 3D volumes created from the terrestrial laser scans of Room 1.

The phase surface 153 was defined above deposit 100 and represents the (time of) use of the floor.

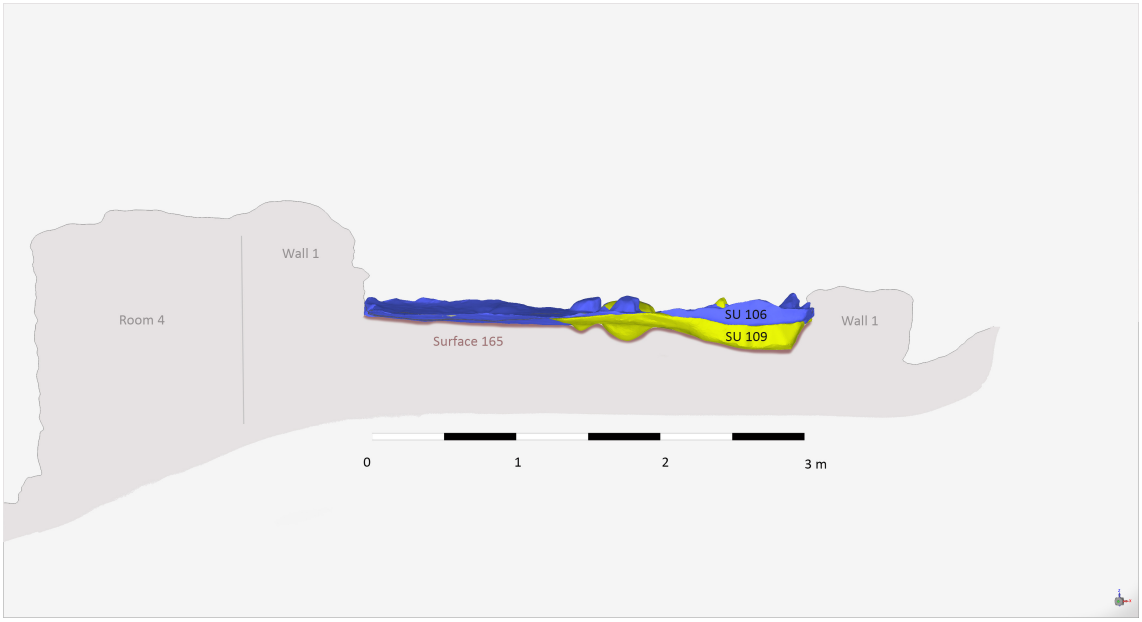


Fig. 6.16: The stratigraphic units 109, 106, and 115 (large stone in the middle) create a leveling layer on surface 165 for the overlying floor construction in Room 1.

During this time of use (or with the construction of the next floor 96), a stone setting dividing Rooms 1 and 4 was constructed. This stone setting - **wall 6** - consists of undressed limestones in different sizes. The stones are set directly above the sediment and are arranged without order. It is broader than the foundations mentioned until now, measuring 80 cm in width and approximately 195 cm in length. The stones are bound with grey mortar, differing from the yellow mortar used for foundation wall 1. It is attached to the hearth/oven in the south and to the foundation wall 1 in the north. In the center of the foundation, there is a setting of six bricks. It is interpreted as a door sill leading from room 1 to room 4 and is recorded as **SU 101**. The underlying wall 6 hence is not the foundation of a continuous dividing wall but the foundation for a wall with a door in it.

SU 96 was deposited above surface 153. It is a very loamy and compact deposit with many wooden fragments. In the middle, near the southern wall, there is a circular deposit with a diameter of approximately 25 cm consisting of pebbles. This pebble patch in the middle of the layer is neither visible in the photos nor distinguished as a deposit in its own right and can therefore only be seen as a deposition component. In the west corner, there is a patch of wooden fragments, which together with the wooden fragments in the rest of the layer suggest a wooden floor. The compact loamy sediment is most probable the bedding for a new floor level, even when the placement of the planks directly above the sediment does not seem comprehensible. The finds contain forged nails, a metal ring, some larger bone fragments, and some

Fig. 6.17: Remains of a wooden floor SU 100 in Room 1.

coins in the southwest corner – two of which are dated to 1715[174] (Fnr.:518) and 1684 (Fnr.:525).

Find Number	SU	Material	Description	Comment	Dating
579	96	glass	glass fragments	-	-
576	96	pottery	sherds	Cat.Nr.0237/T15 - jar, Cat.Nr.0193/T35 - bowl, Cat.Nr. 0270/T20 - jar	-
577	96	bone	bone fragments, tooth	-	-
519	96	metal	ring in two pieces	-	-
518	96	silver	coin 1715	-	1715
525	96	silver	coin 1684?	-	1684
549	96	silver	coin	-	-
559	96	silver	coin	in excavated material	-

Table 6.13: Finds in SU 96.

The interpretation of deposit 96 as floor requires the introduction of the **phase surface 161 IF**, which represents the time of use of the floor level.

[174] Might have fallen through the above lying floor level. (the bedding is dated to the end of the 17th century).

The following **deposit 74** consists of a homogeneous loamy and compact sediment with stones, charcoal, limestone, and a high percentage of pebbles (30% 20-63 mm), including finds like pottery, nails, a knife, and glass.

Find Number	SU	Material	Description	Comment	Dating
498	74	metal	knife		
465	74	silver	coin 1624		1624

Table 6.14: Finds in SU 74.

It is about 25 cm thick and is interpreted as material brought in to construct another floor level.

Above SU 74 lies **deposit 54** which consists of loose soil with lots of pebbles (2-6,3 mm – 10%, 20-63 mm – 10%) and bigger stones (63-200 mm – 2%); it is present in the whole area of the room. The central southern part containing the bigger stones appears to be part of a collapsed wall. The finds include brick rubble, an iron hammer (Fnr. 347), a decorative fitting (Fnr. 352), glass and pottery, and an undated coin which can only be referred to as originating from the Principality of Bayreuth in the Holy Roman Empire.

Find Number	SU	Material	Description	Comment	Dating
528	54	glass	glass fragments		
529	54	pottery	sherds	CatNr. 0164/T23, CatNr. 0170/T26	
531	54	bone	bone		
347	54	metal	hammer		
352	54	metal	decorative fitting		
366	54	metal	coin	Principality of Bayreuth/HRE	
530	54	metal	nails		

Table 6.15: Finds in SU 54.

Deposit 35 is a small area with brown sediment, referred to as debris with a humic matrix. It contains some stones, a glass flask (Fnr. 301), and pottery. The two previously described deposits are both interpreted as debris, concluding that the two layers originate from a renovation event – probably at the nearby church and are used as a leveling material.

Find Number	SU	Material	Description	Comment	Dating
301	35	glass	glass flask		
318	35	glass	glass fragments		
317	35	wood	wood fragments		
319	35	pottery	rim and body sherds of a pot	Cat.Nr.0317	
320	35	bone	bone		

Table 6.16: Finds in SU 35.

The above lying **deposit 32** is a poorly preserved mortar floor.[175] The most intact part is in the western half of the room. The deposit also contains loamy sand and pebbles (2-6,3 mm – 10 %; 6,3-20 mm - 20 %) and finds like pottery, bricks, nails, and glass which supposedly were deposited after the use time of the floor.

Find Number	SU	Material	Description	Comment	Dating
361	32	pottery	sherds		
362	32	bone	bone		
364	32	metal	metal fragments		

Table 6.17: Finds in SU 32.

Parting from the assumption of a floor, **surface 50** represents the last surface being used in this room.

Loose brownish-black clayey silt with 15 % of little pebbles (2-6,3 mm), brick and wall debris, and pottery are defined as **deposit 20**. The photo evidences a darker brown deposit in the eastern third of the room and the same dark brown sediment with more grayish inclusions in the west. Visually the latter seems like the sediment of SU 7 in Room 2, SU 18 (above the oven), and SU 22 in Room 4 (see Fig. 6.18). It is interpreted as intentional filling of the room to level the ground for another purpose after the use time of the hermitage. The finds represent a wide range of discarded materials (see table 6.18).

[175] It seems unusual to have a mortar floor without bedding, being directly set above of debris.

Fig. 6.18: SU 20 in the north, enclosed by Walls 1 and 4, SU 7 below, SU 18 in the center (above the oven), SU 22 right on the left of SU 18.

SU 6 is dark, humic sediment with pebbles (6,4-20 mm – 10%, 20-63 mm – 10%) and remains of the topsoil. It contained ceramic fragments, brick debris, and an iron plate (see tab. 6.19). Due to its characteristics and content, it may be interpreted as another filling of the room. Most likely, the filling was deposited there simultaneously to SU 20 and formed part of it.

Find Number	SU	Material	Description	Comment	Dating
129	20	glass	glass, pottery	CatNr. 0149a/T40 – perforated pot CatNr.0149b/T49 – perforated bowl	-
171	20	glass	body sherds		-
126	20	pottery	KO fragments	partially glazed CatNr 0193/T35 - bowl	-
127	20	bone	bone		-
130	20	metal	fitting keyhole plate		-
172	20	metal	crown caps	from Fnr. 126	-
128	20		snail shells		-

Table 6.18: Finds in SU 20.

Find Number	SU	Material	Description	Comment	Dating
83	6	glass	body sherd	sod zone	
149	6	glass	body sherd	from Fnr. 91	
167	6	glass	body sherd	from Fnr. 81	
79	6	pottery	tiled oven fragment, green	sod zone	
80	6	pottery	brick fragment	sod zone	
81	6	pottery	coarse	sod zone	
82	6	pottery	body sherd	sod zone	
84	6	pottery	rim sherd	sod zone	
85	6	pottery	rim sherd and body sherds	sod zone	
86	6	pottery	green	sod zone	
91	6	pottery			
94	6	metal	metal fragment		

Table 6.19: Finds in SU 6.

Oven-Hearth

Oven

In the northwest corner of room 2, a masoned foundation which was renewed various times, was excavated. The first quadrangular foundation **SU 137** was probably the first constructional activity in room 2. It is constructed with undressed limestones which are bound with light whitish-yellow mortar. Its orientation differs slightly from the later foundations built on top of it. Stratigraphically it is under the dividing wall (M4) between Room 1 and Room 2. It was not removed by the excavation process but remained in situ. Due to its shape and appearance, it is identified as

the oldest foundation of a tiled stove.

This oldest foundation is filled with **deposit 117**. It is a loose filling of stones of irregular quadrangular to rectangular shape and sediment, lying in the corner within the outline of the foundation 137. The stones and sediment are addressed as debris. The renewal might have taken place because of a collapse requiring a renewal of the stove or have been part of a more extensive renovation of the hermitage.

SU 83 is another foundation built atop of the debris and the older foundation. It is a U-shaped foundation, closed with the later constructed **SU 80** in the south. The u-shaped foundation is made of limestones bound with yellow mortar. In contrast to this masoned construction, the small SU 80 is a dry-stone wall with no mortar binding the stones together. The orientation is slightly shifted in comparison to the oldest foundation. SU 83 and SU 80 are identified as the second phase of the oven.

Find Number	SU	Material	Description	Comment	Dating
468	83	glass	body fragments		
469	83	pottery	body sherds, fragments of a stove tile		

Table 6.20: Finds in SU 83.

Find Number	SU	Material	Description	Comment	Dating
477	80	bone	div. fragments		
475	80	Eisen	nail fragment		
474	80	glass	1 RF , 1 BF		
476	80	pottery	pl. BF, RF, fragment of stove tile	Green, yellow, glazed	

Table 6.21: Finds in SU 80.

The youngest foundation is **SU 60**. It is also a quadrangular construction of limestone bound with yellow mortar. The orientation is the same as in the second phase (SU 83, 80). It was addressed as the third phase of the oven, constructed when a renovation of the old one was necessary.

These constructions are identified as foundations for an oven fired by a hearth located in the southeast corner of room 4. As the hearth and the oven work as a single entity, the constructions are connected, as seen in the record (see Fig. 6.19).

Find Number	SU	Material	Description	Comment	Dating
398	60	bone	flute		
423	60	bone	bone		
424	60	glass	glass fragments		
422	60	metal	Metal fragments		
429	60	mollusk	Snail shell		
425	60	pottery	pottery fragments		
428	60	pottery	pipe stem?		
421	60	slag	slag?		
426	60	stone	Slate with boreholes		
430	60	wood	wooden nail		

Table 6.22: Finds in SU 60.

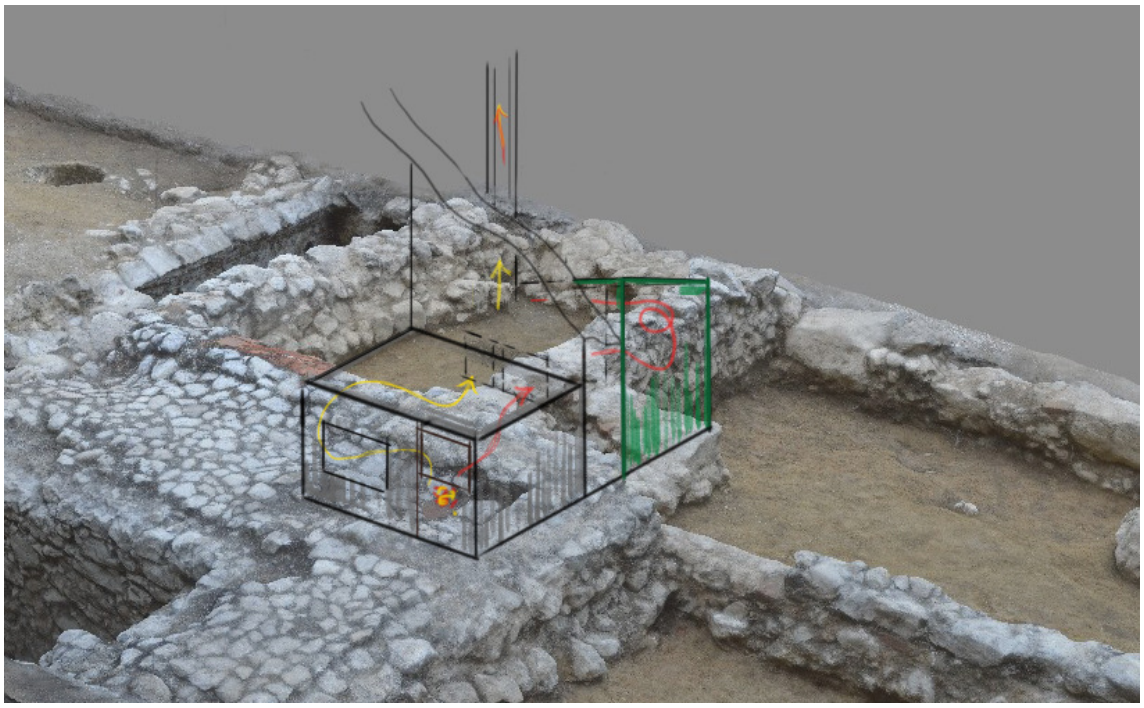


Fig. 6.19: Oven-hearth complex in the kitchen/living room. The tiled oven in the living room was fired from the kitchen, keeping the living room smoke-free.

Hearth

The first construction in the area of room 4 was the **SU 88**. It is a u-shaped foundation of limestone with its opening to the north northwest. Its orientation is the same as the building itself, being NNW- SSO. Undressed limestones of different sizes were used for this foundation, bound with the same yellow mortar as SU 83. The mortar and the thickness of the wall and its morphology are visually the same as in SU 83. They connect at the height of the dividing wall of rooms 2 and 4. Therefore, it is assumed that the two deposits were built in one construction step,

and together, they form the second phase of the hearth/oven construction (see Fig. 6.19, 6.20).

Fig. 6.20: Oven-hearth complex from the southeast.

SU 94 was built later on top of SU 83. It is located in the center of the u-shaped foundation 83, consisting of stones and bricks without mortar. The deposit is addressed as a combustion chamber, which had the floor covered with stones and bricks.

The hearth and oven form a central area in the house and contribute to the assignment of the function of the rooms. Many historical tiled ovens consist of a foundation (firebox) constructed directly at a wall and an eventual super construction. The super constructions often stood freely on the foundation. The (primary) function of tiled ovens is warming an interior space. The heating works by periodically burning fuel (wood).[176] Tiled ovens take longer to heat but generally keep a constant temperature for a more extended period of time than metal ovens and radiate with lower temperatures.[177]
Between the 8th and the 11th century, tile stoves (tiled ovens) could be heated with a new system – they could be run as breech-loader. This describes ovens fired from an adjacent room (see Fig. 6.20). The advantage of an oven fired from the living room is that the living room remains smoke-free. It was operated as a breech-loader,

[176]Roth Heege 2012, 129, 137.
[177]https://en.wikipedia.org/wiki/Masonry_heater

meaning that it was fired from the back. This is the 'classical' way of running a tile stove. Over the centuries, simple cubic box-ovens were popular; they often had a bench in the countryside.[178] The base of a tiled oven, like in the case of the hermitage, is generally a massive foundation/base. Located above the base is a furnace body consisting of stove tiles and fireclay. For reasons of stability, pebbles and brick fragments are often placed between the oven tiles in the fireclay.[179]
Beginning with the 1330s, cornice tiles and with 1370/80 corner tiles were produced; before that and in simpler constructions, fireclay was used for the transition of base and body and the corners between sidewalls. The simple box-ovens had horizontal areas which could not be covered with tiles. Ceramic cover panels were used for these areas from the first half of the 16th century in southwest Germany and Switzerland. Such cover panels were also used to cover the wall behind the tiled oven and as fire protection as floor tiles below. The upper area was mostly covered with a simple stone plate and/or fireclay hidden behind a decorative coronation tile. The interior of the oven, in the simplest case, is a hollow space without subdivision from oven tiles where a fire is burning.[180]
The smoke outlet could be the upper part of the firehole or a separate hole above the firehole. There are also contexts with ceramic pipes with sooting in the interior, interpreted as escape pipes.[181] According to Richard Atzbach, a chimney was not necessary, though – there are cases where the smoke streamed free through the house.[182]
Reconstructions of tiled ovens are based on archaeological contexts, historical illustrations, miniature ovens, still standing historical ovens, and practical experiments of reproduction of historical ovens. The tiled oven of the hermitage on the Falkenstein can be reconstructed from the foundations found in rooms 2 and 4 and the oven tiles as an archaeological base.(see Fig. 6.19)

The first oven was a quadrangular foundation in room 2. A corresponding hearth in room 4 was not excavated as the process was stopped at a higher level to preserve the stone pavement. The functional connection with a hearth in room 2 can only be established at the level of the second phase of the oven, which was built when the first foundation of the oven was in disuse. This second phase consists of the u-shaped foundation in room 2 and another u-shaped foundation in room four. They are connected at the wall between room 2 and room 4 and built with the same yellowish mortar and limestones. In room 4, with deposit 94, there is evidence of a

[178] Atzbach 2014, 195-196; Roth Heege 2012, 129.
[179] Roth Heege 2012, 129.
[180] Roth Heege 2012, 129-130.
[181] Roth Heege 2012, 135.
[182] Atzbach 2014, 200.

combustion chamber with a brick and stone-covered floor. In room 2, the u-shaped foundation was closed with a wall with no mortar binding afterward. The hearth seems to stay at this state until the deterioration of the hermitage, but in room 2, the tiled oven is renewed once more. This 3rd phase presents the second renovation of the oven. There were no finds of fireclay, which would facilitate the reconstruction of the superstructure of the tiled oven.

The oven tiles found at the Falkenstein have not been subject to further analysis until now. Preliminarily it can be said that there are many different tile fragments, including flat tiles with green glaze, relieved tiles with various plastic motives and green glaze, and a few yellowish-brown flat tiles. They were found in several of the stratigraphic units including 5, 7, 14, 18, 21, 25, 29, 33, 83, 71, 80, 36, 52, 60, 63, 96 (2011) and 187, 192, 212, 213, 224 (2012). Concentrations were found in SU (7?), 25, 29 and 63. So far, only the ground plot of the tiled oven – a quadrangular to rectangular one – can be reconstructed for sure. Due to the simple nature of a hermitage, the shape of the superstructure most probably was just rectangular, raising the ground plot of the foundation. More could be said after analyzing the oven tiles, although various architectonical reconstructions of oven types might be possible with the same set of tiles.[183] The system of the smoke outlet, location of the stirring hole, and other details are not known. The smoke outlet had to lead to the chimney, which is historically mentioned in a report of 1683 stating that maintenance was needed.[184]

Room 2

Room 2 is built at the same time as room 1. After building the surrounding walls (W1) and wall 4, which separate Room 1 from Room 2, the stone layer 127 was deposited. It consists of three big limestones located in the southeast of the room. The above lying SU 126 is dull yellowish-brown sandy clay with pebbles (2-6.3 mm – 10 %; 6.3-20 mm - 10 %) in the northeastern part of Room 2. There is a high percentage of charcoal in the layer; other finds include pottery and a metal door hinge (Fnr. 740). The high percentage of charcoal is interpreted as rotten remains of an assumed wooden floor installed above this level on pad stones (SU 122).

[183] see Roth Heege, 2012, 144.
[184] AES 10/36

Find Number	SU	Material	Description	Comment	Dating	Measuring point
761	126	pottery, metal	pottery fragment with metal			
755	126	bone	bone			
760	126	bone	Turned bead, bone?			
758	126	glass	glass fragments			
740	126	metal	Door hinge			yes
757	126	metal	metal fragments			
756	126	pottery	pottery fragments			
759	126	stone	Flint			

Table 6.23: Finds in SU 126.

Wall 4, which separates Room 1 from Room 2, was built above the first leveling layers in the two rooms, which indicates that the leveling layers in the two rooms might be one event of deposition. Foundation wall 4 was erected shortly after, presumably still in the same construction event as Foundation Wall 1. It consists of irregularly shaped and randomly placed boulders of different sizes running from ENE-WSW. The lowermost stones are all of smaller size, not until further above there are bigger stones. The smaller irregular stones are arranged in such a way to form a vertical face. The bigger stones are partially dressed. Mortar of yellow color was used as a bonding agent amongst the stones. The wall separates Room 1 from Room 2 and has a width of 40 cm. Its visible length is about 2,4 m. In the east, it attaches to Foundation Wall 1; partially, the mortar of foundation wall 4 is in superposition to Foundation Wall 1, which evidences their relative sequence.

SU 122 consists of two big limestones next to the east wall of the room. Both have a nearly rectangular outline and measure 40 x 30 cm. They seem to be placed intentionally there – either as pad stones or as material for a leveling layer. They protrude through the bedding/pebble layer 107 (and 110). Like the stone deposit, 115 and SU 106 and 109 in Room 1, the **stone settings SU 127, SU 126 and SU 122** are interpreted as layers leveling the natural terrain. (see Fig. 6.21)
There is no evidence of a floor; however, as it is supposed that the underlying layers can be addressed as leveling layers, it is assumed that there was another floor level. The surface **SU 162** marks the time of use of a supposed floor of perishable material, which either is entirely vanished due to bad preservation conditions or was removed in following renovation actions in the room.

The material, which was defined as **deposit 110** is dull yellowish sandy clay with little pebbles (2-6,3 mm – 5 %) and fills the whole extension of the room except for the southeastern corner. The loamy sediment is not homogeneous in color but mottled. It is described as a filling underneath a pebble layer (SU 107) and a bigger stone layer (SU 105). The interpretation on site was that SU 110 was a layer to

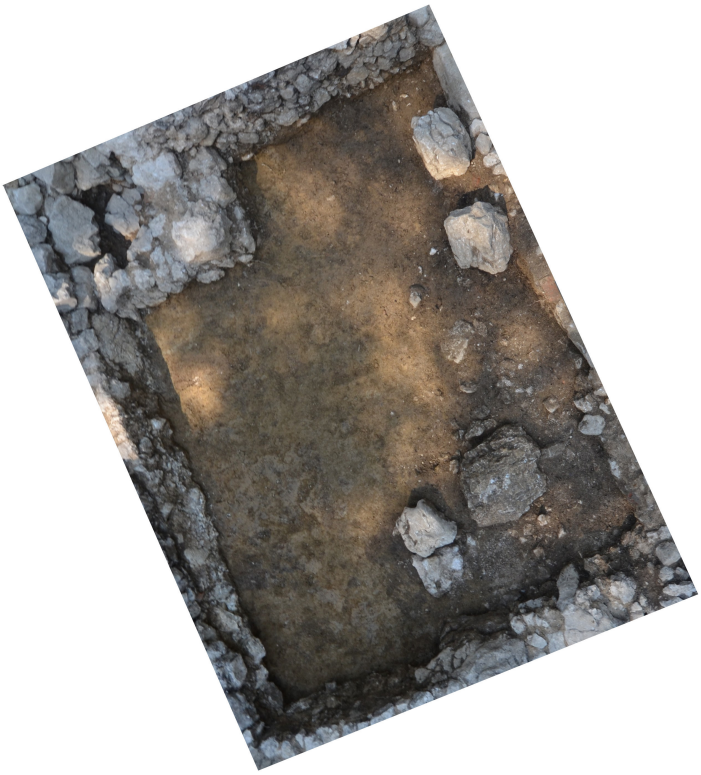


Fig. 6.21: Leveling deposits 122, 126 and 127.

level the ground. As the finds are primarily small single pieces (Table 6.24), it may be material that fell through the floor spaces (between the planks) during the use time. This interpretation was mentioned in a preliminary report. For me, it seems rather unlikely as items like the sundial and the turkey stone cameo are items of (personal) value, which would have been retrieved from under the planks. Also, the space between the planks must have been really big to allow a sundial to fall through. There is material like Cat. Nr. 1030 present in this stratigraphic unit, which is also present in other deposits, which are topographically not adjoining. One of these units – SU 126 – is also interpreted as leveling layer of the underground, another one - SU 52 - is the uppermost filling of cellar 1, and the stratigraphic units 10/33/51 are more recent units, which were found within the area where the glass vase Cat. Nr. 1030 was originally discarded. It seems as if parts of the vase were removed with material that served as a leveling layer and fills while they continued to use the area as a waste heap.

The **deposit 111** mainly consists of stones from 6,4-20 cm (30%) and stones bigger than 20 cm (60%), which are mixed with sediment. It is located west of Room 2 alongside the wall forming an elongated deposit. Due to its consistency and appearance, it is seen as debris of a collapse.

Above there is a pebble layer **SU 107** with pebbles of homogeneous size between

Find Number	SU	Material	Description	Comment	Dating
692	110	glass	blue pearl		
708	110	glass	gemstone		
714	110	glass	blue pearl		
722	110	glass	three base fragments		
725	110	glass	fragments		
726	110	glass	rim fragment, lid?		
720	110	wood	fragment		
717	110	pottery	fragments		
723	110	pottery	bowl of a pipe		
724	110	pottery	pipe bit/mouthpiece		
718	110	bone	bone		
667	110	metal	little ring		
668	110	metal	Wolfgangihackerl		
693	110	metal	(shoe)-buckle		
719	110	metal	metal pieces		
737	110	metal	pocket sundial		1682
661	110	Silber	coin		
662	110	Silber	coin		
664	110	Silber	coin	Eagle with striped shield, cross	
665	110	Silber	coin		
694	110	Silber	coin, one-sided		
656	110	stone	whetstone		
721	110	turkey stone	heart-shaped cameo		

Table 6.24: Finds in SU 110.

Find Number	SU	Material	Description	Comment	Dating	Measuring point
654	111	Silber	coin			

Table 6.25: Finds in SU 111.

6,4-63 mm. It covers the room except for a little area in the southeastern corner. It is 7-10 cm thick and therefore complies in material and thickness the requirements of a foundation/stone packing (Rollierung). There are a few ceramic sherds and some iron nails in the deposit.

Find Number	SU	Material	Description	Comment	Catalogue Number	Dating
648	107	bone	bone			
649	107	glass	glass fragments			
645	107	metal	metal fragments			
650	107	metal	metal hull, compressed	scape (of a scabbard)	2084	17-20 Jh
646	107	pottery	pottery fragments	pot with handles, in various stratigraphic units	301	16th c.
647	107	pottery	pottery fragments	bottle?, in various stratigraphic units	118	19th c.
647	107	pottery	pottery fragments	bowl, in various stratigraphic units	270	17- 18th

Table 6.26: Finds in SU 107.

Assumably, there had to be a floor above the bedding, which is not preserved. Nevertheless, an interface of use was introduced. This **surface 158** is the second floor-level in room two and can be correlated with surface 169 in room 3. Later on, **wall 5** (W5) was erected on this phase surface between Room 2 and Room 3 (Fig. 6.22). It is erected atop of foundation wall 1 and consists of a single row of limestones and smaller stones above it. The sizes of the stones differ from 10 cm to 40 cm. The wall is oriented NNW-SSE like the underlying foundation wall 1. It is set above wall 1 with mortar and is attached to it in the south. Its width is 28 cm, and, in the north, it does not extend until the other end of the rooms. It only extends for 1.90 m and then leaves a gap of 0.95 m. This gap is interpreted as a passage between room 2 and room 3. Looking into the 3D record, it is visible that the threshold has the same height as the floors in rooms 2 and 3, which supports the interpretation.

Fig. 6.22: Wall 5 between Room 2 and Room 3 built atop Wall 1.

In the case of room 2, wall 5 was built before the leveling layer for the next floor level (105-97-68) was completed. The erection of the wall and the subsequent new floor may be part of a renovation phase. Like in room 2 in room 3, a leveling layer for a floor (75) was done after building this wall. Therefore, floor levels 49 and 17 can be seen as contemporary.

The deposits 105, 97, and 68 are are thought to be one leveling layer.

Deposit 105 consists of stones – mostly of bigger ones measuring more than 20 cm (60%), 64-20 cm (10%) and pebbles 20-63 mm (10%). The stones are present in the whole room, but an accumulation is visible in the northern area. They form a horizontal plane. Between the stones, ceramic sherds, glass, iron nails, and a metal clasp for clothing (Fnr.: 587) were found. **Deposit 97** is dull yellowish-orange loam with 15% of pebbles (6,4-20 mm). It is an irregular loamy deposit, covering the stone layer 105 in the southern part of the room. It contains pottery, glass, metal, and coins.

The above lying **deposit 68** is similar in color (dull yellowish-brown) but described as sandy clay (and also dark loamy sediment) with bigger pebbles from 20-63 mm (15 %). It is especially rich in finds, containing 30 find numbers, the second-highest number of find numbers in a stratigraphic unit. It is assumed that the material of the three leveling deposits is from the same area. This assumption is supported by the presence of fragments of cataloged finds in all three or two of the units. The bowl with handles with the catalog number 238 is present in all three deposits; also, Cat. Nr. 237 – a milk jug – and Cat. Nr. 117 are present in all three. Cat. Nr. 239, the glass flask with the Cat. Nr. 1013, Cat. Nr. 224 and Cat. Nr 183 are present in SU 68 and 97.

Find Number	SU	Material	Description	Comment	Dating
620	105	bone	bone		
622	105	glass	glass fragments		
624	105	glass	Crown glass fragment ?		
587	105	metal	Clothing clasp		
621	105	metal	Metal fragments		
619	105	pottery	pottery fragments		
623	105	pottery	Pipe stem?		
625	105	pottery	decorated pottery fragment, face		

Table 6.27: Finds in SU 105.

Find Number	SU	Material	Description	Comment	Dating
612	97	bone	bone		
614	97	glass	glass fragments		
611	97	metal	Fragment of a pendant		
617	97	metal	Flower-like non-ferrous metal		
618	97	metal	Metal fragments		
616	97	mollusk	Shell fragments	Fresh water?	
613	97	pottery	pottery fragments		
615	97	stone	flintstone		

Table 6.28: Finds in SU 97.

Find Number	SU	Material	Description	Comment	Dating	Measuring point
512	68	metal	coin 1798	Maximilian I. Joseph von Bayern (1795–1825)	1798	yes
514	68	metal	coin	Ferdinand II. (1619–1639)		yes
497	68	silver	coin with emblem LBV 1668	Johann Philipp von Schönborn (1647–1673)	1668	yes
500	68	silver	coin	3 Kreuzer Karl VI (1711-1740)	1738	yes
513	68	silver	coin 1684?	Maximilian Gandolph Graf von Kuenburg (1668–1687)	1684	yes
515	68	silver	Max Ios v. Bayern 1766	Maximilian III. Joseph (1745–1777)	1766	yes
501	68	silver	coin	Tiroler Vierer 1650		yes
503	68	silver	coin	not identified		yes

Table 6.29: Finds in SU 68.

The most recent one is the find number 512, dating to 1798. Therefore, its primary use time would have been in the last quarter of the usage of the hermitage. They might also have fallen through the above lying floor (surface 17). The deposits 68 and 97 both contain fragments of the same vessels. It suggests that the leveling material was taken from a place where this vessel was discarded. The glass flask KatNr. 1013 (Fnr.533, 614) is only present in deposits 97 and 68. Other vessels belong to SU 97 and 68 and are scattered in more stratigraphic units. The pot with handles CatNr. 0305, the bowl with handles CatNr. 0183 and the bowl with handles CatNr. 0239 are amongst others present in SU 97 and 68.

The ceramic jar with the CatNr. 0237 (Fnr.: 539, 619, 613) and the tab handle bowl CatNr. 0238 (Fnr.: 613, 539, 619) are (amongst others) present in all three deposits (195, 97, 68). The three deposits are interpreted as material for leveling the ground for the planks/beams (SU 36/37/66/67) of the overlying floor because of their consistency, the fact that they form a horizontal plane, and the finds, which

seem to be fragmented material which was thrown away at some point.

SU 36 and 37 are wooden structures in the southern part of the room. They are both east-west oriented, relatively well preserved, and measure 135 x 33 cm and 135 x 25 cm, respectively. In/under(?) the wood of both SUs a total of ten wooden nails (SU 36: Fnr.: 374, 375; SU 37: Fnr: 386.388, 390-392, 396) were found. These finds belong to the stratigraphic unit. Other finds were recorded with the unit because they were removed with the sediment surrounding the wood. With SU 36, some tiles of a tiled stove (Fnr.: 487) were removed. With SU 37, some glass fragments (Fnr.: 416) and pottery (Fnr.: 417) were removed. They are most probably belonging to units lying above.

Find Number	SU	Material	Description	Comment	Dating
379	36	pottery	pottery fragments		
487	36	pottery	tiled oven fragments		
374	36	wood	Wooden nail	Found in/ under a beam	
375	36	wood	2 wooden nails	Found in/ under a beam	
416	37	glass	glass fragments		
417	37	pottery	pottery fragments		
386	37	wood	wooden nails	Fr.: 386, 387, 388, 390, 391, 392, 396	
387	37	wood	wooden nails	Fr.: 386, 387, 388, 390, 391, 392, 396	
388	37	wood	wooden nails	Fr.: 386, 387, 388, 390, 391, 392, 396	
390	37	wood	wooden nails	Fr.: 386, 387, 388, 390, 391, 392, 396	
391	37	wood	wooden nails	Fr.: 386, 387, 388, 390, 391, 392, 396	
392	37	wood	wooden nails	Fr.: 386, 387, 388, 390, 391, 392, 396	
396	37	wood	wooden nails	Fr.: 386, 387, 388, 390, 391, 392, 396	

Table 6.30: Finds in SU 36 and SU 37.

SU 66 and SU 67 are also remains of an east-west oriented wooden structure in the northern part. Their state of preservation is worse than the one of SU 36 and SU 37, and they are barely visible in the photographic record. They all lay above SU 97 on a horizontal plane and left their marks in the underlying SU 68. The units 66, 67, 36, and 37 are interpreted as parts of a wooden floor; as they are all oriented in the same direction and are relatively wide, they are addressed as wooden planks.

Find Number	SU	Material	Description	Comment	Dating
483	66	bone	different bone fragments		
484	66	iron	nails		
399	66	metal	Patron saint medal		
404	66	metal	coin		
485	66	pottery	pl. RF, WF	2T glazed	
478	67	bone	1 bone fragment		
479	67	Eisen	Longitudinal object, nail?	forged	
482	67	glass	2 fragments		
480	67	pottery	pl. WF, RS	2T glazed	

Table 6.31: Finds in SU 66 and SU 67.

The **stratigraphic units 23a and 23b=56** are stone settings made of bigger limestones. The deposit 23b was renamed to 56 for practical reasons while measuring. They are seen as part of the floor construction and maybe represent pad stones for the wooden planks. The stones are only present in the east of the room. 23a and 23b are physically divided; 23a lies more north. Deposit 59 is a loose stone layer in the northwestern area of Room 2. It consists of 64-200mm (30%) stones and stones bigger than 200 mm (70%). As there is no physical evidence for the wooden planks (36, 37, 66, 67) to lie above the stones, they were arranged at the same level in the Harris matrix.

The **surface 17** represents the last floor/use level of Room 2. It was in use until the hermitage was left to decay.

The **deposit 27=29** is brown sandy loam; it is further described as dark (darker than the underlying sediment) and humic, containing a lot of tiles from the tiled stove. The grittier material 27 (debris material from the wall) in the south was mixed with the loamy material 29, and therefore they were put together. Rests of mortar are visible in the southwestern corner and might have been part of the wall construction. It is assumed that in this SU, the last things in use before collapsing and the debris material of the collapse are combined.

Find Number	SU	Material	Description	Comment	Dating
261	27	bronze	coin		
218	27	metal	Wolfgangihackerl		
230	27	metal	coin 1684?		1684
233	27	metal	coin 1691		1691
300	29	2 metal + bone?	Bead on wire		
282	29	bone	bone		
304	29	bone	button		
250	29	bronze	coin		
262	29	bronze	bead		
263	29	bronze	coin		
264	29	bronze	Small bronce ring (open)		
265	29	bronze	button		
266	29	glass	bead (with drilled hole)		
268	29	glass	Glass flask	Cat.Nr. 1039	
276	29	glass	Bottle neck		
283	29	glass	glass fragments		
269	29	metal	coin		
284	29	metal	metal fragments		
295	29	metal	coin Franz II/I		
309	29	metal	coin		
409	29	metal	metal fragments		
410	29	metal	button		
415	29	metal	coin		
303	29	nacre	nacre fragments		
280	29	pottery	tiled oven fragments		
281	29	pottery	pottery fragments		
408	29	pottery	pottery fragments		
257	29	silver	coin Bayern with globus cruciger 1755		1755
310	29	silver	coin Joseph I, 3 Kreuzer 1711		1711
418	29	silver	coin		
259	29	stone	flint		
267	29	stone	polished stone object		

Table 6.32: Finds in SU 27 and SU 29.

SU 25 is dark brown sandy clay with pebbles from 20-63 mm (10 %) and 64-400 mm (30 %). The sediment is humic and densely rooted. It is located at the southern wall of the oven and is getting narrower in the north. It mainly contains tiles of a tiled stove (Fnr.: 255). In addition to the oven tiles, a coin from Maximilian I Joseph (?) of Bavaria (1795-1825) (Fnr.: 225), a flintstone (Fnr.: 236), metal pieces (Fnr.: 251), bone (Fnr.: 252), glass fragments (Fnr.: 253) and pottery (Fnr.:254) were found.

Find Number	SU	Material	Description	Comment	Dating
252	25	bone	bone		
253	25	glass	glass fragments		
307	25	glass	glass fragments		
225	25	metal	coin Max Joseph? Kg. V. Baiern		
251	25	metal	metal fragments		
305	25	metal	metal fragments		
254	25	pottery	graphite fragment		
255	25	pottery	tiled oven fragments		
308	25	pottery	pottery fragments		
237	25	stone	flint		
306	25	wood	wood fragments		

Table 6.33: Finds in SU 25.

Looking at its components, it is the debris of the tiled oven construction. Above of it **surface 149** was introduced to represent the end of Room 2 and the start of a phase of disuse.

Room 3

The layers in Room 3 are all heavily destroyed by a lime pit. The construction of it cut all layers and only left a small part of the fillings of the room intact. The first visible deposit in Room 3 is deposit 128, a dull yellowish-brown sandy clay located in the east of the room, alongside the wall.

Find Number	SU	Material	Description	Comment	Dating
741	128	metal	metal fragments		
743	128	silver	coin		
783	128	silver	coin		1691

Table 6.34: Finds in SU 128.

The coin found inside the deposit dates exceptionally late for being the first deposit in this room. As Room 3 is heavily disturbed by a later lime pit, it can only be assumed that the coin came in its position because of its construction or other factors.

Superimposed to SU 128 is **deposit 118**, which is described as a stone layer mixed with dull yellowish-brown sandy loam and pebbles. The sediment was described as grayish in the field. It is located in the east of the room and is L-shaped due to the interface cutting it. The SU record states that the deposit is maybe equal to 111 (Room 2) – the problem is that 118 is referred to as stone layer, 111 is interpreted as

debris of a collapsed wall. SU 111 is only present in the west, alongside the wall. If 118 continued to the east cannot be stated because of the interface, which is cutting it. As it is also present in the north, to the other wall, it is more probable that it had been a layer covering more of the room; most probably, it presents a leveling layer.

Find Number	SU	Material	Description	Comment	Dating
746	118	glass	glass fragments		
747	118	wood	wooden fragment		
745	118	pottery	pottery fragments		
748	118	bone	bone		
744	118	metal	metal fragments		
710	118	silver	coin		
711	118	silver	coin, 1688		1688
713	118	silver	coin		

Table 6.35: Finds in SU 118.

SU 102 is grayish yellowish-brown clayey silt with pebbles. It has the same layout as the underlying deposit 118, with an L-shaped ground plot. The layer might have covered the whole room, but in any case, had a greater extension than at the point of excavation.
It has to have been in use at the same time as deposit 107 in Room 2, because like in the case of SU 107 the wall 5 (W5) is placed upon deposit 102, which means the two deposits were in use at the same time. Therefore, the surfaces 158 and 169 are correlated and present a phase interface.(see Fig. 6.23)

Find Number	SU	Material	Description	Comment	Dating	Measuring point
652	102	bone	bone			
653	102	metal	metal fragments			
651	102	pottery	pottery fragments			

Table 6.36: Finds in SU 102.

The **surface 169** was introduced above deposit 102 to mark the time when this surface was open, which comprised at least the time of construction of Wall 5.
After the construction of Wall 5 (which is described above with Room 2), it came to the deposition of **SU 75**. The deposit is described as dull yellowish-brown sandy clay. While excavating, the SU was defined as covering the whole room area and excavated like that. Further excavation, however showed that a boundary to another stratigraphic unit was not visible at the moment of removing it. Observing the photographic record, the northwest edge of SU 112 can be seen in SU 75's photo.

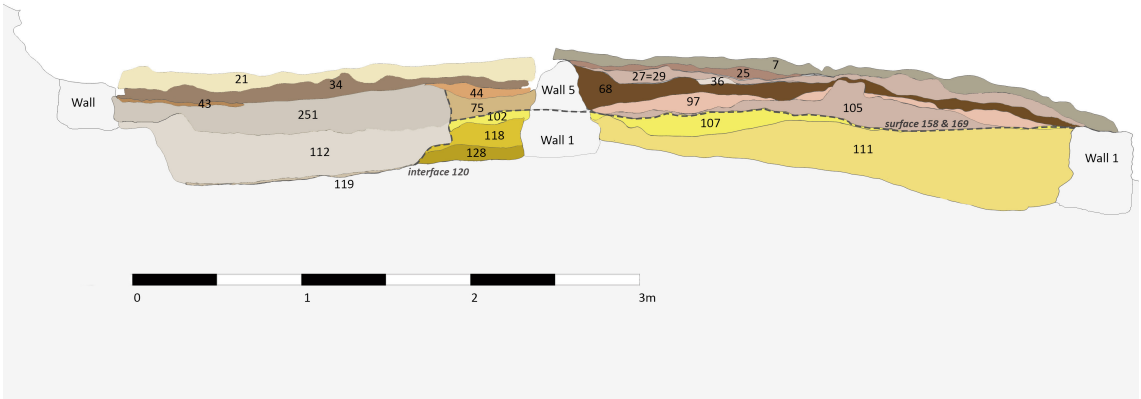


Fig. 6.23: Section through Room 2 and Room 3. SU 102 and SU 107 are located at the same height.

A brighter yellowish area can be distinguished from darker sediment alongside the eastern wall (W5) and the northern wall. A darker patch in the west of the proposed SU makes the distinction to the north in the very western part difficult.

Fig. 6.24: SU 75 and SU 251.

SU 75, therefore, only comprises the darker sediment with stones alongside the eastern and northern wall (see Fig. 6.24), suggesting a cut with the extensions of

112 (IF 120 - see Fig. 6.23). The central part of what was named deposit 75, therefore, is given the **SU 251** and is stratigraphically arranged much later as part of the filling of the construction pit. Its finds are mixed with the finds of SU 251.

Find Number	SU	Material	Description	Comment	Dating
627	75	bone	bone	limits of deposit were not recognized; finds mixed up with finds of later construction pit (SU 251)	
630	75	glass	Bottle neck, heat effects	see above	
631	75	glass	glass fragments	see above	
555	75	metal	coin 2 Heller 1893	see above	1893
629	75	metal	metal fragments	see above	
626	75	pottery	Fragment with fish scale pattern, blue, white	see above	
628	75	pottery	pottery fragments	see above	
632	75	pottery	Pipe neck?	see above	
526	75	silver	coin Ferd. II	see above	
527	75	silver	coin	see above	
546	75	silver	3 Kreuzer, Leopold I, 1699	see above	1699

Table 6.37: Finds in SU 75.

Above this stratigraphic unit, three deposits lie in the very east and north of room 3. **SU 44** is rectangular and measures 20 x 35 cm; it is limited by stones, except for the southwestern area. It mainly consists of a fragment of wood; a metal nail (FNr. 377) was found in it. The orientation of the wood fibers is perpendicular to the stone wall W5. Therefore, it is supposed to be a wooden component of a floor construction, most probably a plank. The **deposit 61** defines a half oval deposit with an extension of approximately 30 x 40 cm. It contains a lot of wooden fragments; its state of preservation is worse than SU 44; as it lies at the same height as SU 44 is interpreted as part of the wooden floor as well. **SU 58** is an elongated rectangular unit of 30 x 120 cm. Some bigger stones mark the area. The whole area is covered in wooden fragments, especially concentrated in the western corner. It is interpreted as an east-west oriented wooden plank. The SU 70 extends the SU 58 to the room's northeast corner. It is dark brown sediment with some wooden fragments. SU 58 and SU 70 are seen as one unit, a plank that decayed to a higher degree in the east corner. **The interfaces 77, 78 and 79** represent the impressions of the described wooden planks. The planks are part of a wooden floor destroyed by the construction pit. They are only preserved in the very east and north, but it is evidence for another surface – SU 49. This is the last proven floor in Room 3. **Deposit 43** mainly consists of tile debris mixed with dark brown sandy loam. It is only present in the north and east of the room as it is cut by the construction pit.

There are isolated little stones and some finds. The deposit was definitely placed there in a phase of disuse of the hermitage.

Find Number	SU	Material	Description	Comment	Dating
354	43	glass	glass fragment		
356	43	pottery	pottery fragments		
349	43	bone	bone		
350	43	metal	metal fragment, clasp		

Table 6.38: Finds in SU 43.

Construction pit

The layers in Room 3 are all cut by a feature, which takes two-thirds of the area of the room at its biggest extension.

SU 120 represents an interface of 2 x 1.5 m (north-south, east-west), cutting the topmost layer underneath the humus – the stratigraphic unit 43. It is a rectangular pit with vertical walls, which uses the southern wall as a limit; the rest is cut into the preexisting stratification. The base is flat, and its extensions are a little smaller than at the top, measuring 1.9 x 1.45 m.

SU 146 consists of 10 (unexcavated) post holes that are arranged alongside the walls of the pit. They are interpreted as part of a planking of the pit. SU 119 is a lime deposit at the base of the pit. The lime covering of its interface identifies the pit as a lime pit for construction works.

This **deposit 112** is inhomogeneous sediment, which is described as grey-brownish and loamy with stones and wood fragments; it's heavily mixed with lime and has some sandy areas. It is a filling brought in after the use of the lime pit.

Find Number	SU	Material	Description	Comment	Dating
691	112	glass	glass fragments		
687	112	pottery	sherds		
688	112	bone	bone		
659	112	metal	patron saint medal, cross IHS, saint with staff		
689	112	metal	metal pieces		
686	112	sulfur	Sulfur stone ?		
657	112	silver	coin, with emblem 1681		1681
658	112	silver	coin, eagle, shield in flower		
660	112	silver	silver coin 1732		1732
663	112	silver	coin, flower	like Fnr. 658?	
666	112	silver	coin, emblem?		
673	112	silver	coin	poorly preserved	
690	112	stone	dressed stone		

Table 6.39: Finds in SU 112.

SU 251 was assigned in the process of analyzing; this stratigraphic unit is the central part of SU 75. It consists of an inhomogeneous filling comprised of brighter dull-yellowish/beige sediment and darker components. It contains stones and some brick fragments. Its outline is visible in the east, where it is distinguishable to darker sediment alongside the wall, and in the northeast, where a corner is visible. These two lines correspond with the outline of the underlying deposit 112, which is clearly delimited by a frame of lime. SU 251 is interpreted as filling of the upper part of the lime pit, where the lime did not reach. The inhomogeneous components of the filling made the differentiation on-site difficult.

SU 76 is an interface is interpreted as another smaller construction pit dug into the older one. It has an irregular oval shape and measures approximately 100 cm x 50 cm. It is filled with deposit 69, comprised of 50% loose stones; the other half is dark sediment. The filling might also be a fill component of the construction pit above at the level where the lime was visible. Possibly it was part of the fill 75, which filled the upper part of the pit. If that interpretation is accurate, interface 76 would be obsolete. The only finds are some pottery fragments (find Nr. 419).

In the already filled lime pit, another pit was placed at some time – **interface 57** marks this rectangular pit. Like the first one, it uses the southern wall as a limit, while the other walls are cut into the sediment. It comprises an area of approximately 110 x 70 cm, has vertical walls and a flat base. It might have been dug in the course of yet another church renovation. In this pit, a planking of wood was placed. It was assigned the **SU 65** and consisted of three wooden planks at the bottom of the pit. They are oriented east to west and are preserved in an area of approximately

60 x 90 cm. Partially they are covered by a 1-3 cm thick layer of lime. In this area, the wood is better preserved than in the others, where it only could be seen as dark humic sediment and impressions. The find assigned to the layer had to have come in after the disuse of the pit and are likewise part of the above lying fillings.

Find Number	SU	Material	Description	Comment	Dating
464	65	iron	nails	forged	
460	65	wood	plank	rests of mortar at one side	
461	65	pottery	small tile fragment		
462	65	pottery	1 WF		
463	65	pottery	tile fragment?		

Table 6.40: Finds in SU 65.

Above, in the western half of the pit lays **deposit 64** of small pebbles (2-6,3 mm) with an extension of approximately 60 x 60 cm. A wooden fragment with a nail in it was found in this deposit. It is probably debris of the construction works. After the deposition of the pebbles, a rectangular structure – **SU 55** – with dimensions of 0.5 x 0.3 m entered the pit. It is pure lime and therefore interpreted as a bag of lime that has not been used anymore and left in the pit. Dull yellowish-brown sandy clay, which is delimited by a frame of lime with dimensions of 1.5 x 1m, is identified as **deposit 53**. The finds contain glass fragments, a coin, iron nails, and a worked stone. It is addressed as filling of the pit, occurring after its use.

Find Number	SU	Material	Description	Comment	Dating
346	53	glass	glass fragment		
344	53	metal	coin		
348	53	metal	iron nails		

Table 6.41: Finds in SU 53.

A second filling is **deposit 34** which consists of brownish-black sandy clay with stones (6,4-20 mm – 15 %, 20-63 mm – 5 %). It is a loose oval-shaped filling with a maximum thickness of 40 cm. It contains brick fragments, and underneath them, there were wood fragments; numerous bigger stones are seen as debris, and there was also a block of burnt lime. The contents support an interpretation as filling with materials from construction work.
As the construction pits use the southern wall of the hermitage as a limit, the foundations of the hermitage had to have been visible at that time.

Room 4

The first events in room 4 could not be retraced as the excavation was stopped at the stone layer **SU 41**. This stone setting consists of undressed limestones of different sizes. Most of them measure about 7-15 cm, but their sizes reach from smaller filling stones of about 3 cm to bigger ones of about 20 cm in length. They cover the whole floor area in room 4, except for the hearth in the southeast corner and the area of the stairways to cellar 2. The paving is compact and carefully set. The edges towards the cellar in the west are irregular and give the impression that stones might have been ripped out. This is the only indication that cellar two might have been built after the hermitage was already erected. The pavement is the first and only floor detected in room 4. The paving was left in situ, and the excavation was not continued at this point to preserve it for eventual later reconstruction of the hermitage.

The relation to the hearth in the southeast is unclear because it is not excavated further. It seems as if paving 41 was attached to the hearth after the latter was built. Interface 40 was inserted into the stratigraphic sequence to represent the use time of the floor in room 4.

Above it, there is **deposit 22**, which is sediment with 20% of small pebbles (<20 mm). It is a rectangular deposit in the central area of room 4, covering the western wall of the hearth. The sediment is lying above the stone basement and is thought to be the remains of the humic topsoil. It contained pottery, glass, and brick fragments.

Find Number	SU	Material	Description	Comment	Dating
231	22	glass	glass fragments		
228	22	wood	wood fragments		
227	22	pottery	tiled stove fragments		
229	22	bone	bone		

Table 6.42: Finds in SU 22.

Deposit 28 is dark sediment 20% of small pebbles (<20 mm), resembling deposit 22. It is lying above deposit 41 in a quadrangular to oval area located in the north of room 4, partially covering the surrounding wall 1 in the north of the room. As deposit 22, it is addressed as rest of the humic topsoil and contains pottery and fragments of bricks.

Find Number	SU	Material	Description	Comment	Dating
247	28	glass	glass fragments		
245	28	pottery	tiled stove fragments		
246	28	pottery	layer of sherds		
248	28	bone	bone		

Table 6.43: Finds in SU 28.

Room 5

A fifth room in the south of the hermitage is evidenced by two walls addressed as wall 2 and wall 3. These walls are perpendicular to the wall south of room 2 and room 3 and seem to confine another room. Only the upper part of these stone settings is visible as this area was not excavated further (see Fig. 6.25).

Wall 2 is the western confining wall. It consists of a single row of limestones running north-northwest to south-southeast. The stones measure 20 x 20 cm as a maximum extension. At the northern end, where it is attached to wall 1, a stone bigger than the others is shifted to the east.

Wall 3 parallels wall 2 and forms the eastern confining of room 2. It is only visible in two limestones, bigger in extension than those used at the western wall.

The room is interpreted as an annexed chapel. This is evidenced by historic illustrations showing an annex in the south of the hermitage, which is narrower than the building itself. This annex has a small belfry on every illustration. Historical records mention an annexed chapel which could have included a belfry. For instance, Jacob Rieder writes in 1701 that he had equipped the annexed chapel with a little altar.[185] The surface left without excavating between the two walls was given the **SU 46**.

[185] AES 10/36

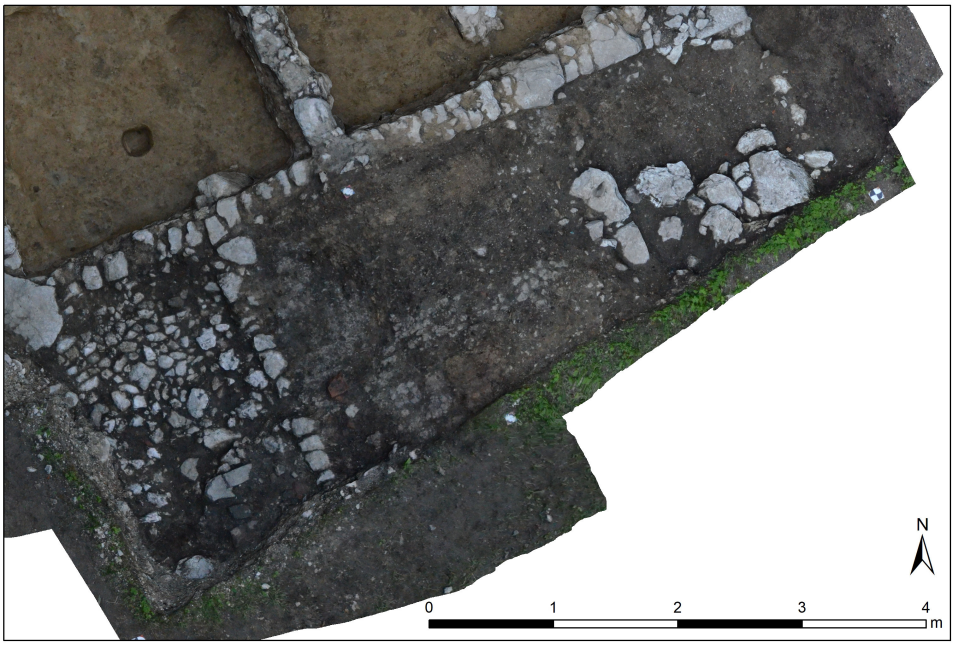


Fig. 6.25: The yet to excavate Room 5.

Modern Hay barn

Above the two Walls 2 and 3, two deposits were removed. **Deposit 10** was located above W3 and consisted of humic sediment with 20% of stones (20-63 mm and 64-200 mm). It has a rectangular shape with a bulge towards SU 2 and is limited by the trench limits in the east. It contained modern finds and charcoal (see table 6.44).

Find Number	SU	Material	Description	Comment	Catalogue Number	Dating
140	10	bone	bone			
158	10	bone	two bone fragments	from fnr. 103		
201	10	bone	button - horns?	button with four holes	3005	16th-18th c. & 1900+
105	10	charcoal	charcoal			
101	10	glass	body sherd	vase?, in various stratigraphic units	1030	16th-18th c.?
102	10	glass	various body sherds			
157	10	glass	various fragments	from fnr. 103		
162	10	glass	various fragments (beer bottles)	beer bottle, from for. 139, in various stratigraphic units	1049	1890-1910
162	10	glass	various fragments (beer bottles)	from fnr. 139, in various stratigraphic units	1053	1920-1932
97	10	metal	Sappel			
99	10	metal	1 Groschen			1926
100	10	metal	K.K. Kreuzer Oesterreichische Scheidemünze (Royal and Imperial Austrian small money)			1885
138	10	metal	metal fragments			
141	10	metal	pocket knife		2078	1900+
142	10	metal	key hole			
159	10	metal		from fnr. 103		
161	10	metal	nails + various fragments	from fnr. 103		
210	10	metal	button	brass?, button with hole, spoil	2004	1900+
103	10	pottery	rim sherds + body sherds partly glazed	pot, in various stratigraphic units (catalogue: only SU87?)	49	middle of 15. - 16th c.
139	10	pottery	pottery fragments	jar, in various stratigraphic units	186	17th-18th c.
156	10	pottery	rim sherd green	from fnr. 102		
125	10	shell	shell			
160	10	wood	several wood fragments	from fnr. 103		
104	10		seeds			

Table 6.44: Finds in SU 28.

Deposit 24 is located above wall 2 and consists of dark brown (10YR3/3) sandy loam. It is described as a humic deposit containing recently burned wood. Due to their location and their contents, deposit 10 and 24 are interpreted as remains of the use of a hay barn. The hay barn is visible in several photos of the beginning of the 20th century (see Fig. 4.18 and 4.19). The three units representing the sod in the two excavation trenches and the extension in 2012 (SU 1, 170, 180) are easily correlated, and so is their interface (SU 8, 72).

North of the hermitage

Latrine Pit

The pit in the northeast corner of the trench of 2011 was cut by its limits; the remaining part was excavated in 2012. The **interfaces (131, 249)** of the two parts of the pits can be correlated with certainty too. The interface of the pit seems to show a significant depth difference between 2011 and 2012 in the 3D-data – photographic data though evidence, that the deepest part of the pit is ending in a steep slope just a few centimeters east to the trench limits of 2011.

Fig. 6.26: Latrine pit in the northeast corner of the trench of 2011.

As to the filling(s) of the pit, it becomes more difficult because varying differentiations were made. The thick filling SU 125 of 2011, described as dark-brown loamy, humic filling, is topographically opposed to the three fillings SU 237-239 of 2012 described as brown loam, grayish-brown fine sediment with brown loam flocks, and dark brown loamy filling with little grit, respectively. Above of SU 125, **deposit 72** was identified; it consists of dark brown sediment in an oval shape which is clearly different from the surrounding light brown sediment. To the south and the west, it is delimited by stones. The catalog numbers 252, 212 and 1025 are objects distributed in both stratigraphic units, suggesting that these might be an entity. Most

probably, the pit, being interpreted as a latrine pit reused as a waste pit, consists of different fillings, which have been differentiated to a higher grade in 2012. If the interpretation of a reused latrine pit is accurate, the composition of such a latrine consists of different events of discard resulting in different deposits. Waste such as pottery and a drinking glass was discarded into this latrine pit and might have moved between different deposits. The differentiation between the deposits does not give any further information. It has to be assumed that the contents of the latrine pit were repeatedly removed; the shape of the pit also indicates this. It can be described as pear-shaped, and it is conical to the bottom. Removing the contents, its original outline would have been modified from time to time. The contents date from the 14th to the 17th century, supporting the interpretation of a pit used to discard waste.

SU	Color (Munsell)	Soil type	Coarse soil	Coarse Soil Size	Coarse Soil %	Structure	Density	Topographic Description	Arch. Characteristics/Finds
125	10YR5/4 dull yellowish brown	clay	edged-angled	3, 4, 5	5, 10, 1	inhom.	moist, 4	loamy-humic, dark brown, elongated oval extent, pointed at the bottom	pit with stones above, filled contemporaneously with the demolition of the hermitage; big stones from rock fall (?); many finds between stones, rubbish pit (?), mercury found
237	10YR4/3 brown	sandy clay	edged-angled rounded	1,2,4/1	20,15,2/ 40	hom.	moist, 4	nearly quadrangular, thicker towards the middle of the trench	loamy mixing, many animal bones, many sherds, some glass
238	10YR4/3 brown	sandy clay	edged-angled rounded	1/ 1	20/ 20	hom. some animal burrows	moist, 4	nearly triangular extent, inclined plane	homogeneous, brownish SU with lots of sherds, a few bones, regular distribution of sherds
239	10YR4/3 brown	sandy clay	edged-angled rounded	5 / 4,5	5/ 10,5	hom.	moist, 3	extent similar to half of an ellipse	residual deposit of rubbish pit, (see SU 235)

Table 6.45: Deposits in the latrine pit.

Waste area

Deposit 233 is brown sandy loam filling a longitudinal ditch. It is located in the northwest of trench 2012 and runs from southwest to northeast. It lies directly above the geological underground. In the west, there is a lot of rubble until a depth of

30 cm (it was not excavated completely), and it is broadening towards the south. The deposit does not contain stones in the east but compact grey clay. Due to its characteristics and the fact that there were no finds inside, it is interpreted as a gully. **Deposit 231** is dark greyish brown sandy clay with stones. It is located directly above the geological underground in the southeast of the trench. It has an irregular, longitudinal shape. Its base follows the natural slope – it is shallow in the west, has sharp edges in the east, and is considerably thicker here than in the west. The deposit looks like the filling of a very shallow ditch, but it is probably a rest of the above lying SU 215. Its lighter color marks the transition to geology.

Deposit 51 consists of dull yellowish-brown (19YR5/3) sandy clay in the northern part of trench 1. In the east, there are rounded limestones without any order and in different sizes. The trench limits cut the deposit. Even though the color description does not precisely match, photos and the general description and the topographic position suggest that it is the same as deposit 177 of the excavation campaign 2012.

Deposit 177 is dark grayish brown 10YR4/2 sandy loam in the southeast of trench 1. An artificial limit was drawn in the north as younger deposits still superimposed the deposit. Deposit 189 has the same color and sediment characteristics. It was defined as a half-round unit at the southern trench limit of 2012, and in contrast to 177, it included charcoal flitter. It was interpreted as being part of SU 177 already in the excavation process.

Deposit 215, described as very dark greyish brown (2.5YR3/2) sandy loam, matches deposit 177 in the description, photos, sketches, and topographically in the 3D laser scan data. Therefore, the three deposits are interpreted as being part of an area where waste was deposited over the years.

SU 189 is a semicircular deposit at the southern trench limit of 2012 with a diameter of app. 1.5 m. It is described as dark greyish-brown silty loam with some charcoal flitters. Due to its position and characteristics, it might also be part of the abovementioned waste area. They were all summarized as one SU 51=177=215=189.

Regarding their position, the deposits 33 from 2011 and 224 from 2012 fit accurately. The colors are described in a similar way, but not as the same. Also the photos do not really correspond as there is a considerable amount of mortar visible in 224. **SU 71** is stratigraphically below 33 and is more similar to the description of 224; they share the color and contents, and its position would complement the southwestern corner of 33. As it is unlikely (but not impossible) that the mortar stopped precisely at the trench limits, and there is some debris visible in the very west of 33, it is assumed that the three deposits can be seen as one deposit. They are seen as deposits lying above the already closed latrine pit and have to be part of events after the desolation of the hermitage.

SU	Color (Munsell)	Soil type	Coarse soil	Coarse Soil Size	Coarse Soil %	Structure	Density	Topographic Description	Arch. Characteristics/Finds
033	10YR3/3 dark brown	sandy clay	other: small limestones	1	5	with roots, loose soil	?,2	rectangular, L-shaped SU in the NW of the trench	pottery, bones, glassm tile/brick debris
071	10YR4/3 dull yellowish brown	sandy clay					moist, 3	rectangular, ca 2x1,5 m, at the western edge of the trench; adjacent to the northern wall; confined by big stones in the north	rich in finds,mainly pottery, glass; iron jaw's harp
224	10YR4/3 brown	sandy loam	edged-angled	1,2,3,4,5	75,5,5,5,10	mortar chunks	dry, 5	white mortar layer at the eastern edge of the extension of the trench, mixed with dark brown sediment	fragments of tiled oven, glass, iron nails, gun flint

Table 6.46: Deposits in the waste area, considered as one single deposit due to their appearance.

Analyzing the photo of SU 33, a circular darker area can be distinguished. This circular area corresponds in shape to the overlying SU 16. SU 16 has a circular outline. It is dark brown clayey silt with 10% little pebbles (20-63 mm). This might suggest that the fillings of the underlying latrine pit interacted with the overlying deposits and changed their characteristics, visible in color. (It is also possible that the circular deposit 16 and the circular part of 33 are part of the latrine pit; their extensions exceed the area of the latrine pit, though.) I hypothesize that the deposits 33=224 and 51=177=215 are areas where waste was deposited during the use time of the hermitage. Most leveling layers for new floors and the fillings of the cellars contain parts of the same objects found in these areas. Stratigraphically 51=177=215 was deposited later on. The differentiation made in this area cannot give justice to the different events of deposition and processes happening there. Above of the area there is **SU 16** in trench 2011 and **SU 205** in trench 2012. SU 16 is located in the northwest of the trench and consists of dark brown clay silt with small stones from 20-63 mm (10%). It has little clayey patches and contains grit of bricks. It has a roughly round shape and runs into the trench limit in the west, where it is heavily rooted. **SU 205** is deposited adjacent in the trench of 2012 at approximately the same height and reaching higher. It is dark greyish brown sandy clay. The sediment is inhomogeneous with light brown spots, little limestone scree, and an irregular outline. Looking at the description and the photos, the two units cannot be correlated. It can only be assumed that the equivalent of SU 205 in 2011 was removed with SU 5. **SU 192 (2012)** is located at the eastern trench limit

and has a semicircular outline. It is dark brown sediment with grit and contains spots of mortar. It contains a high percentage of stones between 63 and 200 mm, bricks, and fragments of the tiled oven. With the exception of SU 25 and 29, it is the stratigraphic unit containing most fragments of the tiled oven. At some point, parts of the demolished tiled oven were transferred to this location and deposited there. The reason for this action is unknown.

Paths and tracks

Path 1

In the middle of the trench of 2012, a widespread gravel deposit **SU 195 and SU 196** was visible. They both consist of 2-6,3 mm small gravel (70%) and small pebbles from 6,4-20 mm (30%) with dark grayish brown sandy loam. The shape is irregular but generally longitudinal, running from NEE-SWW. It is supposed that it presents an older path.

Tracks

Above of it, four longitudinal structures **SU 186 and 183 and SU 196 and 190** run parallel to each other. 186, 190, and 196 are described as dark grayish brown sandy loam; SU 183 as grayish brown sand. They are all various meters long, 30-60 cm in width, and have a maximal depth of 15 cm. They are filled with stones; SU 183 additionally contained a concrete block. They are interpreted as ruts of a mini-excavator or another small construction vehicle that were filled with material in time. They might be associated with constructing a freestanding altar in 1978, which is located right outside the trench limits south of the deposits.

Path 2

SU 180 lies to the north of the deposits described above and consists of grayish-brown sand (90%) and small pebbles from 6,4-63 mm (10%). It is a longitudinal feature running from NNE-SSW, and as the deposits mentioned above 195 and 196, it is interpreted as the gravel of a path. The finds inside comprise modern objects like can pull-caps.

Bench and fireplace

In front of the altar, four tubular concrete foundations were found. These features 241-219, 242-220, 243-221, and 244-222 are the foundations for a recent bench. Contemporary witness Ferdinand Schußleitner, who gave information about this bench on-site, stated that such a bench had been there in der 1950s and 1960s. A flat pit was located right to the east, in front of the bench . The circular flat pit 167 was filled with SU 210. This deposit consists of very dark gray sandy loam with stones from 20-63 mm (10%), 64-200 mm (20%), and >200 mm (70%). It is a circular filling that is partially interspersed with lots of charcoal and charcoal flitter.

It also contains a lot of recent and older forged nails. SU 181 is a circular deposit placed above SU 210. It is very dark gray silty loam. SU 175 is sandy loam from the same color lying above SU 181.

SU 167-210 is interpreted as fireplace, which was most likely used for barbecues sitting on the bench and enjoying the setting. After its use it was covered with SU 181 and SU 175.

Path 3 (Bundesforste)

SU 166 is a semi-cylindrical interface disturbing wall one in the northeast corner. It is filled with brown sediment containing stones. Its diameter is about 60 cm. The purpose of the feature is unknown. It can only be referred to as a recent disturbance of Foundation Wall 1. Above it, an interface **SU 167** was established to mark the beginning of interventions interpreted as in association with the works at the current path built by the Österreichische Bundesforste AG. SU 48 is an inhomogeneous humic filling of long-rectangular shape (6 x 0,3 m) containing pebbles and recent glass finds. **SU 14** is composed of stones without binding lying loose in dark sediment. It is of irregular oval shape lying on an NNW-SSE orientation. SU 15, as well as SU 14, is a layer of stones, being smaller and lying denser than those composing SU 14. SU 3 is a dark humic deposit with stones of about 10 cm. The deposit is nearly rectangular, measuring 2 x 1 m and contained recent pottery and plastic. SU 48, 14, 15, and 3 are interpreted as recent disturbance by the erection of the pathway by the Bundesforste.

Pits

SU 234 filling interface 247 is a 1.5 m long and 0.5 m wide, oval deposit. It consists of dark grayish brown (10YR4/2) sandy clay but was not homogeneous and disturbed by an animal burrow; it contained charcoal at its bottom. It is interpreted as a flat pit with unknown use.

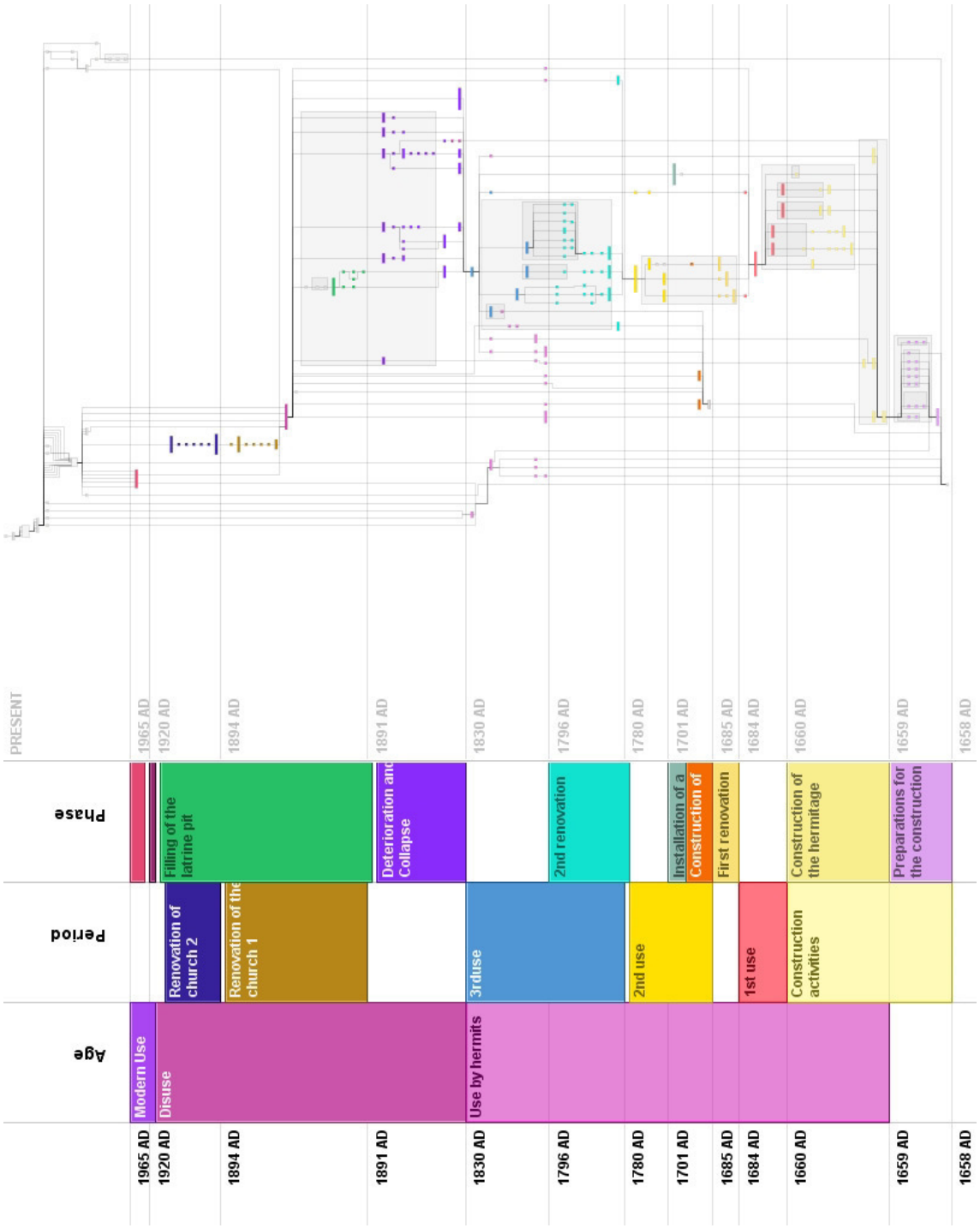


Fig. 6.27: Overview of the Harris Matrix of the stratigraphic units at the Falkenstein. See appendix for the Matrix.

Chapter 7

Phasing and Periodization

After analyzing the single deposits, verifying their relation to each other, and finding an interpretation, the stratigraphic sequence represented in a Harris Matrix was structured into phases and periods.

As described in theory in the section Stratigraphic theory (see p. 52), phases and periods are defined intervals in archaeological stratigraphy.

Phases are used for the structural events in the archaeological and historical context like the construction, a renovation, or a collapse. Analyzing structural relations and drawing logical connections between deposits and sequences in the individual rooms, phases are established beyond the extent of one room. Phase surfaces, which represent an area of a site at a certain defined time interval (local scale), were implemented for use phases – e.g., after the construction of a floor, after a renovation until the next event (deposit) starting a new phase could be determined.

A relative chronological order was established using temporal data (dating of finds) and through correlation of specific units.[186]

Periods are generally incorporated in the higher-level concept of time. A period may contain different phases. Period interfaces are all the surfaces exposed at a certain defined time interval and form a common surface/ground level in time on a global scale and facilitate the correlation of different sites.

The chronology was established using the dating of the finds, historical data, dendrochronological and C14 data. Due to fragmentation of the finds, the long lifespan of modern pottery, and the nature of some stratigraphic units (backfills with the material of waste heaps), determining a definite date was not always possible. The individual problems are described in relevant cases.

Relative chronological relations and the comparison of events visible in the excavation data with historical data made it possible to date a good portion of the deposits and surfaces.

The establishment of phases led to the creation of two- and three-dimensional phase plans.

[186] Harris 1989, 129.

Period 1 - Phase 1

Preparations for the erection of the hermitage

The first visible intervention on the Falkenstein is the removal of the humic topsoil to create a surface for the construction of the hermitage dated to 1659. This artificially created surface 165 is cut into the geology and does not form an even ground but presents a firm base for the construction of the building.
After cleaning the area from the topsoil, the post holes 142, 143, 130, and 141 were dug, and presumably, they were used in some way in the construction of the hermitage.
The post holes were filled with deposits 135, 139, 129, and 132 later on when not used anymore. Inside one of the post holes - SU 129 - in the area of what would be Room 2 later on, a pipe was found. This pipe with the Cat. Nr.5003 is dated to 1620-1650.
The presence of a ceramic smoking pipe, which was produced slightly earlier than the construction of the hermitage, backs up the assumption that the post holes are connected to its construction.
The pipe might have been smoked by one of the persons constructing the hermitage and, after breaking, was dumped in one of the existing holes, which afterward were filled with material to level the ground for the floor of the hermitage.(see Fig. 7.1)

Period 1 - Phase 2

Erection of the hermitage and first use

The second phase comprises the erection of at least one of the two cellars, Foundation Wall 1, the first leveling layers, the first foundation for the oven, Wall 4, and the first floors.(see Fig. 7.3) These features were constructed in the spring of 1659 after the preparations for the construction were done; historical records give the date.
The construction of Cellar 1 was one of the first construction activities. After preparing the terrain, a construction pit for the cellar was excavated, and the side walls were erected. Stratigraphic relations show that Cellar 1 was built earlier than Foundation Wall 1 of the main building, which was constructed after erecting the cellar vault. With the construction of the walls of Cellar 1 with SU 116, an earthen floor was created inside of it.
The first foundation for the oven SU 137 is stratigraphically below the dividing wall M4 between Room 1 and Room 2. Therefore, this first phase consisting of a quadrangular foundation of undressed limestones, which are bound with light yellowish-white mortar, was one of the first installations in the hermitage.

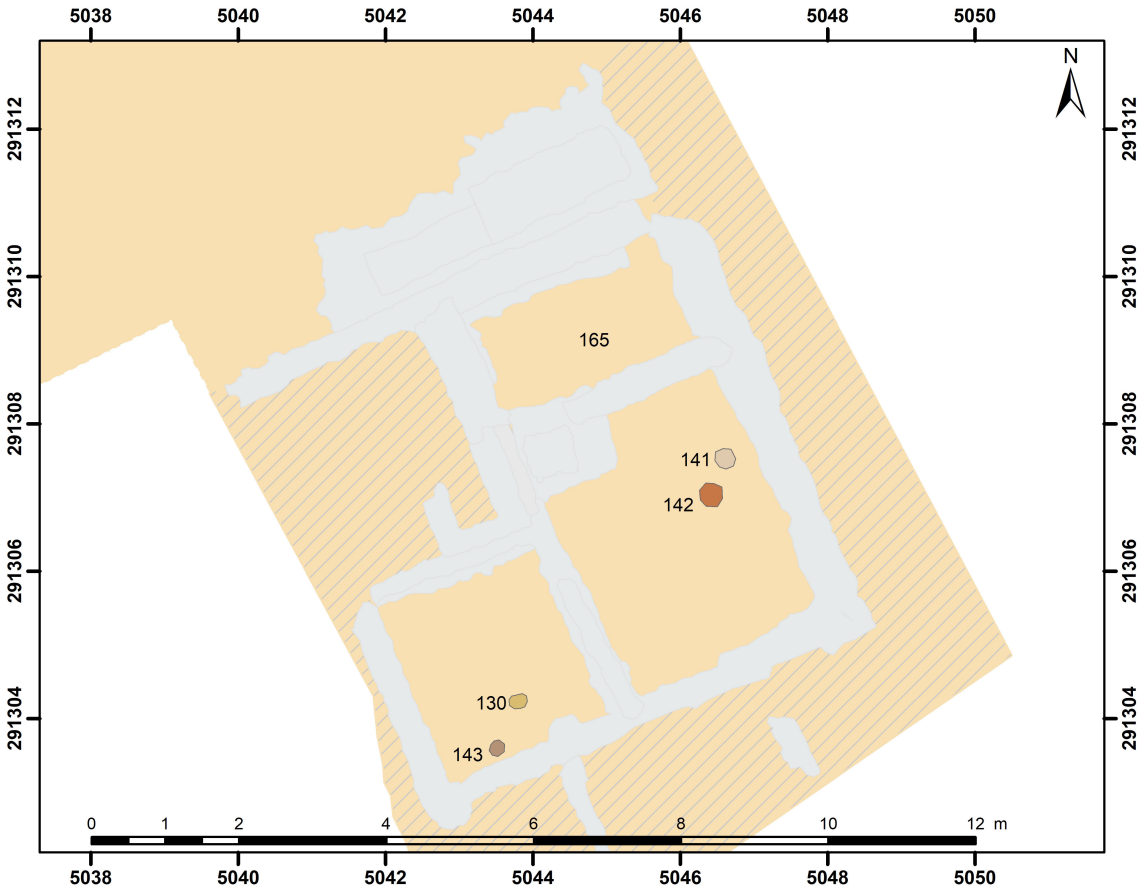


Fig. 7.1: Phase 1, showing the surface and features created for the erection of the hermitage. The dashed area is not excavated until surface 165. The later walls are shown in light grey for orientation.

It is assumed that the leveling layers for the first floors were done simultaneously (or a little later) than the erection of the surrounding Foundation Wall 1 of the hermitage and the two cellars. According to this, they should only contain finds, which predate the erection of the hermitage in 1659.

The stratigraphic units 106, 109, and 115 were summarized as leveling 1 for the first floor in Room 1. The only dated find located in SU 106 (no datable finds in 109; 115 is a bigger stone) is a ceramic candle holder, which most probably might have been used in the adjacent church. The candle holder has the narrow range of 1610/20-1650 as fabrication date and supports the assumption of deposition at the time of the historically recorded erection of the walls.

The leveling consisting of SU 126 and 127 in Room 2, like leveling 1 in Room 1, contains parts of the same bowl Cat. Nr. 192. This and the dating of other finds to the 17th century support a contemporaneous deposition of the leveling layers, which in fact are one deposit, for the first floors in these two rooms (Fig. 7.2).

The descriptions of the leveling in Room 1 and Room 2 are very similar and differ mainly in the percentage of coarse material contained. The photos at the end of the

excavation show that Wall 4 is set above of darker material in the east. Therefore, it is assumed that the wall was built after leveling the underground inside of the surrounding wall M1 and that the deposits 126, 127, 106, 109, 115 are one continuous deposit. Supposedly the act of leveling the inside of M1 took place in the same construction event in 1659.

Fig. 7.2: Wall 4 on top of rests of SU 106/SU126 (in the right), leveling the ground to build it.

Above the leveling layers, not only the dividing wall between Room 1 and Room 2 was constructed, but also a series of stones was placed alongside the northern surrounding Wall 1 and the western wall in Room 1. These stones (SU 164) presumably served as padstones for a wooden floor installed above them. The floor itself (SU 100) is not directly dated; the coin recovered with the deposit dating to 1700 presumably is evidence of the use time and fell between its planks at some point after 1700. The wooden floor was constructed of east-west oriented timber beams with north-south oriented planks fixed with nails onto them.
In Room 2, deposit 122 is interpreted as padstones for a not preserved wooden floor, which was in use at the same time as Floor 100 in Room 1.
The hearth in room 4 was most probably operative from then on; as the last floor level was not removed, no statement about an underlying floor level can be made. As the height difference between the visible floor in Room 4 and the 1st floor level in Room 1 is about 40 cm, another one probably existed at about the height of the

stones SU 164, which in the west might also have formed the sill from Room 1 to Room 4. A floor in Room 3 cannot be evidenced for that time. It is assumed that the one in use was substituted entirely.

The construction time of Cellar 2 could not be clarified satisfactorily. The walls of Cellar 2 are younger than Wall 1 but might have also just been built in the same building event. The wooden planking of the cellar stairs of Cellar 2 covering the masoned stairway, though, was sampled for dendrochronological analysis. The analysis gives a date in the late 16th century for the wooden covering of the stairway. The missing wane suggests a cutting date some years after this date. The wood might have been left to dry for some years or might even be recycled wood from elsewhere. When assuming a cutting date around 1600, there were still more than 50 years left for primary use. Therefore, the assumption of the wood usage in the first construction in 1659 seems quite reasonable. A later construction adding a second cellar to the building appears possible. The covering of the staircase, at least in the case of the preserved covering of one step, remained intact for the entire use time of the hermitage.

Consequently, the surfaces of the cellars 113 and 123 and the surfaces above the first floors in Room 1 and Room 2 SU 153 and SU 162 can be summarized as one phase interface. This phase interface represents the time of use of the first installed floors after constructing the hermitage beginning with 1659.

The time of use of this surface may not be the same in all rooms, as renovations might have been required at different moments in time. This moment can be established by looking at representative finds of the above lying deposits, which determine a terminus postquem for their deposition.

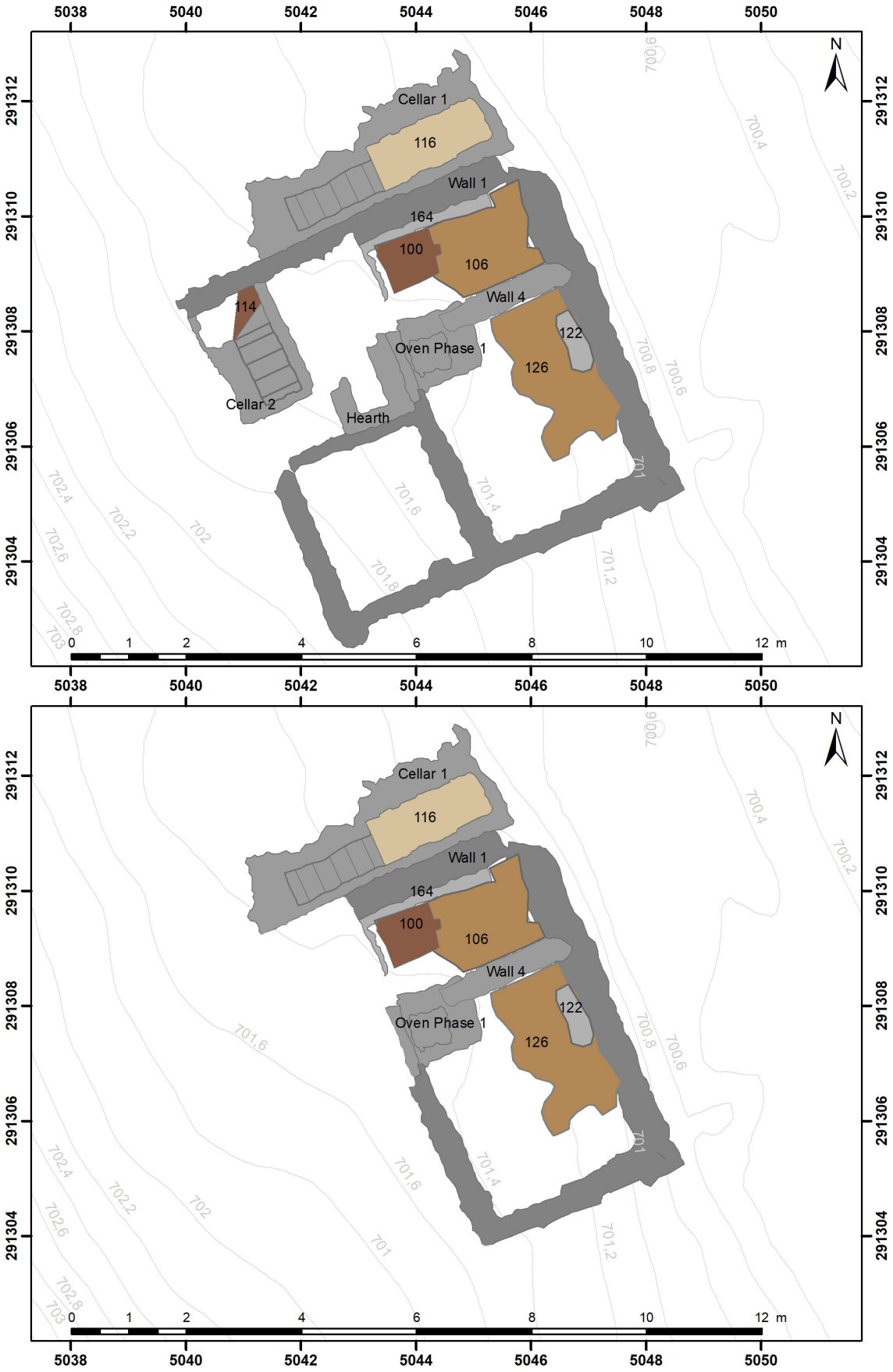


Fig. 7.3: Two possibilities of the first layout of the hermitage. Above: Phase 2, already comprising all four rooms. The outlines of the hermitage and the first leveling layers for the first floors are visible. Below: Possible first hermitage only consisting of rooms 1 and 2 and cellar 1.

Phase 3

Renovation Room 1 and 2 (leveling layers and floors 2), 2nd phase of the oven-hearth complex, and floor 1 in Room 3

In Room 2, SU 111, interpreted as debris, is marking the event of a partial collapse of the foundation/wall next to it or rather some destruction of a renovation or an unidentified structure. Above this debris, leveling material was brought in. This second leveling layer of Room 2 - SU 110 - contains the already mentioned sundial. It is engraved with the date 1682. This very sundial is mentioned in the estate of Wilhelm Buchberger of 1684 and therefore not only can be dated but also assigned to an owner. In the deposit, it serves as terminus postquem. Considering its worth, it was probably deposited after Wilhelm Buchberger's death in 1684. The bedding 110 is covered with the pebble layer 107, serving as a foundation layer for a not preserved second floor which substituted the original one.

As mentioned in chapter two (Historical background), various reports tell us about the state of the hermitage at certain points in time. The first of these reports was written one year before the death of Wilhelm Buchberger and, therefore, probably can be related to the deposits mentioned above. It notes that the hermitage is decrepit – kitchen, garden, chimney, tile stove, furniture, and a bedroom ("Cämerl") should be renovated. It also suggests that Wilhelm Buchberger couldn't take proper care of the hermitage due to his age and disease. The renovation requested by Wilhelm Buchberger may have been carried out after his death, burying some of his belongings. The renovation of the floor is therefore dated to the late 17th century.

As Wilhelm Buchberger only mentions a "Cämerl" and a kitchen and later on at least four rooms are mentioned, it might be possible that only 2 rooms existed at first (see Fig. 7.3).

A key to this suggestion is room 3 and the dating of its deposits (as room 4 was not excavated further than to the paving SU 41. Room 3 is difficult to assess because of the massive recent intervention of the construction/lime pit. The deposits underneath the first floor level contain finds postdating the construction of the hermitage. Deposit 128, being the first deposition in Room 3, includes a coin dating to 1691. The coin is located in the middle of the deposit; an intrusion due to the lime pit can therefore be ruled out; an intrusion to other factors might be possible, as two other overlying layers are interpreted as part of the same leveling layer this idea is unlikely though. The overlying SU 118 contains a coin dating to 1688, but its location was not recorded; the jar within the same SU can only be assigned to

the 17th and 18th centuries. SU 102 does not contain any dated finds. Possibly the room was in use earlier at the level below of these layers, using the natural ground as surface, or that there was a phase where only Room 1 and room 2 existed.

The late dating of finds in room 3 suggests that rooms 1 and 2 constituted a first phase while rooms 3 and 4 were added later. This would mean a smaller first hermitage consisting only of two rooms and an extension of the building with rooms 3 and 4 somewhere between 1683 and 1767 when already four rooms are mentioned in the estate of Nikolaus Kaltenhauser.

A key to finding evidence for this assumption is the walls. Unfortunately, the mortar samples were never analyzed, nor were the walls described as stratigraphic units at the excavation, which leaves only a visual assessment.(see Fig. 7.5)

Fig. 7.4: A picture of parts of the hermitage showing a clear difference in mortar color when it is moist. The yellow arrows show the yellow mortar used in the construction of the first surrounding walls; the blue one indicates the grey mortar of wall 5 erected on top of wall 1 between Room 2 and 3.

Fig. 7.5: Different mortar types (visually assessed) evidencing different construction phases.

The leveling layers for the first constructed floor in room 3 are dated to the late 17th century and might be correlated with the renovations mentioned above of rooms 2, 1, and 4. The installation of the floor is not mentioned in the historical record. As the request for the renovation predates the death of Wilhelm Buchberger, and the renovation presumably was done years later, additional renovations and alterations would not have been mentioned.

The renovation in Room 2, which is interpreted as the living room (mentioned as "Stüberl" in other reports), cannot be related directly to the historic record stating the desolate conditions as only another room ("Cämerl"; supposedly Room 1) is mentioned. The renovation of the tiled stove – located in this room, though can be evidenced archaeologically and correlated with a construction phase. Given that

the tiled stove is incorporated in Room 2, it is assumed that a replacement of the old floor in the room was done simultaneously with its renovation.

At some time, the first oven-hearth complex was filled with deposit 117 identified as debris, which suggests damage to it or might only be the evidence of renewing it. A renewal of the oven was requested in 1683 – this request is correlated with a new foundation built atop the debris and the older foundation. This u-shaped foundation SU 83 was closed with SU 80 in the south is identified as the second phase of the oven.

As SU 88 in Room 4 is in its morphology and visually the same as SU 83, and they are bound with the same mortar, a contemporary construction is assumed. This second phase of the oven-hearth through the visible renovation in Room 2 can be correlated with the historical record; the SU 88 does not show a prior construction in Room 4, but as a renovation of the kitchen is requested in the mentioned report, it may be assumed that some other hearth construction was existing before.

The requested renovation of the kitchen cannot be correlated with any further deposits in Room 4 as only the last stone floor level was excavated. Maybe the erection of wall 6 between Room 4 and 1 is contemporary with some actions that cannot be seen archaeologically (total removal, renovation of perishable material) or because Room 4 was not further excavated. However, these are only speculations without any stratigraphic evidence. In Room 1, though, a loamy packing SU 96 was placed after the erection of the dividing wall to Room 4, which served as a leveling layer for a poorly preserved wooden floor directly above this packing. The badly preserved wooden fragments did not get an SU number in the excavation process. A surface SU 161 was introduced. This second wooden floor replaces floor 100 and the above lying surface 161 is part of a new phase interface. In SU 96, the only find not matching the proposed date of the renovation phase was found. The silver coin of Georg Wilhelm (1712-1726) dates to 1715. Its topographic location is in the middle of the deposit. The assumption of an intrusive find can be sustained by the idea of a wooden floor with gaps, where the coin and material forming part of the loamy packing 96 below the planks fell through.

The surfaces 158 in Room 2, 161 in Room 1, and 169 in Room 3, therefore, are interpreted as phase interface “after the first renovation,” which took place in the late 17th century. This renovation concerned the whole hermitage, though construction activities in Room 4 can only be evidenced at the hearth. As mentioned before, it might be possible that this renovation phase is the expansion from a two-room building to a four-room building.(see Fig. 7.6)

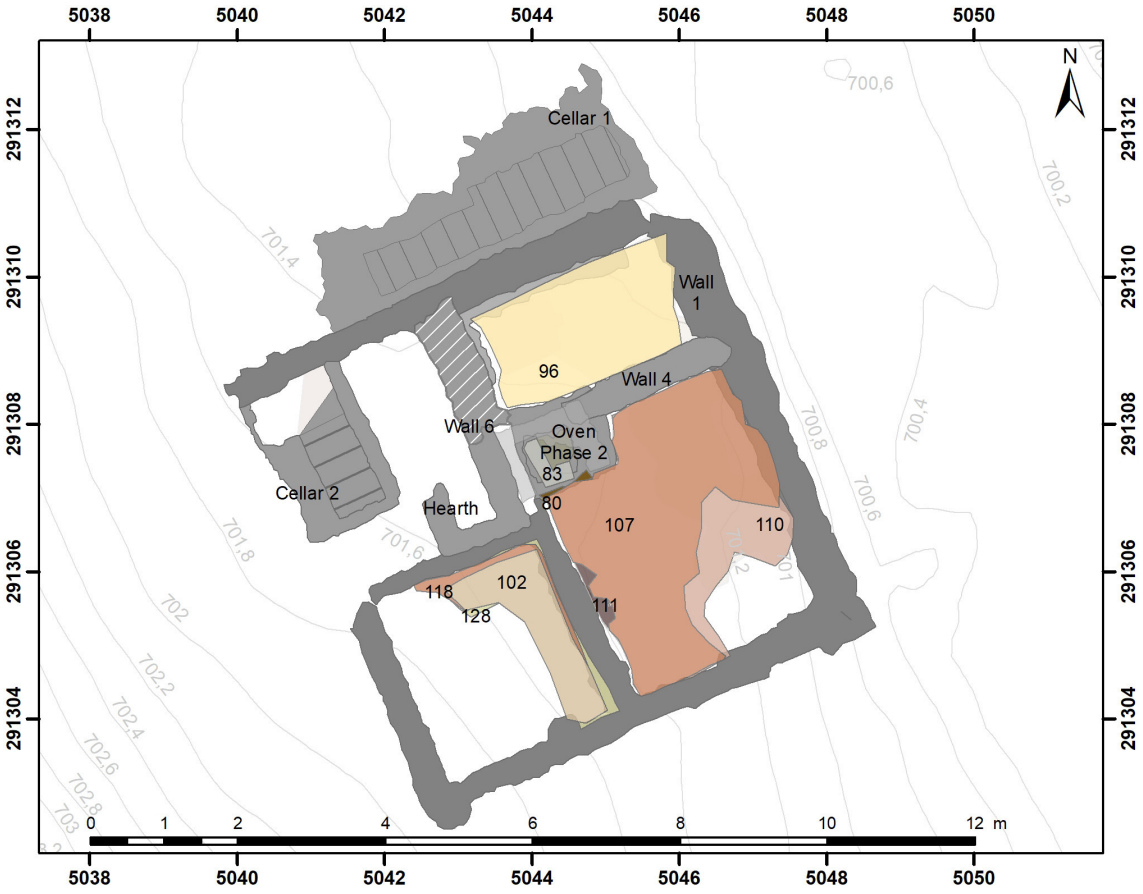


Fig. 7.6: Phase 3, showing the hermitage after its first renovation. Possibly this is the first phase where the final four-room layout was present.

Phase 4

Construction of Room 5

The construction of Walls 2 and 3 for an annexed chapel are defined as Phase 4. The estate of Buchberger of 1683 (see p. 22) asks for a new wooden chapel for the mother of god, which should be attached to the hermitage. The wording is unclear, but it most probably asks for a chapel of wood to be attached and not for a renovation of an existing one.

Room 5 is interpreted to be this attached chapel. That this room is indeed an annexed chapel is suggested by the letter of Jacob Rieder stating that he equipped the annexed chapel with a little altar, and by historic illustrations showing an annex with a small belfry. (see p. 3 - in the section about the historical records of the hermitage)

Therefore, it is assumed that walls 2 and 3 (see Fig. 7.7), which are the western and eastern confining walls of the room, were built at the end of the 17th century.

As this area is not excavated in its entirety, the interpretation is to be seen as preliminary. For the same reason assigning a date from the archaeological record

itself is impossible so far. Future investigations, including the excavation of this area, might clarify the interpretation of Room 5 and its temporal correlation to the rest of the building.

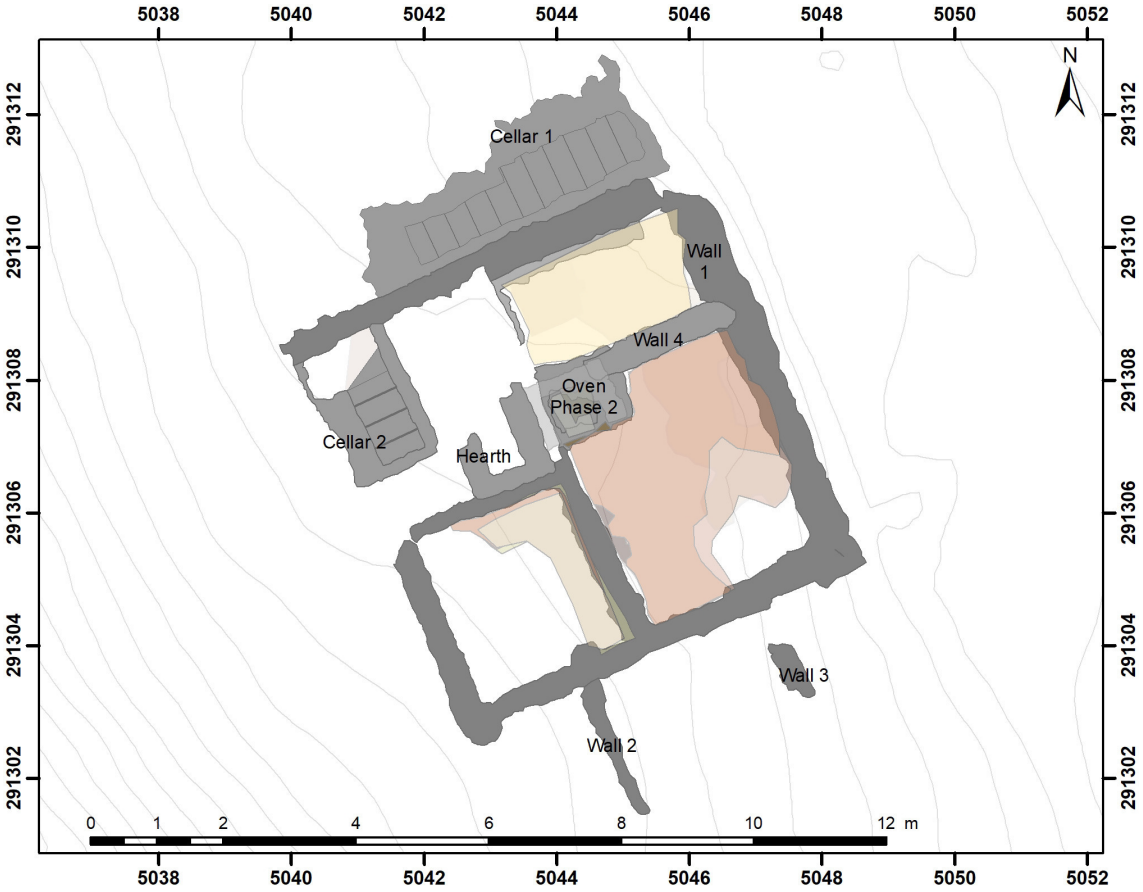


Fig. 7.7: Phase 4, showing walls 2 and 3, which complement the building with room 5 in the south.

Phase 5

Remodelling Room 4/Installation of a trap door

Phase 5 is defined by the remodelling of Room 4 with the installation of a trap door. (see Fig. 7.8) Wooden fragments of deposit 99 interpreted as a trap door in room 4 were sent to dendrochronological analysis. The results of the analysis of the wood undertaken by the University of Natural Resources and Life Sciences in Vienna provided information on the type and age of the wood. The fragments were identified as spruce; dendrochronological analysis resulted in a date of 1696 without bark edge.

The only dated pottery fragment (FNr.566) dates to the second half of the 17th century. Given that the pottery was presumably used for some time and then got

Fig. 7.8: Phase 5 evidencing the installation of a new trap door in room 4.

there, this is a terminus post quem. The dendrochronological date suggests that the wood was cut in the early 18th century. As the trap should have held some weight, it is supposed that wood in good condition was preferred, and presumably, the installation of this trap door can be dated to the early 18th century or sometime later. There is no evidence for an earlier trap door; a preceding one is probable.
Historic records additionally provide the information that in 1731 the floor of the hermitage was fouling, and it is proposed to use part of the proceeds of the inheritance of Hueber (12 Gulden) for repair works. The repair works had to be done as the hermitage still would host people up to at least 1812. Replacements of wooden floors easily could be done without leaving any archaeological evidence. Indeed, it has to be assumed that most of the repair works done in the hermitage are not visible in the archaeological record.

Phase 6

Dividing Wall 5. Dividing Wall 6. Renovation 2 Room 2: Levelling layer and Floor 3, Renovation 1 Room 3: Levelling layer and Floor 2

At some time, the dividing wall 6 was constructed between rooms 1 and 4. The temporal relation between this construction and the following renovation of the floors in rooms 1, 2, and 3 and the renewal of the hearth-oven complex cannot be determined. Atop of this dividing wall, a door sill SU 101 was constructed. The dividing wall was not a continuous stone wall but was the foundation for a wooden wall with a door. Wall 5 (M5) was erected on the phase surface "after the first renovation (late 17th)" (surface 158 in Room 2, 161 in Room 1) between Room 2 and Room 3. It is erected atop foundation wall 1 and may present a renewal of foundation wall 1 in this area. After the erection of this wall in Room 2, new leveling layers for another floor were placed. The stratigraphic units 68, 97, and 105 were summarized as leveling layer 3 of room 2. (see Fig. 7.9) SU 68 contains finds mainly from the 16th to the late 18th century. The youngest coin found inside the deposit dates to 1798, two other coins date to 1738 and 1766. SU 97 contains finds which are only datable into the 17th and 18th centuries. SU 105 contains glass fragments attributed to a beer bottle (Cat. Nr. 1049) also present in other SUs dating to 1890-1910 and a clothing clasp dating to 1900. The last renovation phase should have taken place during the use time of the hermitage, which ended in 1812. Above this leveling layer, the stratigraphic units 23a and 23b=56 are identified as pad stones for wooden planks. Wooden planks are present at the same level as the SUs 36, 37, 66, and 67. Surface 17 represents the last floor/use level of Room 2. It was in use until the hermitage was left to decay. There is no dendrochronological date of the wooden fragments available, nor are there associated finds. The stone layer 41 in room 4 could not be evaluated stratigraphically because the paving and hearth were left in situ. Given that the pavement was built after the hearth, it would have been constructed latest in this phase. Brother Bonaventura mentions in 1767 that the hermitage was moldered and needed restoration.[187] Given that Huebner mentions a well-built hermitage ("eine wohlerbaute Einsiedeley")in 1796[188] this phase should date between 1767 and 1796.

[187] AES 10/36; Filzwieser 2011, 17.18.
[188] Hüber 1796, 280.

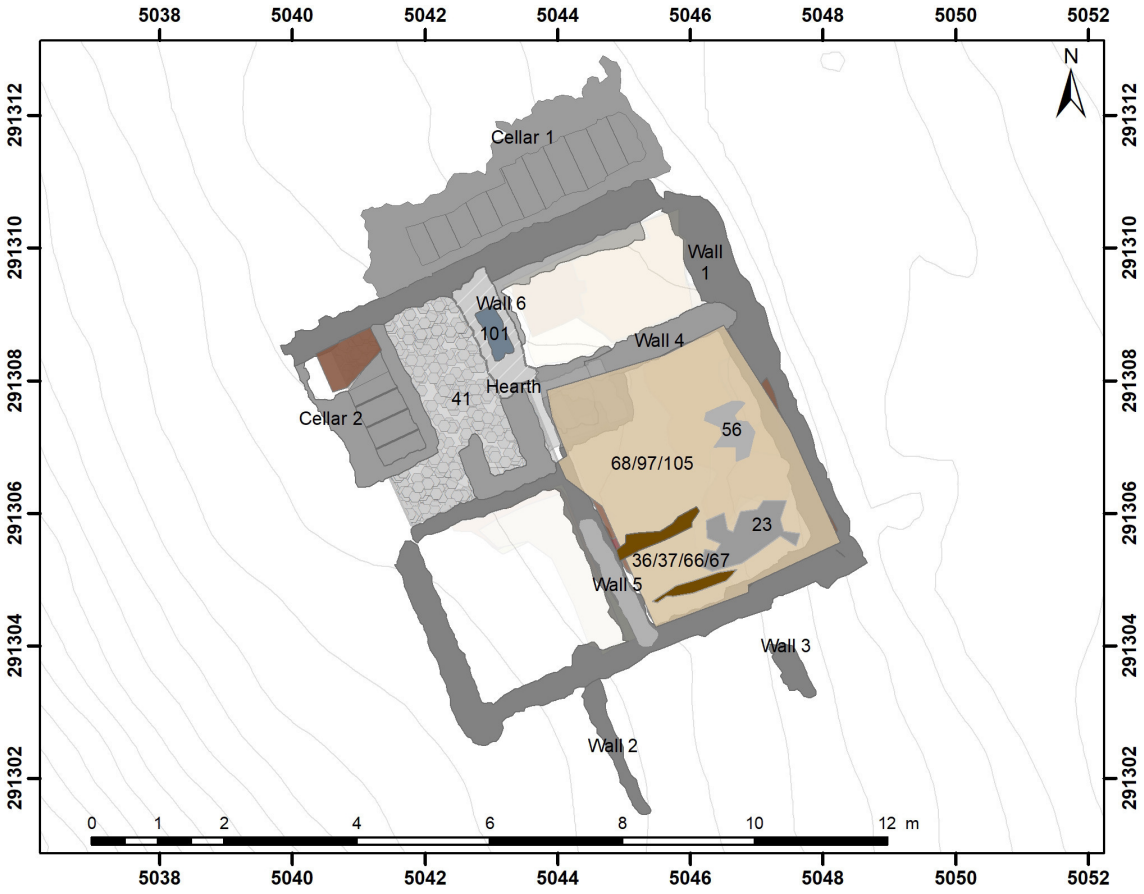


Fig. 7.9: Phase 6 with the added walls 5 and 6 as well as doorsill 101.

Reuse as hunting hunt?

Gunflints and flintstones were found in various stratigraphic units. This led to the idea of a reuse of the hermitage as hunter's hut proposed by the local historian and curator of the local museum Augustin Kloiber.

The elongated and rectangular flints with two firing edges and a trapezoidal cross-section can be addressed as gunflints. (Fnr443-SU81, Fnr535-SU86, Fnr615-SU95, Fnr440-SU81 and a scattered find). These flints were primarily used from the 17th to the 19th century in the military and in civil use for flintlocks in weapons. Gunflints are made of flint stones and related stones; they were produced in large quantities in manufactories. The most known productions were located in Brandon (England) and Meusnes (France), but also other European countries (Denmark, Sweden, Poland, Ukraine, Belgium, Germany, Portugal, Spain, Italy, and Albania) had their productions.

In the flint lock mechanism, a spring-loaded hammer with the flint in its jaws is released by a trigger. It strikes a piece of steel creating sparks and ignites the priming powder, which in turn then ignites the black powder in the barrel, firing the arm. The flint lock mechanism though was also used in other fire-starting tools

Fig. 7.10: Assortment of flint stones and gunflints found at the excavation.

like flintlock tinder lighters or with a fire striker.

More common than possessing a flintlock tinder lighter was the tinderbox. This was a box containing flint, fire striker, tinder and Sulphur tipped wooden splits. The fire striker usually was a D-shaped carbon steel. It was looped around some fingers and stroke against the flint. The tinder was arranged in the bottom of the box and due to the sparks began to glow and ignited the wooden splints. Fire striker and flint were used in every house until the matches emerged.

The flints in different shapes were produced in the same manufactories as gunflints and sold as “strike-a-light”. Normal gunflints, though, were also used as flints for making fire. (Weiner, 965) The flints used with fire strikers did not have to have the shape of the typical gunflints described above but could also be shapeless. (Fnr 535-SU68, Fnr 490-SU52, Fnr427-SU70, Fnr259-SU29 (oval), Fnr 202-SU7, Fnr235-SU24)

In this case of fire strikers, the flintstones typically show bay-shaped zones of wear, originating from striking the flint with the fire striker.

The find numbers representing flintstones were found in the following units:

These units containing the flints are interpreted as removal of humus, different levelings, filling of a posthole before the use, filling of the latrine pit, fillings after the use of the hermitage, waste area, debris, filling of the working pit, part of the recent

use as a hay barn. They are scattered all over the excavations' trenches and do not correspond to one phase. A suggested reuse of the hermitage as a hunting lodge can therefore not be supported by the analysis of the location of the supposed gunflints.

The find of a casting mold for lead shots (Fnr.585) in SU 87, though, would support the hunt. In the same unit, two find numbers with flints (described as silex flake and flintstone/gunflint) were found. The deposit (SU97) dates to the phase of filling of the cellars after the use of the heritage, but with material originating from the waste area used from the beginning of the hermitage until after its use. A lead bullet in SU 7 (removal of humus) and a piece of lead in SU 21 (recent filling of room 3 after the construction of the lime pit) are evidence for the hunt at recent times.

Looking at the description of the contents of tinderboxes, the metal object in SU 87 (filling of cellar 1 after its use) might be a fire striker. The Sulphur stone from SU 112 (filling of the lime pit) might have been used to put the Sulphur on wooden splints to create matches. At least the material for SU 87 originates in the area of the waste deposit of the hermitage.

The present objects might indicate hunt and are evidence of fire-making, but its use cannot be dated exactly as the units mostly are recent fillings, belong to the undated last use phase/phase of deterioration, or were found in the waste deposit.

Without a detailed analysis, the present flints cannot be attributed to a specific use. An analysis regarding use-wear chipped leading edges and display of powder-burn might shed light on the question which of the flints (and similar stones) was used as gunflint or flint for common lightening fire with a fire striker.

Waste area

In use during the whole use-time

The units 33=224 and 51=177=215=189 interpreted as an extensive area, where waste was deposited, seem to have a long use time.(see Fig. 8.1) The finds belonging to these units comprise a dating range from the 16th to the 20th century. The area used to deposit waste is located next to the latrine pit. Its beginnings are dated to the beginnings of the use of the hermitage. More recent finds suggest that different events of deposition also occurred after the use time. Due to the similarity of the deposits (consisting of depositions of broken objects), no stratigraphic differentiation could be made.

Many of the finds are also found in leveling layer of renovation phases of the hermitage. Therefore, it is known that the waste of this area was reused in construction works at the hermitage.

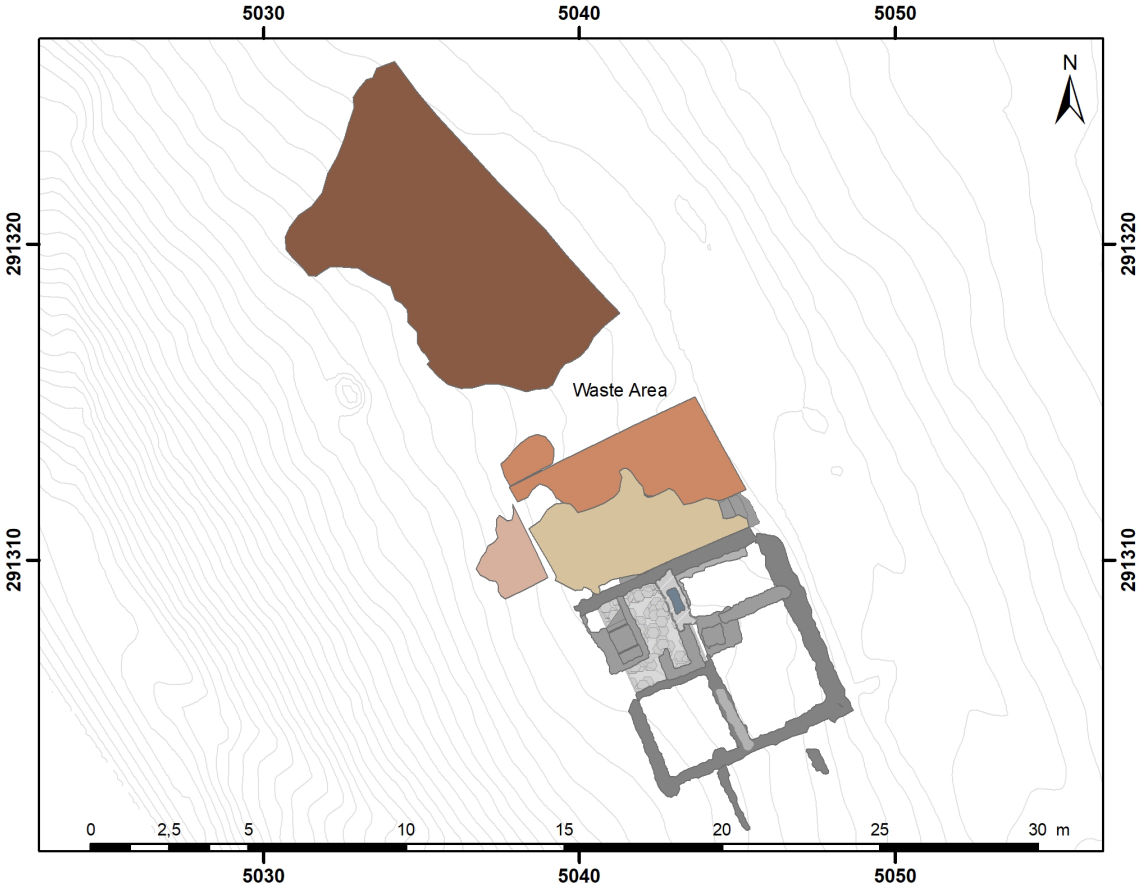


Fig. 7.11: The area where waste was deposited throughout the use time of the hermitage.

Phase 7

Deterioration and Collapse of the building

The SUs belonging to this phase include the things in use before their collapse and the debris material of the collapse.
Deposit 27=29 in Room 2 can be dated earliest to the very end of the 18th century or the beginnings of the 19th century. The latest find is a coin dating to 1755, suggesting the early 19th century more probably than the end of the 18th century. The deposit consists of debris and evidences the point of time of the collapse of the building. The stone debris 134, interpreted as debris of a wall, is also attributed to this phase.
Historical records state that the last usage by hermits was in 1812. A cadaster plan of 1829 still shows the building, suggesting that the collapse took place even later.

Phase 7a - Filling of the latrine pit

The fillings of the latrine pit occurred after the abandonment of the hermitage. The temporal relation to the collapse of the building can only be assessed by looking at

the find material. Only the finds of the SUs of 2011 were analyzed - the two SUs 72 and 125 contain finds dating mainly to the 18th century. The latest find, the bowl with the Cat. Nr. 171 is found in the stratigraphic youngest deposit 72 and dates to 1850-1900. This would suggest a filling of the pit at about the time of the collapse of the building or slightly later.

Phase 7b - Filling of the cellars with debris and further deposits above the collapsed hermitage

Cellar 2 was filled with deposits 95, 63, 42, and 31. These deposits contain finds dating from the 14th (one piece) to the early 20th century, with the latest finds being fragments of beer bottles from 1890-1910 (Cat. Nr. 1049) and 1920-1932 (Cat.Nr.1058) and a bowl dating to 1850-1900 (Cat. Nr. 171). The youngest date thereby originates from the earliest of the fillings. Accordingly, the filling of cellar two occurred quite late, earliest in the 20ties of the 20th century.
Cellar 1 contains the fillings 103, 87, 93, and 52. The finds date from the 17th to the very beginning of the 20th century, with the latest find being a bowl dating to 1850-1900 (Cat. Nr. 171). As stratigraphic units of the two cellars contain fragments of the same objects (Jar Cat. Nr 158 in 103 & 63; bowl Cat. Nr. 171 in 52), it is assumed that the fillings of both cellars occurred/were quite late and at the same time.

Renovations of the Church

Phase 8a - Construction pit phase 1

Interface 120 cuts the stratigraphic unit 43, which consists of tile debris. This brick debris has to be evidence of a renovation of the chapel. It may be that the construction pit was created in the same renovation event, but it is more probable that it was created in a later one. Neither the cut SU 43 nor the contents of the construction pit provide specific dates as the finds can only be attributed to quite long time spans. (16th-19th century)
The first phase of the construction pit (IF 120, SU 146, 119, 112, 251) is a rectangular lime pit of 2x1,5m with wooden planking on its sides. After its use, it is filled with different materials. SU 251 contains a coin dating to 1893 (Fnr. 555) and a bottleneck dating from 1890-1910. Therefore, the renovation pit dates earliest to the end of the 19th or beginning of the 20th century. Historic renovations for the chapel roof are recorded for 1891, suggesting that this construction pit was used for this purpose.

Phase 8b - Construction pit phase 2

Sometime later, in another construction event, another pit was placed into this refilled pit - the interface 57 marks this rectangular pit. The pit is smaller (110x70cm) than the previous one, has preserved wooden planking SU 64, and was also used as a lime pit. It was filled with a lime bag (SU 64).

Modern Features

Modern use of the hermitage area

The use of the area as a hay barn is evidenced by the stratigraphic units 10 and 24. The finds comprise a picaroon, a pocketknife, modern nails, coins of the 1st republic, fragments of old beer bottles and their bottle caps (Stiegl), and recently burned wood. The haybarn is visible on photos and postcards at least from 1902 - 1920. An undated color photo of the haybarn proves that it was still there even after that time.

Fig. 7.12: The modern haybarn on a historic black and white photo (Archiv St. Gilgen).

Pathway

In the area north of the hermitage excavated in 2012 various widespread gravel layers and grit layers compose a pathway of unknown age. The pathway with the SU 180 can be attributed to modern use due to its contents which include modern can caps. The pathways 196, 197 as well as 180 can be attributed to modern use due to its find. The reason and destination of the pathways are not clear.

Bench and fireplace

In the second half of the 20th century, a bench was erected. This bench which had foundations made of concrete was built in the 1950s and remained there until the 1960s. The dates were provided by contemporary witness Ferdinand Schußleitners. A circular pit, interpreted as a fireplace right in front of the bench is due to its location attributed to the same time span. This fireplace was then covered with loam at the same time. Assembly of a freestanding altar In 1978 a freestanding altar was built on the Falkenstein. The altar is still standing there today and provides the date of its erection. The SU 186 and 183 and SU 196 and 190 present refilled tracks of a small construction vehicle that facilitated the erection of this altar.

Chapter 8

Results & Discussion

Combination of archaeological and historical sources

The rooms and their use

When attempting to identify room function in archaeological contexts, features and artifacts provide evidence for the activities carried out in different spaces.

Features within the context provide evidence for the intended primary function of a given space. Fixed features/built objects which are part of the space, such as a hearth, an oven, or a latrine, suggest a permanent use of space. Artifacts may provide evidence for activities carried out by the people using the areas and may provide evidence for the function of a room.

Artifact analysis in the case of Falkenstein is limited due to the character of the deposits. As stated in the chapter about the stratigraphy, most of the deposits inside the hermitage's surrounding walls are backfills for levelings for new floors. The material for those levelings was taken from an area at the NNE of the building right next to the latrine pit, used as a waste area. Therefore, the contents of the levelings in a given room cannot contribute to assigning a room function.

The hermitage was maintained, living spaces kept clean; personal belongings were rare as hermits kept a simple life. Objects of use were reused, and in case they broke, discarded in a specific space. The only possibility to see objects in their original position is the floor levels themselves and the phase of deterioration after the last floor levels.

In the case of the ceramic pipes, we can say that none was found on a floor level or in the phase of deterioration. The only pipe which might have been found in its position where it broke or was forgotten is the one in SU 60 – the youngest foundation of the oven. This pipe, though, could not be dated.

Fig. 8.1: The hermitage rooms are known from the two excavation campaigns and (possible) doorways between the rooms.

The hermitage consisted of 5 rooms. The ground plot is not entirely known from excavation as the trench limit cuts cellar two and room 5. The limits of the hermitage are known in the north, east, and south. Only the georadar data infers the western delimitation.

Room 1 is very small, measuring 4.6 m^2. It is most probably possible to correlate it with the "andern Kämerl" (other room), which the estate of Nikolaus Kaltenhauser

mentions. Accordingly, it was used as a second bedroom and contained shortly after 1767 a bed made of spruce, a small box, a chair, and two coffers of the same material.

Room 2 measured little more than 10 m^2 and was used as a living room. This is indicated by the tiled oven in the room's northwest corner. The remaining tiles have not been subject to further analysis until now. Still, there are many different tile fragments, including flat tiles with green glaze, relieved tiles with various plastic motives and green glaze, and a few yellowish-brown flat tiles. The tiled oven underwent (at least) two major renovations. It is supposed that tiles broke during these renovations and were substituted. As it does not seem to be the case that one category of tiles could make up all tiles for a tiled oven, it is supposed that the oven at all times consisted of different styles. The used tiles might have been leftover tiles from other tiled ovens sponsored by residents of the village. The tiled oven served as central heating for the hermitage; as known from historical sources[189] the building was not used in winter. The furniture can only be reconstructed with the estate of Nikolaus Kaltenhauser. According to it, the living room was equipped with a spruce table, three chairs, and a small dresser. Additionally, it contained four paintings, an iron rooster, and a crucifix.

Room 3 is interpreted as a bedroom. It measures 6.3 m^2, and when Nikolaus Kaltenhauser wrote the estate, it was furnished with a bed, a chair and an armchair, a big crucifix, eight paintings, three jars – two of class and two of pottery, a metal oil bottle, and a garden shovel. Unfortunately, there is not much left inside the room because it is heavily disturbed by a construction pit destroying the bigger part of the area of the room.

Room 4 was used as the kitchen. It measures 5.9 m^2, not counting the possible additional space above the assumed trap door, which would add an extra 1.5m^2. The floor was paved with stones in the latest phase; earlier floors can not be evidenced as the last one was not destroyed. The hearth, serving as a functional hearth-oven complex with the oven in room 2 in the latest phases, was located in the southeastern corner of the room. The estate of Kaltenhauser mentions several dishes. It is supposed that some kind of shelf or dresser was installed on the northern wall.

Cellar 1 is interpreted as a storage cellar for food and provisions. It was equipped with shelves and a small window for fresh air supply.

Cellar 2 is attributed a special function. From the unexcavated western trench limits, a wooden water pipe protruded with water spurting out of it. This might have been the first location of the healing well on the Falkenstein, now located inside the "Quellkapelle". Following this assumption, the well was only accessible from the hermitage kitchen, granting the hermits exclusive access. The water from

[189] Ziller 1969, 52.

the moment of the erection of this second cellar was only being handed out - and probably being sold - by the hermits to the pilgrims.
Room 5 is interpreted as an annexed chapel, even though it was not excavated until the end. The interpretation is supported by the historic illustrations and written records. The estate of Kaltenhauser mentions an old altar, which was located in this room.

The floor plan of the first floor is all that remained physically of the hermitage. The historical sources – the already cited estate of Nicolas Kaltenhauser and the illustrations – provide the information that there was a second floor, though. The estate mentions a room under the roof. It contained a box made of spruce, a bed, which from its denomination differed from the other two mentioned in the rooms on the first floor. It was a lighter type of bed, which probably consisted of a frame and ropes or straps which were fixed at the structure, resembling a modern camp bed.

Doors and windows

There is proof of a door sill between Room 2 and 3, which came into use with the construction of wall five on top of wall 1.
A connection between Room 3 and Room 4 is assumed in the western part, where the stone plaster has a straight edge to the south. The entrance to the kitchen would have been to the west of the hearth.
Room 4 is connected with a door sill made of bricks with Room 1 in the latest phase. Before there was a possible doorsill leading to the exterior or an earlier phase of room 4 at the same position; the stones might also be pad stones for a floor.
A connection between Room 1 and Room 2 might be visible as a masonry seam looking at the wall between Room 1 and Room 2 from Room 1. This seam is not visible from the other side, though. The possible doorway would have been closed in a later construction phase - supposedly when Room 3 and 4 were in use as well, and the entrance was also possible from Room 4. The plan for the new hermitage of Ludwig Priggl in 1739, showing a four-room building, depicts doorways between all rooms.
The entrance door of the hermitage is expected to have been in the south. Originally it would have been in Room 3. With the construction of the annexed chapel (Room 5) between 1684 and 1701 the entrance would have been through the chapel into Room 3. Various historic illustrations support the door at the south.
Another possibility for an entrance is in the southeast corner of Room 2, which also would imply the entrance situation through the chapel after the erection of the chapel. A door at this position is not only suggested by observing the wall at this

Fig. 8.2: Possible masonry seam in the wall between Room 1 and Room 2, that could indicate a door in an earlier phase.

section, but it is also suggested by a door hinge (Fnr. 740) found in (or rather atop of) SU 126 right in front of the wall.
To the right of the northeast corner of Room 2, there is a bigger stone in the foundation – (see Fig.8.2). This stone measures 53 centimeters and could also have served as a door sill, even if it is pretty narrow. None of the historic illustrations support this idea, though. The location and number of windows are unknown – the illustrations differ significantly in this aspect.

The hermitage in time - phases of construction and uses

In the last chapter, the archaeologically visible alterations in and around the hermitage were used to outline different phases, allowing to sketch the history of the building.
The hermitage was built in a construction event in 1659 and existed like this until the first renovation. This first phase of existence was most likely a two-room building with the annexed cellar 1. The visual assessment of mortar color and photos of construction seams (done in the process of analysis and not on-site) and the historical sources, which do not mention more than two rooms by name until 1684, indicate

this as the most probable layout of the first hermitage.

From the beginning on the area north of the hermitage contained a latrine, which was cleaned recurrently. More to the north, the hermits discarded all the waste, and they used the soil containing this waste in renovations to build new leveling layers inside the hermitage.

The first of these renovations, which left archaeological evidence dating between 1683 and 1700, definitely left the hermitage with four rooms and a second cellar. Next to the renovations in rooms 1 and 2, they extended the hermitage with rooms 3 and 4. The oven, which also was renewed in this phase, became a hearth-oven complex with the hearth in room four, evidenced by SU 88, which is built the same way as the new oven phase SU 83. The bedroom, kitchen/living room building becomes a building with a bedroom, a kitchen, a living room, and supposedly another bedroom. This extension also seems to allow two hermits to live there permanently, which was the case from 1720 on.

The erection of the annexed chapel between 1684 and 1701 with the two walls forming the yet to be excavated room in the south of the hermitage could be dated thanks to historical sources. Contemporary construction of the annexed chapel and the two new rooms would appear logistically reasonable; as there is no stratigraphical evidence for it, two separate phases in the same time window were postulated.

The dating of the trap door installed in room 4 at the beginning of the 18th century suggests that there had been another one (or another kind of covering) right after the construction of cellar 2 assumed between 1683 and 1700.

Another renovation included a wall between rooms 2 and 3 and a new floor in both rooms, being the third floor in room 2 and the second in room 3. Historically this can be dated between 1767 and 1796. A new wall was also installed between room 1 and room 4, featuring the still visible door sill made from bricks evidencing the door between the kitchen and room 1.

This is the last archaeological and historical evidenced renovation until the end of its use in 1812.

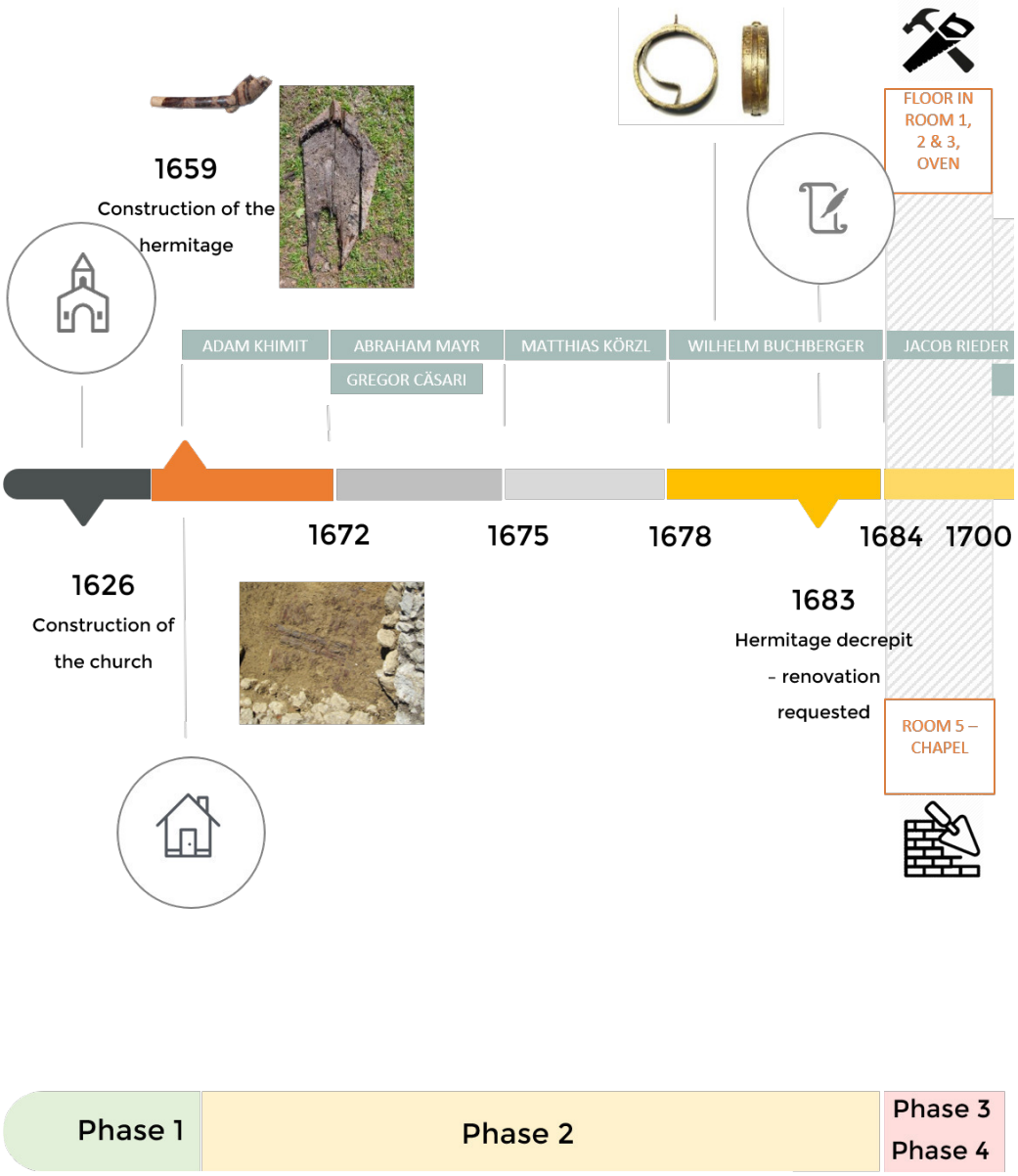
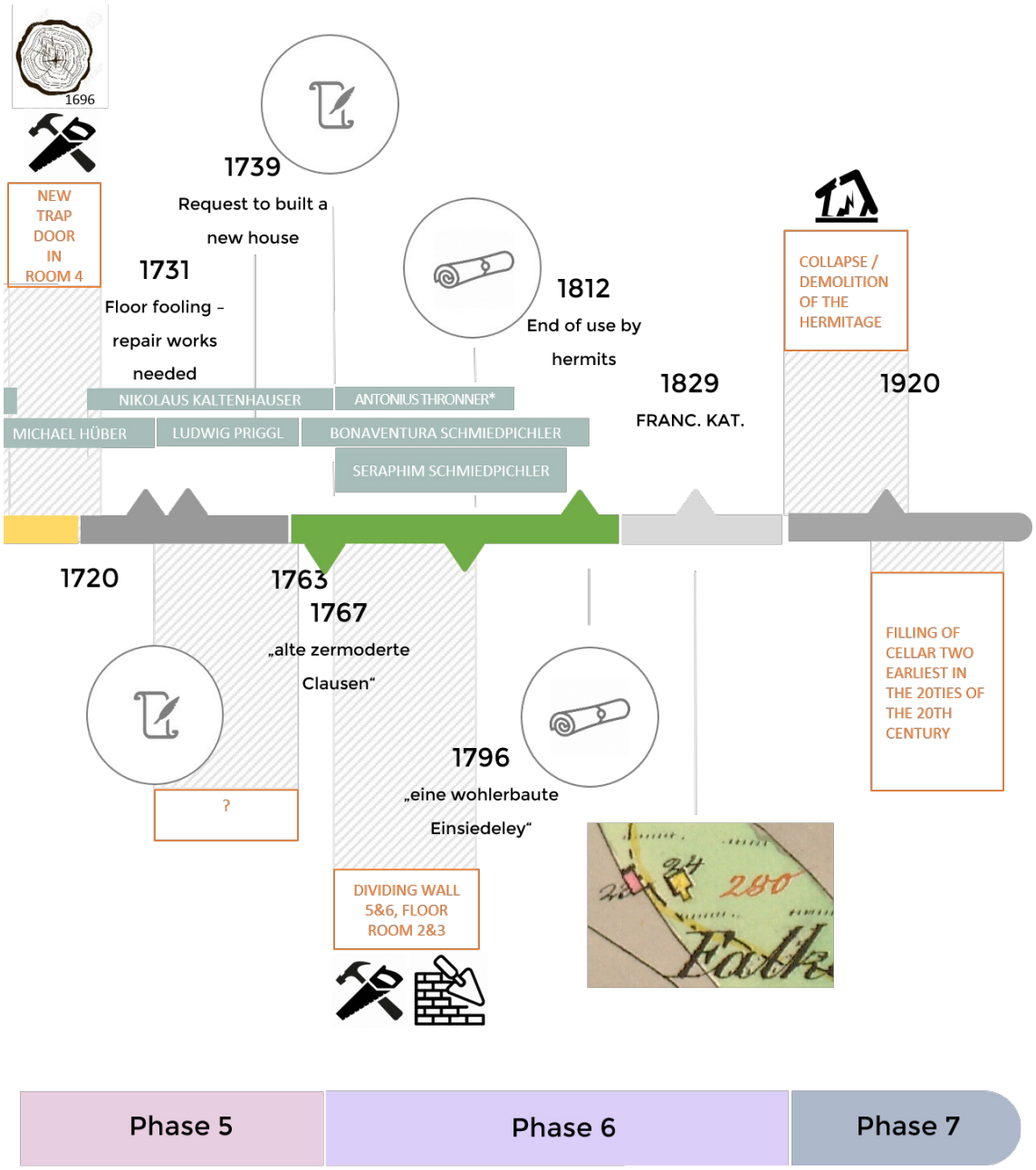


Fig. 8.3: Timeline of the hermitage at the Falkenstein.

Comparison of GPR data interpretation and excavation results

After the completion of the excavation, the question of what could have been seen in the ground-penetrating radar (GPR) data was raised. The comparison of the GPR-data interpretation, GPR-data itself, and the excavation results has the aim to evaluate the accuracy of the interpretation of the GPR-data and the amount of detail visible in the data. The following is an exclusively visual comparison of the radar data and the excavated features. For this purpose, photos and the created



3D volumes were used. An analysis comparing the characteristics of the soil of the deposits like components, constitution, soil moisture content, solidity, and the reflection characteristics of the signal was not carried out. A comparative analysis of these factors would be required for sites that had been prospected with ground-penetrating radar and which were subsequently excavated to understand better how certain features may appear in the prospection data and improve the quality of interpretations of such data.

As mentioned with the interpretation of the GPR data, the radar images of 2009 only seemed to show rooms one and two, which led to the original interpretation that the rest hermitage was directly beneath the modern pathway. After the excavation, it became clear that the total of the hermitage was to the west of the modern pathway,

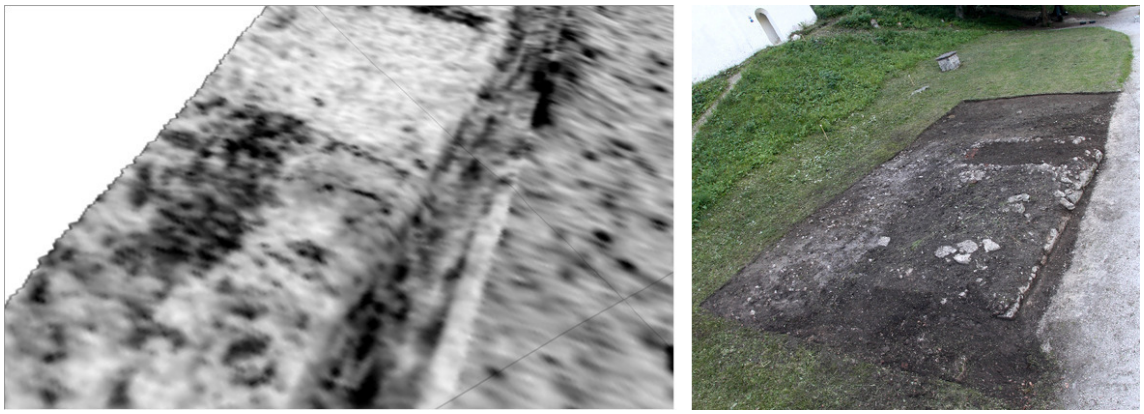


Fig. 8.4: Debris covering the western part of the hermitage.

hidden beneath reflective deposits interpreted as debris. (see Fig.8.4) The excavation results could refuse the original interpretation of debris of the collapse of the hermitage itself. The debris consisted of tiles and other modern construction debris, which resulted from renovations of the church/chapel to the east of the hermitage. These deposits covered room 3 and cellar 1 entirely and room 4 partially, making them nearly invisible in the prospection data compared to the other structures.
Comparing the GPR-data and the excavation data, the walls of rooms 1 and 2 are clearly visible from the beginning, appearing as highly reflective structures. The extension of the reflective debris corresponds very well with the stratigraphic units defined in the excavation. The distinction within the debris made in the excavation - the stratigraphic units 2, 11, and 13 - is not distinguishable in the prospection data. Underneath the debris, the edges of room 4 become clearly visible at 30-40 cm depth, the north-western corner of room 3, and the east wall of cellar 2 only at 80-90 cm depth. (see Fig.8.5)
In room 2, the rectangular structure for the foundation of the oven and the hollow chamber in its center can be made out in the GPR data. The hearth in room 4 is distinguishable by its dividing wall with the oven to room 2 and its northern delimitation in the GPR depth slices. In the cross section[190] the existence of the hearth is more apparent than in the depth-slices - its massive structure renders the oven a far fainter feature. (see Fig.8.6).
The depth of detail is striking when looking at the case of SU 23=56, which consists of bigger stones lying on top of a surface. The two stone layers are very good distinguishable. The depth of the features is quite accurate, even though there was no velocity determination via hyperbola fitting and no topographical correction was done. In contrast to the stones SU 23=56 the massive stone in the latrine pit is only visible as a small reflective feature in the GPR-data - this is because it is surrounded

[190] created with Schlitzi+ - a Python-based GPR-data analysis and visualization tool currently under development by Erich Nau

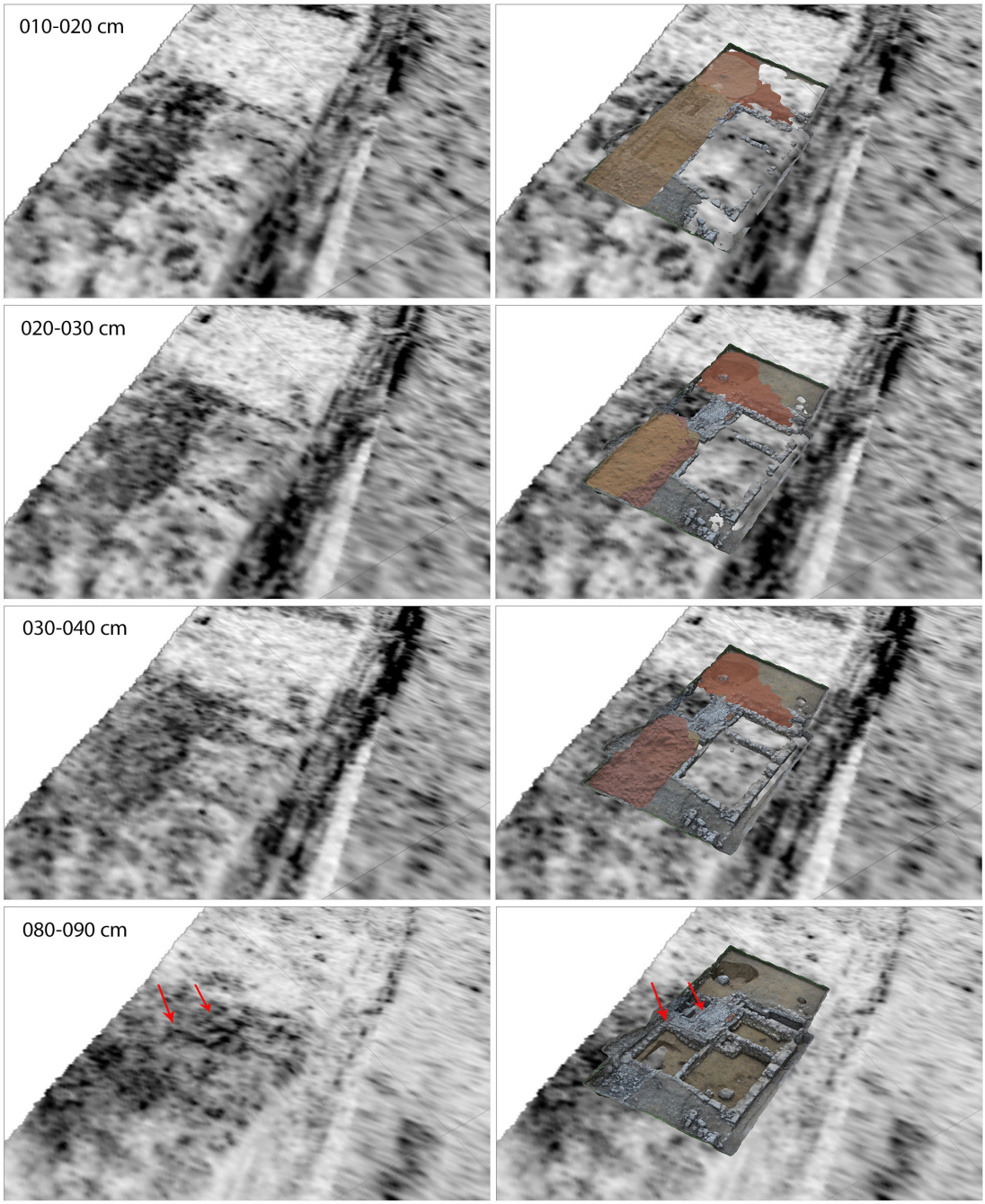


Fig. 8.5: GPR data (left) and 3D models of the excavated debris layers covering rooms 3 and 4. Only at around 90cm walls in this area get clearly visible (lowermost figures).

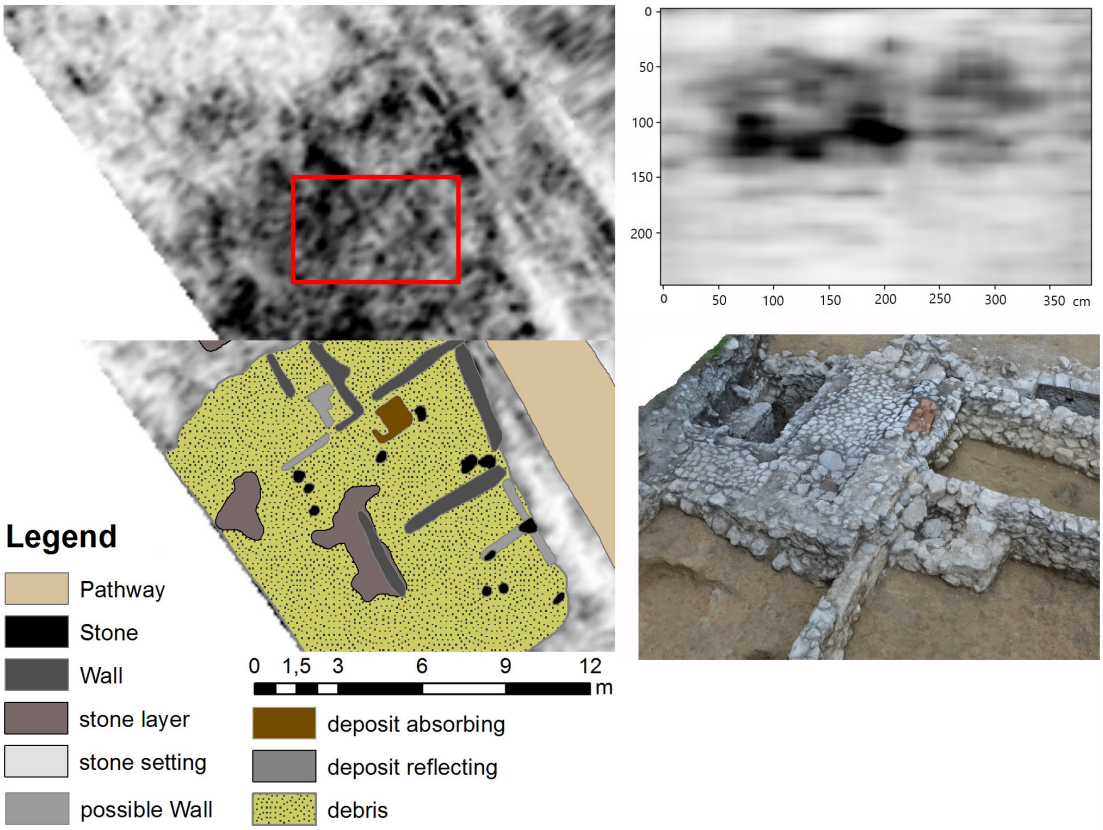


Fig. 8.6: Left: GPR data and interpretation of rooms 2 and 4 with the oven hearth complex in a depth of 60-80 cm; right: NE-SW cross-section through the oven-hearth complex and IBM model.

by a highly absorbing deposit. (see Fig.8.7)
Knowing the excavation record, the longitudinal absorbing area north-northwest of room 1 is easily correlated with the fillings of cellar 1. The dull yellowish sandy clay described in SU 52 and 87 and the dull yellowish-orange sandy clay of SU 103 provide a vast absorbing reflection, only interrupted by the band of sandy mortar with limestones in it of SU 93. The reflective area in the west of the cellar is the result of bigger stones in the fillings and the staircase. The staircase cannot really be seen in the depth slices, but drawing a section through the (processed) GPR-data of cellar 1 with Schlitzi+[191] the stone staircase can be clearly made out. Faint, but visible, is also the delimiting eastern wall, including the window in it. A section through the 3d-models of the excavated stratigraphic units filling the cellar shows that individual units can also be distinguished in the GPR data. Especially the absorbing SU 103 sloping down from the window in the east is obvious. The massive SU was intentionally filled into cellar 1 and presented a maximum z-extension of nearly 1.5 m in the east and a minimum depth of 0.9 m in the west. The big stones in SU 87 lying right in front of the fourth step from above are seen as a reflective feature. The stone between units 52 and 93 cuts in the section cannot be correlated to any specific stone in the excavation data and is probably a smaller but higher reflective one.
In the east of the pathway, there is an apparent linear reflective structure with right-angled edges. The high reflective feature was interpreted as a wall or stone setting. According to the excavation results, it is now assumed that this still buried structure is more likely to be the former terracing of the hermitage garden, which is also mentioned historically and can be linked to a drawing that shows a fence of about 1800.

Life of the hermits

The hermits lived in relatively simple conditions, first in a two, then a four-room building. In contrast to hermits living without anything, the lay brothers on the Falkenstein had personal possessions.
The household contents were abundant and partly of high quality. They contained objects for different uses in the kitchen, at the table, in the garden, or for religious purposes. Part of these objects was listed in inventory lists or the inheritances of the hermits. Next to this, there were also ceramic pipes evidencing tobacco use, a jaw harp, and a flute depicting at least some of the hermits as being musical or liking

[191] a Python-based GPR-data analysis and visualization tool currently under development by Erich Nau

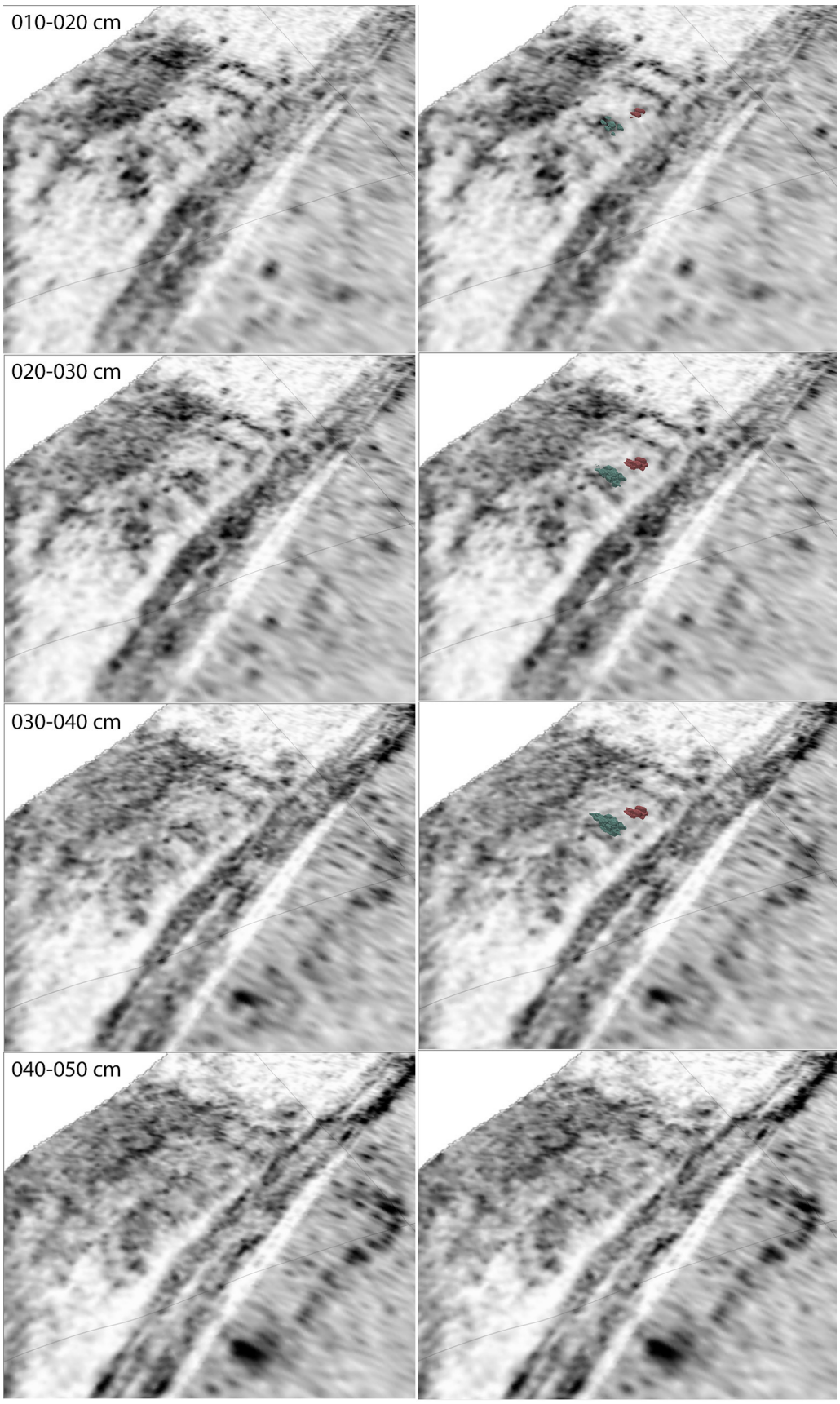


Fig. 8.7: Stone settings in the GPR data and modeled from the laserscan data obtained during the excavation process.

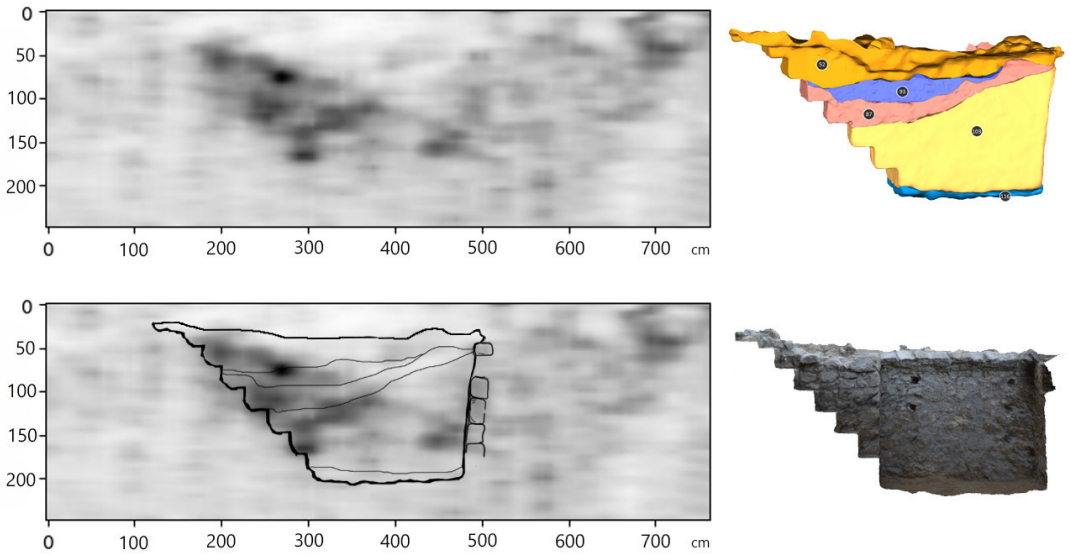


Fig. 8.8: E-W section through the GPR-data of cellar 1 showing the stairs, eastern wall, and stratigraphic units filling it.

music. Their clothing left buttons and belt buckles.

Animal bones from the latrine are evidence of meat consumption. Gunflints and a mold for lead shots suggest they hunted themselves. A historical source shows that Brother Nikolaus was granted permission to gather food in the surroundings but not surpass the limits of the circuit.[192]

The hermits did not live always befitting their status. The vicar (Vikar) reported that they frequently visited the tavern until late night hours. Brother Nikolaus was urged to go to the sacraments more frequently. Brother Jacob was traveling a lot and insisted that he had to to free himself of Satan.[193]

The liquid mercury found at the bottom of the latrine pit might be an indication for the treatment of syphilis. Mercury was used as an oral treatment for syphilis at that time and left the body in a nearly unaltered way. [194]

The hermits did not live in the Falkenstein permanently. In winter, they stayed down in the valley in St. Gilgen at the Sonnleitenhaus (Nr. 8) and manufactured rosaries and other devotional objects like the flasks for the healing water. Not only the hermits but at least at around 1704 also the sacristan and schoolmaster J. Georg Khardt had the permission to sell these devotional objects and candles.[195]

[192] Ziller 1969, 53.
[193] Ziller 1969, 51-53.
[194] Andrea Olschewski, a medic at the LBI for Lung Vascular Research.
[195] Ziller 1969, 52.

Seraphim Schmiedpicher bought half of a house in the village and renovated it, evidenced by a purlin with his initials. He also taught religion in the local school from 1772 on.[196] Both facts suggest that he didn't live in the hermitage at this time.

Material remains of pilgrimage

The pilgrimage is not only visible in historical records but also left material traces. The healing water of the spring was sold in white or blue flasks as a devotional object, produced in the glass kilns of Aich, its branch in Zinkenbach and Hüttenstein. The glass kiln in Aich was founded by Fürsterzbischof von Salzburg Johann Ernst Graf von Thun in 1701 and was used until 1825. The Wolfgangiflascherl were produced at this location in the last quarter of the 18th century. The branch in Zinkenbach worked from 1779-1818.

The glass kiln in Hüttenstein was founded under the same circumstances and abandoned in 1825 as well. The Wolfgangiflascherl were produced there approximately in 1730/1740.

The flasks were produced in white and cobalt blue. Contrary to other flask made in the middle of the 19th century, which were blown as a sphere and then flattened, the Wolfgangiflascherl was blown directly to a flat two-part shape.

The flasks are flat and egg-shaped; the neck is cylindrical to slightly conical in the upper part. The rim is everted with a rounded lip. The dimensions are about 12 cm in height and 9 cm in width.

At the front side of the cobalt-blue flasks, there is a depiction of Saint Wolfgang with his stick and a model of a church floating upon a cloud. Below "St. Wolfgang" is engraved. The backside is decorated with the Falkensteinkapelle with a pair of stags and a chamois. The base shows a wind rose.

More recently, on the 1000th anniversary of the death of St. Wolfgang in 1994, the "Heimatkundliche Museum" of St. Gilgen ordered a new edition of transparent and blue flasks. (150) These new flasks differ with their modern screw cap, a brighter and more transparent blue, a flat base without wind rose, and the date 1994 between the cloud and St. Wolfgang. Recently only the blue edition is continued.

They were sold in St. Gilgen and at the Falkenstein itself, filled with the healing water. Hübner states in 1796 that pilgrims carried thousands of flasks with healing water to Austria, Bavaria, and Bohemia only a short while ago (see Fig. 6.13.

The axe turned into an important attribute in the veneration of Saint Wolfgang starting in the 15th century. This is evidenced by the appearance of miniature axes, named "Wolfgangihackln". These pilgrim badges made of brass, tin, or silver were

[196] Ziller 1969, 53.

probably produced by handicraftsmen alongside the pilgrimage way but were also sold directly by the hermits on the Falkenstein. There is also proof of pendants with representations of Saint Wolfgang with his axe, pictures, amulets, and coins, which served as devotional objects as well.

Fig. 8.9: Miniature axes known as "Wolfgangihackln" was an important attribute in the veneration of Saint Wolfgang.

These traditions were so far only known by written/historical records and from collections. Material remains, recovered in the two excavation campaigns confirm these records, and the results of the excavation campaigns help to reconstruct the pilgrimage traditions of the Falkenstein.
Fragments of the Wolfgangiflascherl and Wolfgangihackerl and other devotional objects were found at the excavation and are being mentioned in the corresponding stratigraphic units.
The only fragment of blue glass - Kat.Nr. 1006 - might be a fragment of a blue Wolfgangiflascherl. The shape of the present base fragment looks nearly quadrangular with softened edges and an omphalos base. The available photo does not show the exterior, but it does not seem to have the wind rose, which would identify it as a Wolfgangiflascherl. Also the ornament on the body sherd is not assignable to the decoration, but could be part of the cloud St. Wolfgang is standing upon. More probable, it is a simple glass flask with floral motives.

The pilgrims' path

The recent pathway leading from the bay of Fürberg to the Falkenstein does not match the pathway's historical course. Historical illustrations and maps, imagery data, and ALS data were used to trace the historical path between St. Gilgen and St. Wolfgang.

Illustrations and Imagery Data

Orthophotos provided by Google Maps and Bing Maps and maps based on them provided the basis for mapping the visible areas of the recent pathway. In the area of the clearing, historical orthophotos from 1952-1952, 2002-2004 (SAGIS online) document the change of course at the clearing. Additionally, there are historical maps and photos of the clearing with the church, documenting this change.

ALS - Data

The Airborne Laser scanning data, used for the topographical analysis to trace the historical pilgrim's pathway, was provided by SAGIS (Geographic Information System of Salzburg).
The data in question was collected within the "Interreg 2008-2010" project framework. The data acquisition took place on 21.04.2009 (valley area of Lake St. Wolfgang) and 20./21.05 2009 (surrounding mountains). The laser scanner used was an Optech ALTM 3100EA operated by the company Helica SrL mounted on a helicopter. Flight altitude was about 1500m. The flight tracks had a width of approximately 825 m and an overlap of 30%. The scan rate was 70 kHz, resulting in an overall mean point density of 1,5 - 2 measurements per m^2.
Raw data processing was done by SAGIS with Software from Optech. The classification was performed with Software from TerraSolid. The provided XYZ-data from SAGIS was processed with Scop and ArcMap, generating a DTM and derived visualizations.

Field Data

The course of the historical pilgrimage path visible in the field was surveyed with the local historian and curator of the local museum Augustin Kloiber on October 2nd of 2015. Partially the path is still visible as a rocky trail, partly as an overgrown hollow way. Especially the lower half is well preserved and traceable parts of the pilgrims still use it. The upper half is less visible and, in short sections, not traceable anymore.

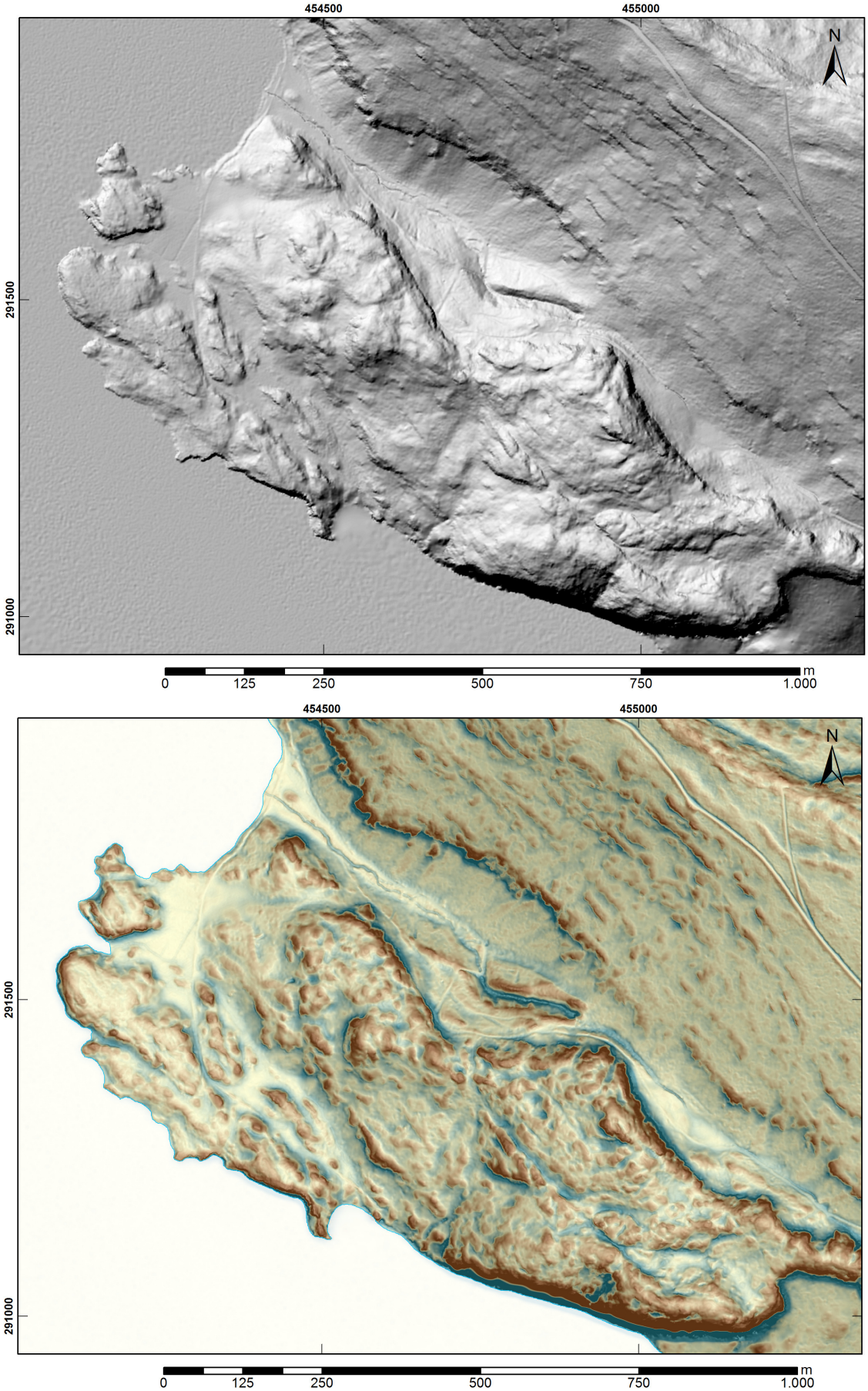


Fig. 8.10: Above: Digital terrain model generated from the XYZ-data provided by SAGIS. Below: Local relief model on top of a slope visualization.

Fig. 8.11: Part of the historical pilgrimage path leading through the wood.

The recent pilgrims path/hiking trail

The current pathway present since the 1940ties and was broadened, slightly allocated, and graveled in 1976 by the community of St. Gilgen in order to guarantee accessibility with (all-terrain) vehicles for authorized persons. Its course can easily be seen in most parts in imagery data and is recorded on recent maps.

Analyzing the ALS data at the bay of Fürberg, the recent path is only slightly visible at the foot of the slope of the Schafberg to its east. It gets better visible in the terrain data again after some 150m, where it is visible as linear depression at the eastern edge of the canyon leading eastwards. It makes a turn south, crossing the stream, making another turn west and after some meters (30) south again. The following part to the south leads straight ahead until a rock face, where the path turns to the west leading alongside the rock face. It passes the Kreuzkapelle and continues until arriving in a slight curve at the clearing.

Nowadays, the historical course of the way can partially be traced in the field and can be seen in the topographical data (ALS). The course on the clearing itself can be estimated from historical illustrations and maps and more recently seen in photographic data.

Fig. 8.12: The broadened recent pathway next to a chapel.

Course of the medieval pilgrims' path

The description of the historic pilgrim's path is subdivided into three sections. The section Fürberg-Falkenstein was surveyed and analyzed in terrain data. The section on the Falkenstein itself is known from historical illustrations and the last section Falkenstein-St. Wolfgang was analyzed in imagery and terrain data.

Fürberg-Falkenstein

The ALS-Data does not show too much detail (point density of 1.5 - 2 measurements per m^2), but various linear features are visible. Comparing the features with the mapping of current pathways and waterways, the pathway/forest road and the stream can be clearly assigned.

When looking at the data at the bay of Fürberg, the historic path cannot be seen. According to the local historian Augustin Kloiber, the pilgrims arrived at the southern part of the bay with the Traunderl and then followed the topography straight towards east-southeast. It is not sure if this path went to the right or left of the small creek. Approximately 40 years ago, there was still a little bridge across the stream. A path becomes visible at about 180 m from the bay right next to the stream. This point might coincide with the former bridge, suggesting that the historic pathway came from the other side, crossing this bridge.

While the recent path follows the slope to the east, the historical pathway begins

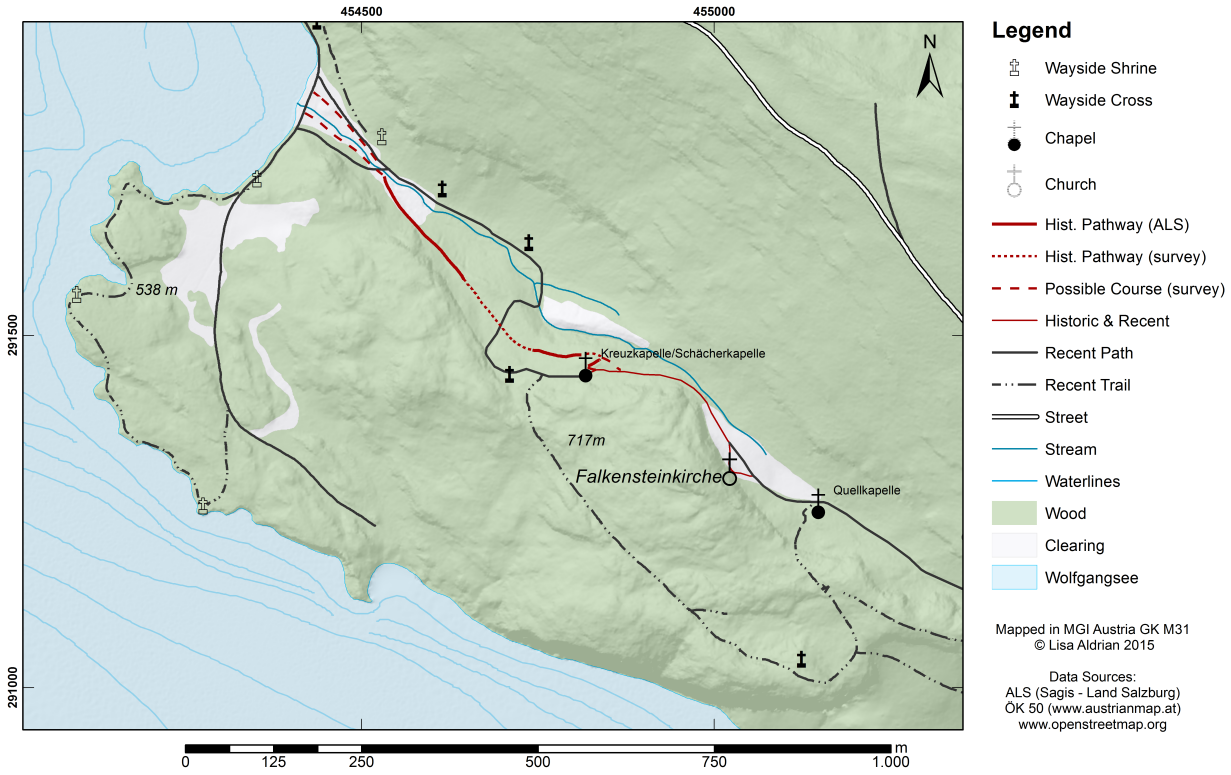


Fig. 8.13: Wolfangweg. The historical and recent course of the section Fürberg-Falkenstein.

at the bay and goes straight up or crosses the creek in the flat terrain before going upwards. A clearly visible linear feature to the creek's south then leads upwards to the southeast. This feature is also traceable in the field as a rocky pathway leading more or less straight upwards.

The pathway then is crossed by the current path before it turns in a slight curve to the east. It is only slightly visible in the terrain data; in the field, no pathway is visible, but there is a strip without trees leading straight until reaching an area with dense beech saplings where the path is visible as hollow way and in the field as in the ALS-data. The historic pathway thus ran on a lower terrace parallel to the recent pathway.

After the beech saplings, the pathway makes a sharp turn to the southwest leading through a passage limited by boulders on both sides directly to the Kreuzkapelle. The boulders were and are carried up the hill by the pilgrims to expiate their sins. Parts were moved to the other side of the recent pathway while it was built. It is possible that the historical path first led back through the passageway and went up at some point after that. As the terrain is quite steep in this part, it is assumed

that the historical path most likely took the same course as the current path. This course leads to a slight curve to the clearing.

Falkenstein

The historical pathway that existed until the early 20th century in the area of the clearing went right beside the church, as proved by several illustrations, pictures, and the Franziszeische Kataster.[197] In all the illustrations, the pathway leads up to the chapel in a staircase and leads down to a more gradual staircase on the other side. In one case, it's not a staircase but just a sloping path. It describes a curve towards the chapel, leading between the chapel and the hermitage. The Franziszeische Kataster dates to the same time (1829) and confirms the course shown on the artistic illustrations. The photographs (being more recent) also show a staircase leading upwards and a sloping path leading downwards. Some of them show a little WSW-ENE-oriented shelter in the area where the illustrations depict the hermitage. Hence the pathway still was the same after the hermitage had already disappeared. Nowadays, additionally to the path described above, which still keeps leading up to the church and down again on the other side, there is a new pathway leading straight across the clearing.

Falkenstein-St. Wolfgang

In the east of the clearing, the pathway continues the only viable way between the slopes of the foothill of the Schafberg to the north and the Falkenstein to the south. After crossing the clearing, passing the Quellkapelle at the right-hand side on its end, the path ascends until the Beilwurfkapelle.[198] From there, it follows the ridge to the east and finally leads downwards to the village of Ried. There are two options – or one may choose the route alongside the lake or the path across the hill (on the slope of the Schafberg) until reaching St. Wolfgang after 3 km. Modern construction changed the original pathway continuously in settlement areas. In St. Wolfgang, the Pilgerstraße (pilgrims street) and the St. Wolfgang Straße nowadays directly lead to the church of St. Wolfgang. The church is located directly at the shore of the sea, where according to the legend, the axe of St. Wolfgang has landed.

[197] Filzwieser 2011, 23.
[198] Not visible in the data.

Chapter 9

Conclusions

The present thesis provides a detailed building history of the hermitage at the Falkenstein beyond the knowledge of its exact location and general layout already discovered in the precedent research project.

The stratigraphic analysis revealed the relationship between deposits and surfaces and allowed the structuring into phases as well as the integration in an absolute chronological scheme. The building history does include different phases of construction, renovation, and use of the 5 rooms and of single events. Many of these events have been successfully linked to the historical record. The sequence of events seen in the data in combination with the historical record reveals an insight into the living condition of the hermits over the lifespan of the hermitage.

The combination of archaeological and historical sources led to the attribution of a primary room function and location of doorways and the use of the space around the hermitage. Without the combination of those two sources, less information would be available.

A planned future excavation of the remaining parts of Cellar 2 and Room 5 will hopefully complete the picture of the hermitage. Excavating Cellar 2 could provide proof of the supposed access to the well with the healing water and the theory of limiting access to it by the hermits.

The material record - as far as analyzed in the scope of this thesis - gives an insight into the pilgrimage traditions mentioned in historical sources. In addition, the analysis of ALS data and a field-walking survey evidence the original course of the pilgrims' path.

An honest effort to present an accurate account of the past at the hermitage at the Falkenstein was made. Individual conclusions might be based on assumptions regardless. Like in every excavation and interpretation process it is not possible to present a definite solution, but different possibilities of how the past might have looked. This is not only due to shortcomings in the research process itself, which always will be there, but in the nature of things being interpretable in different ways.

An efficient technique to visualize the topographical stratigraphic record as 3D vol-

umes and 3D surfaces was presented. A workflow for processing terrestrial laser scan data and the photographic record for a 3D visualization of the excavated surfaces and deposits has been established. The implemented workflow has already been successfully used in other excavations and is an addition to the standardized documentation process used in the excavations. The developed workflow can also be replicated in open-source software solutions like MeshLab, Blender, and CloudCompare. Newer developments (see 5.1) manage to go beyond manual point-cloud processing, creating a 3D point-cloud from top and bottom point-cloud with a programmatic approach. This will hopefully lead to a solution also incorporating the creation of the 3D volume itself.

The presence of a 3D record of every stratigraphic unit of the excavation has shown its value in the analysis of the stratigraphic sequence and in the comparison with the GPR data. Visualizing the location of the finds in the 3D units makes it a lot easier to deduct the process of deposition involved. Displaying leveling layers in different rooms made it possible to literally see a surface of use, even though they were excavated on different points in time. Differences and similarities become apparent more naturally in 3D. The recorded 3D results are more intuitive in handling and understanding for the human brain. Every stage of the excavation can be visualized as a textured 3D model to answer questions that may arise or just to have a 3D phase plan. Graphic, as well as metric information, can be retrieved at the recorded level of accuracy and quality. 2D plans - like the phase plans and sections, as well as ortho-photos, can be extracted.

A combination of the stratigraphic sequence with the topographical stratigraphic record, its associated finds, and respective dating, as well as the historical record, has been done in ArcScene. This was limited in terms of 3D visualization. With ArcGIS Pro, a better and easier workflow is possible now. A catalog of all the stratigraphic units as 3D features and ortho-photos with descriptions could be created and should be made available.
The integration of complex meshes into GIS databases is still problematic and non-geodatabase-linked programs have to be used for displaying. A program facilitating the visualization and analysis of real 3D GPR-Data together with excavation and other data would still be a giant step to simplify the process and amplify the possibilities.
A shift towards a digital archaeology is unmistakably visible in the last years. Doubts and skepticism toward accuracy and efficiency have been rejected and also the time-consuming processing is being optimized. The opportunity to present and display 3D data has been seized in all branches of archaeology. Still, the step to go beyond

- to combine it with the archaeological information and use its analytical potential- a real 3D GIS has not been achieved. Going there the raised question about the possible accomplishments of 3D data will hopefully be answered and an understanding/awareness for real 3D archaeology raised.

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SU Catalog

SU 001
Type: d
Color: not taken - topsoil
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: homogeneous, loose topsoil
Density: humid, 3
Topographic description: complete trench; 7 x 12 m; rectangular - defines the trench
Archaeological characteristics: topsoil; partly stones, loam, debris deleted; finds: pottery, plastic
Interpretation: topsoil

SU 002
Type: d
Color: brownish black
Color Code: 10YR2/2
Soil texture: loamy sand
Code: lS
Coarse material - shape: miscellaneous: fragments of roof tiles/bricks
Coarse material - size: 4
Coarse material in %: 50
Texture: homogeneous
Density: dry, 2
Topographic description: western half of the trench, from the southern limits until the surrounding wall in the north
Archaeological characteristics: debris layer with app. 200 fragments of bricks/m², sand in between of the bricks, many cavities; finds: glass, pottery, metal - mostly recent
Interpretation: leveled debris of a renovation of the church

SU 003
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3
Coarse material in %: 10
Texture: homogeneous, heavy rooting
Density: humid, 3
Topographic description: rectangular elevation (app. 2 x 1 m) with darkbrown color at the eastern limits of the trench, north of SU 6
Archaeological characteristics: stones (app. 10 cm); finds: wooden fragment, glass, potty, bones
Interpretation: recent disturbance

SU 004
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: recent disturbance in the east of room 1
Archaeological characteristics: finds: some pottery fragments
Interpretation: recent disturbance - construction of path

SU 005
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 1,2,3,4
Coarse material in %: <10,<5,<5,<1
Texture: partly heavy rooting
Density: humid,3
Topographic description: rectangular SU at the northern trench limit; limited by the wall in the south and the trench on the other three sides; 4 x 7 m, 1-15 cm
Archaeological characteristics: rest of humus; some loamy patches; finds: pottery, glass; underneath loamy SU
Interpretation: part of the topsoil

SU 006
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged,rounded
Coarse material - size: 2,3
Coarse material in %: 10,10
Texture: slight rooting
Density: humid, 3
Topographic description: inside Room 1, rectangular outline
Archaeological characteristics: rests of humus; find: pottery, in the south iro plaque, fragments of bricks
Interpretation: filling

SU 007
Type: d
Color: grayish yellowish brown
Color Code: 10YR4/2
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged, rounded
Coarse material - size: 2,2
Coarse material in %: 20,10
Texture: partly heavy rooting

Density: humid, 3
Topographic description: rectangular shape with some irregular extensions to the north
Archaeological characteristics: rests of humus in R2; some bigger stone boards on the surface; finds: many tiles of the tiled oven (southwards starting from the oven), glass, metal, pottery
Interpretation: part of the topsoil

SU 008
Type: i
Topographic description: interface in the are of the complete trench; after removal of the topsoil; different depths due to different removal
Archaeological characteristics: defined by removal of topsoil, artificial interface;
Interpretation: interface remove of topsoil

SU 009
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged,rounded
Coarse material - size: 2,2
Coarse material in %: 10,10
Texture: slight rooting
Density: humid, 3
Topographic description: nearly rectangular SU
Archaeological characteristics: rests of humus above oven; finds: nails, pottery
Interpretation: part of the topsoil

SU 010
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged, rounded
Coarse material - size: 3,4
Coarse material in %: 10,10
Texture: heavy rooting at the northern limit
Density: humid, 3
Topographic description: rectangular SU with extension in the direction of SU 2; eastern limits cut by trench limits
Archaeological characteristics: 3 big stones in the center; finds: charcoal, pottery, recent metal, glass, coins
Interpretation: recent deposit - use of hay barn

SU 011
Type: d
Color: dull yellowish-orange
Color Code: 10YR6/3
Soil texture: schluffiger Sand
Code: uS
Coarse material - shape: angular-edged, rounded
Coarse material - size: 4,1
Coarse material in %: 10,90
Texture: homogeneous, interspersed with stones
Density: ?,2
Topographic description: irregular circular SU in the southwest of the trench; limited by SU 2
Archaeological characteristics: fine granular gravel interspersed with smaller stones (<10cm); finds: coins, brick fragments, recent find material
Interpretation: debris of a renovation of the church

SU 012
Type: i
Interpretation: deleted

SU 013
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3,4,5
Coarse material in %: 10,20,70
Texture: partly loose, cavities
Density: dry,2
Topographic description: SU with irregular surface in the southwest of the trench; outline: irregular sector
Archaeological characteristics: material is much coarser than SU 11, apart from that similar; big concrete chunks, limestones, mortar-sand; clear distinction to the underlying humic material; finds: recent - plastics, marble, folding rule
Interpretation: debris of a renovation of the church

SU 014
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 1
Coarse material in %: 10
Texture: loose stone layer in dark sediment
Density: ?, 1
Topographic description: elongate oval SU with extensions to the northwest
Archaeological characteristics: dark soil with bricks and stones; finds: pottery, glass, nails, tiles, wood
Interpretation: wooden plank

SU 015
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: north of the building
Archaeological characteristics: stone layer
Interpretation: stone layer - construction of path

SU 016
Type: d
Color: dark brown
Color Code: 10YR3/3
Soil texture: clayey silt
Code: lU
Coarse material - shape: angular-edged
Coarse material - size: 3
Coarse material in %: 10
Texture: heavy rooting, especially in the west
Density: humid, 4
Topographic description: nearly circular filling in the northwest of the trench
Archaeological characteristics: few loam spots, brick fragments; finds: pottery, glass, metal, wood
Interpretation: deposit

SU 017
Type: i
Topographic description: interface floor level Room 2
Interpretation: floor level room 2

SU 018
Type: d
Color: brownish black
Color Code: 10YR3/2
Soil texture: clayey silt
Code: lU
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1 , 3, 2
Coarse material in %: 20 u 20, 30
Texture: loose filling, many stones, slight rooting
Density: humid, 3
Topographic description: nearly rectangular SU southeast of R1
Archaeological characteristics: rest of humus above of oven; brick fragments; finds: pottery, glass
Interpretation: part of the topsoil

SU 019
Type: i
Topographic description: interface foundation if the oven
Interpretation: interface foundation of oven

SU 020
Type: d
Color: brownish black
Color Code: 10YR3/2
Soil texture: clayey silt
Code: lU
Coarse material - shape: angular-edged
Coarse material - size: 1
Coarse material in %: 15
Texture: loose filling
Density: ?,1
Topographic description: rectangular; inside R1
Archaeological characteristics: brick debris, wall debris, gravel; finds: pottery
Interpretation: filling

SU 021
Type: d
Color: brownish black
Color Code: 10YR3/2
Soil texture: clayey silt
Code: lU
Coarse material - shape: angular-edged
Coarse material - size: 2
Coarse material in %: 5
Texture: rooting
Density: humid,4
Topographic description: quadrangular; limited by wall; area of Room 3
Archaeological characteristics: finds: coins, tiles, bricks, pottery
Interpretation: filling

SU 022
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged,rounded
Coarse material - size: 1,1
Coarse material in %: 10,10
Texture: -
Density: humid, 3
Topographic description: rectangular deposit in the southwest
Archaeological characteristics: rests of humus; small pebbles; above of stone setting (Rollierung); finds: pottery (mostly blue glazed), glass, brick fragments
Interpretation: part of the topsoil

SU 023
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 5
Coarse material in %: 100
Texture: -
Density: -
Topographic description: big stones in Room 2
Archaeological characteristics: -
Interpretation: padstones for wooden floor

SU 024
Type: d
Color: dark brown
Color Code: 10YR3/3
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -

Archaeological characteristics: -
Interpretation: deposit - use of hay barn

SU 025
Type: d
Color: dark brown
Color Code: 10YR3/4
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged; miscellaneous: tiles/bricks, bricks
Coarse material - size: 3,4
Coarse material in %: 10,30
Texture: heavy rooting, apart from that homogeneous
Density: humid, 3
Topographic description: irregular SU at the southern wall of the oven; getting more narrow in the north
Archaeological characteristics: mostly fragments of tiles of tiled oven; finds: pottery, tiles of the tiled oven, glass, nails, coins, flint; beneath SU 27 (yellowish, loamy - like Estrich; SU 25 - dark soil)
Interpretation: debris of collapse of oven

SU 026
Type: d
Color: dark brown
Color Code: 10YR3/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: slight rooting
Density: humid, 4
Topographic description: rectangular; app. 3x1,5 m; close to the northern wall
Archaeological characteristics: very compact loamy filling
Interpretation: deposit

SU 027
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3
Coarse material in %: 10
Texture: inhomogeneous
Density: humid, 3
Topographic description: irregular SU in Room 2; loamy, dark with rests of screed(?) (Estrich)
Archaeological characteristics: SU 27 = SU 29; finds: coins
Interpretation: debris

SU 028
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1,1
Coarse material in %: 10,10
Texture: small pebbles
Density: ?,3
Topographic description: quadrangular-oval deposit
Archaeological characteristics: dark sediment; small pebbles; above of stone layer; finds: pottery (glazed), brick debris
Interpretation: part of the topsoil

SU 029
Type: d
Color: brown
Color Code: 10YR4/4
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged; miscellaneous: tiles/bricks
Coarse material - size: 3,3
Coarse material in %: 30,40
Texture: -
Density: humid, 3
Topographic description: darkbrown, humic SU in Room 2
Archaeological characteristics: heavily interspersed with tiles of the tiled oven; southern area: gritty material (collapse of the wall); underlying SU light loamy with wooden beams, finds: coins, glass pearls, tiles, glass, small
Interpretation: debris

SU 030
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: stones in humic filling
Density: -
Topographic description: ca 2x1 m big area stone layer at the southwestern trench limit
Archaeological characteristics: modern SU with many modern finds
Interpretation: debris

SU 031
Type: d
Color: brownish black
Color Code: 10YR3/1
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1,1
Coarse material in %: 10,10
Texture: -
Density: -

Topographic description: round-oval SU
Archaeological characteristics: loose, black sediment, intense smell, bricks, debris, stones; finds: glass, beer cap, pottery
Interpretation: filling C2

SU 032
Type: d
Color: dull yellowish-orange
Color Code: 10YR7/3
Soil texture: loamy sand
Code: lS
Coarse material - shape: rounded; miscellaneous: mortar
Coarse material - size: 1,1
Coarse material in %: 10,20
Texture: screed
Density: ?,1
Topographic description: rectangular SU
Archaeological characteristics: loose sediment finds: pottery, bricks, nails, glass
Interpretation: floor R1

SU 033
Type: d
Color: dark brown
Color Code: 10YR3/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: miscellaneous: small limestones
Coarse material - size: 1
Coarse material in %: 5
Texture: medium rooting
Density: ?,2
Topographic description: rectangular, L-shaped SU in the northwest
Archaeological characteristics: finds: pottery, bones, glass, brick debris
Interpretation: waste area

SU 034
Type: d
Color: brownish black
Color Code: 7.5YR3/2
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged
Coarse material - size: 2,3
Coarse material in %: 15,5
Texture: loose filling
Density: -
Topographic description: oval, max. 40cm depth; center disturbed by a wooden post
Archaeological characteristics: possible wall debris with numerous bigger stones; bigger bloc of lime
Interpretation: filling with materials from construction work

SU 035
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: homogeneous
Density: humid, 3
Topographic description: irregular
Archaeological characteristics: some small stones, finds: pottery
Interpretation: leveling material

SU 036
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: wooden plank in R2, north
Archaeological characteristics: wooden plank
Interpretation: part of floor construction Room 2

SU 037
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: wooden plank in R2, south
Archaeological characteristics: wooden plank
Interpretation: part of floor construction Room 2

SU 038
Type: i
Topographic description: interface end of decay/destruction of the hermitage
Interpretation: end of collapse/destruction of the building

SU 039
Type: i
Topographic description: interface foundation of the hearth
Interpretation: interface foundation of the hearth

SU 040
Type: i
Topographic description: R4
Interpretation: interface floor level Room 4

SU 041
Type: d
Color: -

Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: R4
Archaeological characteristics: stone paving Room 4
Interpretation: floor R4

SU 042
Type: d
Color: brownish black
Color Code: 7.5YR3/2
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged
Coarse material - size: 1,3,4,5
Coarse material in %: 2,5,40,3
Texture: very compact, many stones, heavy rooting at the bottom
Density: humid, 4
Topographic description: rectangular Su with extensions to the northern edge of the wall
Archaeological characteristics: black SU with modern construction debris, many big partially worked stones - wall debris?, limited by surrounding wall
Interpretation: wall debris

SU 043
Type: d
Color: dark brown
Color Code: 10YR3/4
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged; miscellaneous: bricks
Coarse material - size: 2,?
Coarse material in %: 10, 50
Texture: -
Density: humid, 4
Topographic description: boot-shaped SU consisting of brick fragments
Archaeological characteristics: fragments of bricks, partially very brittle; few little stones; few finds
Interpretation: brick debris

SU 044
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 2
Coarse material in %: 10
Texture: -
Density: humid, 3
Topographic description: rectangular SU in the southeast corner of R3 (20x35 cm)
Archaeological characteristics: finds: 1 preserved wooden fragment, one nail
Interpretation: part of floor construction Room 4

SU 045
Type: i
Topographic description: west of R5
Interpretation: Interface floor level in the west of Room 5

SU 046
Type: i
Topographic description: Room 5
Interpretation: Interface floor level Room 5

SU 047
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: R5
Archaeological characteristics: wall debris of the eastern wall in Room 5
Interpretation: wall debris of the eastern wall in Room 5

SU 048
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: rounded
Coarse material - size: 1
Coarse material in %: 10
Texture: inhomogeneouse, humic filling
Density: -
Topographic description: rectangular (6x0,3 m)
Archaeological characteristics: disturbance by the construction of the pathway; finds: pottery, glass(recent)
Interpretation: gravel for pathway

SU 049
Type: i
Topographic description: interface floor level Room 3
Interpretation: floor level Room 3

SU 050
Type: i
Topographic description: interface floor level Room 1
Interpretation: floor level Room 1

SU 051
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/3
Soil texture: sandy clay
Code: ~sT

Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: humid, 4
Topographic description: loamy SU in the north; adjacent to SU 52 in the south; in the east until the trench limit: stone layer
Archaeological characteristics: loamy compact material in the area of the stone paving; limestones 3-25cm, various finds: pottery, metal, glass; finds: pottery, glass, metal, coins
Interpretation: waste area

SU 052
Type: d
Color: dull yellowish-brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged
Coarse material - size: 2
Coarse material in %: 5
Texture: inhomogeneous
Density: humid, 3
Topographic description: inside C1, but also beyond its extensions
Archaeological characteristics: humic, loamy, inhomogenous material; partially sandy, mortar grit; finds: pottery, metal, bones, glass
Interpretation: filling C1

SU 053
Type: d
Color: dull yellowish-brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: loamy
Density: humid, 4
Topographic description: rectangular (1,5x1 m), framed by lime
Archaeological characteristics: presumably pit filling with various nails and some glass fragments
Interpretation: filling of the lime pit

SU 054
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged, rounded
Coarse material - size: 4, 1, 3
Coarse material in %: 2, 10+10
Texture: loose loam with many stones
Density: humid, 2
Topographic description: rectangular filling inside R1
Archaeological characteristics: finds: glass, pottery, iron hammer, metal fitting; bricks debris
Interpretation: leveling material 1Room1

SU 055
Type: d
Color: Kalk
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: lime
Coarse material - size: -
Coarse material in %: -
Texture: homogeneous
Density: humid, 3
Topographic description: rectangular filling inside Room 3; 0,5x0,3 m
Archaeological characteristics: homogeneous lime-SU; no finds
Interpretation: a bag of lime inside the lime pit

SU 056
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: SU 56 was assigned to be able to measure outlines of 23a and b easier
Archaeological characteristics: SU = SU 23
Interpretation: padstones for the wooden floor (=23)

SU 057
Type: i
Topographic description: R3
Interpretation: interface lime pit

SU 058
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3,4
Coarse material in %: 10,10
Texture: -
Density: humid, 4
Topographic description: rectanglular; ca 30x120 cm; occasionally big stones
Archaeological characteristics: interspersed with wooden fragments; find concentration in the western corner
Interpretation: part of floor construction Room 3

SU 059
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 4,5
Coarse material in %: 30,70
Texture: -
Density: -
Topographic description: loose stone layer in the northern area of R2
Archaeological characteristics: loose stone layer in the northwestern area of Room 2
Interpretation: padstones Room 2

SU 060
Type: d
Color: -
Color Code: -
Soil texture: inhomogeneous
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: humi?
Topographic description: filling of the oven foundation; above stones laid out evenly; interspersed with bricks
Archaeological characteristics: finds: fragments of the tiled oven, pottery, bones
Interpretation: foundation for oven

SU 061
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3
Coarse material in %: 20
Texture: -
Density: humid, 3
Topographic description: half-oval, ca 30x40 cm
Archaeological characteristics: SU contains wooden fragments
Interpretation: part of the floor construction Room 3

SU 062
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3
Coarse material in %: 5
Texture: heavy rooting
Density: humid, 3
Topographic description: black material between and above the stones of the northern wall of R2
Archaeological characteristics: some areas interspersed with mortar; finds: coins, pottery
Interpretation: wall debris M1

SU 063
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3,4,5
Coarse material in %: 45,10,45
Texture: very inhomogeneous, slight rooting
Density: humid, 4
Topographic description: nearly rectangular SU with even surface
Archaeological characteristics: sticky, many big, dressed stones with a humic filling; many tiles of the tiled oven
Interpretation: filling of C2

SU 064
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 1
Coarse material in %: 100
Texture: -
Density: dry, 1
Topographic description: irregular deposit of gravel; ca 50x50 cm
Archaeological characteristics: supposed lime pit
Interpretation: filling of lime pit

SU 065
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: miscellaneous: wooden planks
Coarse material - size: -
Coarse material in %: 100
Texture: -
Density: humid, 3
Topographic description: wooden planks on the floor of the working pit in R3; ca 70x90 cm
Archaeological characteristics: wood with partially 1-3cm lime layer above it; (wood very good preserved in this area)-->sample; in the rest of the area, the wood is only preserved as dark rests; finds: nails, pottery
Interpretation: wooden planking in a construction pit

SU 066
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: wooden beam in the northern part of R2
Archaeological characteristics: wooden planks
Interpretation: part of floor construction Room 2

SU 067
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: rests of wooden beams in Room 2
Archaeological characteristics: wooden planks
Interpretation: part of floor construction Room 2

SU 068
Type: d
Color: dull yellowish-brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: rounded
Coarse material - size: 3
Coarse material in %: 15
Texture: homogeneous
Density: humid, 3
Topographic description: dark - loamy SU in Room 2
Archaeological characteristics: finds: pottery, glass, metal, four coins
Interpretation: leveling Room 2

SU 069
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3,4
Coarse material in %: 25,25
Texture: -
Density: humid, 4
Topographic description: rectangular SU with rounded corners in Room 3; adjacent to the lime pit; 60x25 cm
Archaeological characteristics: stone packing; few finds;
Interpretation: filling construction pit

SU 070
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3,4,5
Coarse material in %: 5,30,20
Texture: -
Density: humid, 3
Topographic description: rectangular SU; continuation of SU 58
Archaeological characteristics: few finds; wooden fragments and bigger stones
Interpretation: part of floor construction Room 3

SU 071
Type: d
Color: dull yellowish-brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: humid, 3
Topographic description: rectangular; ca 2x1,5 m; at the western trench limit; it is limited by the northern wall of the building and in the north contains big stones
Archaeological characteristics: humic, loose SU with loamy inclusions; many finds: pottery and glass; jaw's harp
Interpretation: waste area

SU 072
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 80,20
Texture: homogeneous, disturbed by den
Density: -
Topographic description: oval, even surface with big stones; limited in the south and southeast
Archaeological characteristics: many different pottery fragments; more finds at the bottom
Interpretation: filling of latrine pit

SU 073
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: silty loam
Code: uL

Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: homogeneous
Density: humid, 3
Topographic description: nearly semicircular, loamy SU northwest of room 4
Archaeological characteristics: few finds
Interpretation: filling/debris

SU 074
Type: d
Color: dull yellowish-orange
Color Code: 10YR6/4
Soil texture: loamy clay
Code: tL
Coarse material - shape: angular-edged
Coarse material - size: 2,3,4,5
Coarse material in %: 10,10,30,5
Texture: homogeneous
Density: humid, 4
Topographic description: rectangular SU; homogeneous surface; 2x3m; depth appr. 25cm
Archaeological characteristics: loamy, compact material with stones; charcoal, lime, and gravel inclusions; finds: pottery, nails, knife, glass
Interpretation: leveling material in Room 1

SU 075
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: alongside the eastern and northern wall of Room 3 (excavated as the whole extension of the room; in the process of analysis split up in SU 75 and SU 251)
Archaeological characteristics: dark, loamy dark sediment; many finds: coins, pottery, glass
Interpretation: leveling material Room 3

SU 076
Type: i
Topographic description: the interface of the working pit in Room 3
Interpretation: interface construction pit

SU 077
Type: i
Topographic description: interface SU 70/58
Interpretation: interface of 70/58

SU 078
Type: i
Topographic description: interface SU 61
Interpretation: interface of 61

SU 079
Type: i
Topographic description: interface SU 44
Interpretation: interface of 44

SU 080
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: humid, 3
Topographic description: stone setting in the soil; southern "wall" of the oven foundation - without mortar; later addition; partially big stones
Archaeological characteristics: finds: pottery and fragments of tiles of tiled oven, bones
Interpretation: a later wall of the foundation of the oven

SU 081
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged
Coarse material - size: 4
Coarse material in %: 40
Texture: -
Density: humid, 4
Topographic description: posthole; limited by stones; diameter appr. 40 cm
Archaeological characteristics: find concentration in the upper part; flint, metal, glass
Interpretation: posthole

SU 082
Type: d
Color: dull yellowish-brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged
Coarse material - size: 3
Coarse material in %: 70
Texture: homogeneous
Density: humid, 3
Topographic description: ca 1,50x0,50 m; north of R4; depth app. 10 cm
Archaeological characteristics: above of light loam; finds: pottery, glass, nails
Interpretation: waste area

SU 083
Type: d
Color: -
Color Code: -
Soil texture: -

Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: u-shaped foundation for the oven; with mortar
Interpretation: foundation of oven

SU 084
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 4
Coarse material in %:?
Texture: -
Density: -
Topographic description: stones inside SU 85 to fix the post (ca 15-20x15-20cm)
Archaeological characteristics: stones inside of posthole - to fix the post
Interpretation: stones to fix a post

SU 085
Type: i
Topographic description: interface posthole 84-81
Interpretation: interface posthole

SU 086
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: rounded; granular gravel
Coarse material - size: -
Coarse material in %: -
Texture: rooting
Density: ?, 4
Topographic description: inside of hearth structure
Archaeological characteristics: finds: pottery, glass pearls, organic rests
Interpretation: filling of the hearth with gravel

SU 087
Type: d
Color: dull yellowish-brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged
Coarse material - size: 2
Coarse material in %:?
Texture: loamy
Density: humid, 4
Topographic description: longitudinal-rectangular SU inside of C1; underneath of the first step, covering the whole extent
Archaeological characteristics: finds: pottery, glass, metal, glass pearls, nails, bones
Interpretation: filling C1

SU 088
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: southeast corner of R4
Archaeological characteristics: masonry identic with SU 8
Interpretation: foundation of the hearth

SU 089
Type: i
Topographic description: interface SU 36

Interpretation: interface of 36

SU 090
Type: i
Topographic description: interface SU 37
Interpretation: interface of 37

SU 091
Type: i
Topographic description: interface SU 66
Archaeological characteristics: interface of 66
Interpretation: interface of 66

SU 092
Topographic description: interface SU 67
Archaeological characteristics: interface of 67
Interpretation: interface of 67

SU 093
Type: d
Color: brown
Color Code: 10YR4/6
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: homogeneous
Density: -
Topographic description: longitudinal-rectangular SU inside of C1
Archaeological characteristics: loose-sandy mortar; finds: pottery, glass, metal
Interpretation: filling C1

SU 094
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: southeast corner of R4
Archaeological characteristics: no mortar
Interpretation: foundation of the hearth

SU 095
Type: d
Color: dull yellowish-orange
Color Code: 10YR6/3
Soil texture: clayey sand
Code: tS
Coarse material - shape: angular-edged
Coarse material - size: 1,3,5
Coarse material in %: 30,10,60
Texture: inhomogeneous
Density: humid, 2
Topographic description: L-shaped SU in K2; 1,30x 1m
Archaeological characteristics: filling of the cellar with sandy material and debris; smaller to the bottom due to steps; finds: stone weight
Interpretation: debris/filling

SU 096
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 5,5
Texture: -
Density: humid,4
Topographic description: R1; rectangular; 2x3 m; depth app. 10 cm
Archaeological characteristics: very loamy with many wooden fragments; in the center area with gravel; finds: nails, coins, bone
Interpretation:?

SU 097
Type: d
Color: dull yellowish-orange
Color Code: 10YR6/3
Soil texture: loam
Code: L
Coarse material - shape: rounded
Coarse material - size: 2
Coarse material in %: 15
Texture: -
Density: humid, 4
Topographic description: irregular, loamy SU inside of room 2
Archaeological characteristics: loamy filling; finds: pottery, glass, metal, coins
Interpretation: leveling material in Room 2

SU 098
Type: i
Topographic description: deleted
Archaeological characteristics: -
Interpretation: ?

SU 099
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: homogeneous, no rooting
Density: -
Topographic description: L-shaped; limited by walls of the cellar and steps (C2);
Archaeological characteristics: cuts the groundwater level: wood (partially decayed) above of steps
Interpretation: trap door?

SU 100
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: humid
Topographic description: ca 1m², decayed wood; depth 10cm
Archaeological characteristics: -
Interpretation: wooden floor

SU 101
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: on the wall between R1 and R4
Archaeological characteristics: wood surrounded by loamy material; N-S planks; E-W beams; finds: nails, pottery, coins, bones
Interpretation: door sill

SU 102
Type: d
Color: grayish yellowish brown
Color Code: 10YR5/2
Soil texture: clayey silt
Code: lU
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: sandy, with gravel
Density: dry, 2
Topographic description: L-shaped; at the eastern limit of R3
Archaeological characteristics: pebble gravel and sand; finds: pottery, charcoal flitter, brick fragments
Interpretation: leveling material Room 3

SU 103
Type: d
Color: dull yellowish-orange
Color Code: 10YR6/4
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged; small limestones
Coarse material - size: 2
Coarse material in %: 2
Texture: more homogeneous loam
Density: humid, 4
Topographic description: inside of C1; declining from east to west
Archaeological characteristics: loamy SU in C1; finds: pottery, bones, metal
Interpretation: filling of C1

SU 104
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: very inhomogeneous, no rooting
Density: humid, 3
Topographic description: nearly rectangular SU with extensions; surface follows the slope; 2,5x3 m
Archaeological characteristics: loamy transition to geological underground; rich in finds
Interpretation: waste area

SU 105
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged, rounded
Coarse material - size: 4, 5, 3
Coarse material in %: 10 u 60, 10
Texture: -
Density: dry
Topographic description: stone filling in most parts of R2 - especially in the northern area; forms one level
Archaeological characteristics: stone filling for leveling; finds: pottery, nails, glass
Interpretation: leveling material in Room 2

SU 106
Type: d
Color: dull yellowish-brown
Color Code: 10YR2/3
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged
Coarse material - size: 2,3,4
Coarse material in %: 5,5,1
Texture: -
Density: humid, 3
Topographic description: rectangular (2x3 m) SU with a gap in the southern corner of room 1; in the east the pottery; mean depth of 7 cm
Archaeological characteristics: alongside the southern wall more loamy; alongside northern wall sandy; in the eastern corner: loamy-humic material; finds: pottery, glass, nails
Interpretation: leveling material in Room 1

SU 107
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: rounded
Coarse material - size: 3,4
Coarse material in %: 95,5
Texture: homogeneous
Density: dry, 2
Topographic description: homogeneous pebble-gravel; total extent of R2 except for a small area in the southeastern corner
Archaeological characteristics: fundarme SE, einige pottery.stücke, nails
Interpretation: gravel layer (Rollierung)

SU 108
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: bioturbation (den)
Archaeological characteristics: -
Interpretation: den

SU 109
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 1
Coarse material in %: 10
Texture: -
Density: humid, 3
Topographic description: ca 1,5x1 m; max depth 10 cm, in the eastern part of R1
Archaeological characteristics: -
Interpretation: leveling material in Room 1

SU 110
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: rounded
Coarse material - size: 1
Coarse material in %: 5
Texture: loamy filling
Density: -
Topographic description: rectangular SU inside of R2
Archaeological characteristics: few finds: pottery, nails, coins; loam partially lighter, partially mottled - leveling
Interpretation: leveling material in Room 2

SU 111
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 4,5
Coarse material in %: 30,60
Texture: -
Density: dry, 2
Topographic description: longitudinal debris deposit alongside the western wall of R2
Archaeological characteristics: big stones and some bricks; stones alongside the inside of the wall are covered with mortar;
Interpretation: debris?

SU 112
Type: d
Color: dull yellowish-orange
Color Code: 10YR6/4
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: inhomogeneous SU
Density: -
Topographic description: rectangular SU in R3; loamy SU with lime and wood; occasionally sandy areas
Archaeological characteristics: SU is heavily mixed, stones and wooden fragments - filling of the former lime pit;
Interpretation: backfill of the lime pit

SU 113
Type: i
Topographic description: interface floor level steps in C2
Interpretation: interface floor level steps in C2

SU 114
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: above of the last step of C2
Archaeological characteristics: wood covering the final step of the stairway to C2
Interpretation: wooden planking in C2

SU 115
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: rounded
Coarse material - size: 5
Coarse material in %: 100
Texture: -
Density: dry, 5
Topographic description: 1 bigger stone in the east R1
Archaeological characteristics: padstone
Interpretation: part of floor construction R1

SU 116
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/3
Soil texture: loam
Code: L
Coarse material - shape: angular-edged; miscellaneous: wood/plank fragment
Coarse material - size: 2, 3
Coarse material in %: 10, 2
Texture: -
Density: humid, 3
Topographic description: rectangular SU in C1; between trench limits, surrounding wall, and steps
Archaeological characteristics: loamy with small limestones and wooden fragments; without finds
Interpretation: part of shelves

SU 117
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: dry, 2
Topographic description: quadrangular-rectangular shape; inside of the tiled oven
Archaeological characteristics: loose stone filling; finds: bricks
Interpretation: filling of the oven

SU 118
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/3
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: L-shapes SU in the eastern part of R3; stone layer in a sandy pebble filling
Archaeological characteristics: stone layer surrounded by gravel and sand; finds: glass, pottery, coins; not disturbed by the lime pit
Interpretation: leveling material in R3

SU 119
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: lime
Coarse material - size: -
Coarse material in %: -
Texture: homogenous
Density: -
Topographic description: rectangular limelayer
Archaeological characteristics: thin lime layer lying on the loamy surface, the base of the lime pit; without finds
Interpretation: part of the end of lime pit

SU 120
Type: i
Topographic description: lime pit R3
Interpretation: interface lime pit R3

SU 121
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: coarse mortar
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: oval SU; greyish-brown; ca 40x70 cm; mortar on stones right to the west of the stairways to C1
Archaeological characteristics: finds: pottery, metal
Interpretation: mortar patch

SU 122
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 5
Coarse material in %: 100
Texture: -
Density: dry, 5
Topographic description: quadrangular stones at the eastern wall of R2
Archaeological characteristics: 2 big (pad)stones
Interpretation: leveling material in R2

SU 123
Type: i
Topographic description: C1
Interpretation: interface floor level C1

SU 124
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 1,2,3,4
Coarse material in %: 20,10,10,5
Texture: inhomogeneous - disturbed
Density: dry, 4
Topographic description: cylindrical pit; not perfectly circular; diameter ca 60 cm
Archaeological characteristics: disturbance in association with the construction of path?
Interpretation: disturbance - construction of path

SU 125
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: clay
Code: T
Coarse material - shape: angular-edged
Coarse material - size: 3, 4, 5
Coarse material in %: 5, 10, 1
Texture: inhomogeneous
Density: humid, 4
Topographic description: loamy-humic, darkbrown SU; longitudinal-oval; conical at the bottom

Archaeological characteristics: stones proved to be part of a filling of a pit; filling with collapse/destruction of the building; stones as part of rockfall?; many finds between the stones
Interpretation: filling of latrine pit

SU 126
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: angular-edged, rounded
Coarse material - size: 2, 1
Coarse material in %: 10, 10
Texture: -
Density: humid, 4
Topographic description: irregular dark-loamy SU in the northeastern part of R2
Archaeological characteristics: dark, loamy filling; finds: lots of charcoal, metal, some pottery
Interpretation: leveling material in Room 2

SU 127
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: 3 big stones in the southern part of R2
Archaeological characteristics: 3 big (pad)stones
Interpretation: leveling material Room 2

SU 128
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: sandy clay
Code: ~sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: loamy SU in the eastern part of R3
Archaeological characteristics: -
Interpretation: leveling material Room 3

SU 129
Type: d
Color: dull yellowish-brown
Color Code: 10YR5/4
Soil texture: clay
Code: T
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: central area of R3; loamy, sandy SU with circular outline; diameter ca 30 cm
Archaeological characteristics: sandy, loamy filling; posthole with charcoal fitters; finds: pottery, nails, pipe
Interpretation: filling of posthole

SU 130
Type: i
Topographic description: interface posthole 129 in Room 3
Interpretation: interface posthole 129 in Room 3

SU 131
Type: i
Topographic description: north of the hermitage, interface pear-shaped pit 125-72
Interpretation: interface latrine pit

SU 132
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: humid, 2
Topographic description: posthole in the northeast corner of R2; dm ca 25cm; depth ca 50cm
Archaeological characteristics: loose, humic filling with three stones; finds: nails, pottery
Interpretation: posthole R2

SU 133
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: rounded
Coarse material - size: 1
Coarse material in %: 15
Texture: -
Density: dry, 2
Topographic description: longitudinal-oval - rectangular SU alongside the northern wall of C1
Archaeological characteristics: dark filling with loam and gravel; finds: pottery, nails, glass, brick debris
Interpretation: construction pit for C1

SU 134
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -

Coarse material - shape: angular-edged
Coarse material - size: 4
Coarse material in %: 50
Texture: -
Density: ?, 2
Topographic description: longitudinal-rectangular shape
Archaeological characteristics: stones: pottery, glass
Interpretation: Steinverfüllung neben nördl Wand von C1

SU 135
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 3
Coarse material in %: 3
Texture: -
Density: humid, 2
Topographic description: funnel-shaped posthole; dm app. 25 cm
Archaeological characteristics: no finds
Interpretation:?

SU 136
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: R2
Archaeological characteristics: -
Interpretation: den

SU 137
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: -
Interpretation: ?

SU 138
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 4 + 5
Coarse material in %: 40 + 60
Texture: homogeneous
Density: dry, 2
Topographic description: stones in the eastern area of R2; 1 bigger (50x20cm) and four smaller stones
Archaeological characteristics: stones with rests of mortar; no finds
Interpretation: debris?

SU 139
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1, 1
Coarse material in %: 15-20, 3
Texture: -
Density: humid, 3
Topographic description: Dm: 20 cm, runde Form
Archaeological characteristics: small wooden splints; grit;
Interpretation: posthole R3

SU 140
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: bioturbation (den)
Archaeological characteristics: -
Interpretation: ?

SU 141
Type: i
Topographic description: interface posthole SU 132
Interpretation:?

SU 142
Type: i
Topographic description: interface posthole SU 135
Interpretation: interface posthole SU 135

SU 143
Type: i
Topographic description: interface posthole SU 139
Interpretation: interface posthole SU 139

SU 144
Type: i
Topographic description: interface of 140
Interpretation: interface of 140

SU 145
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: sediment; water sputtering from below
Interpretation:?

SU 146
Type: d
Color: not excavated
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: -
Interpretation: 10 Steckenlöcher im Raum 3, quadratisch angeordnet – vermutlich Teil der Holzschalung der Kalkgrube

SU 147*
Type: i
Interpretation: end of use C2

SU 148*
Type: i
Topographic description: -
Interpretation: end of use R4

SU 149*
Type: i
Topographic description: -
Archaeological characteristics: -
Interpretation: end of use R2

SU 150*
Type: i
Topographic description: -
Interpretation: end of use R3

SU 151
Type: i
Topographic description: -
Interpretation: end of use R1

SU 152*
Type: i
Archaeological characteristics: -
Interpretation: end of use C1

SU 153*
Type: i
Archaeological characteristics: -
Interpretation: floor level 1 R1

SU 154*
Type: i
Interpretation: begin R1

SU 155*
Type: i
Interpretation: begin R2

SU 156*
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: -
Interpretation: wall C1

SU 157*
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: -
Interpretation: wall C2

SU 158*
Type: i
Archaeological characteristics: -
Interpretation: floor level 2 R2

SU W1*
Type: d
Topographic description: -
Archaeological characteristics: external wall
Interpretation: surrounding wall

SU W2*
Type: d
Topographic description: -
Archaeological characteristics: -
Interpretation: western wall R5

SU W3*
Type: d
Topographic description: -
Archaeological characteristics: -
Interpretation: eastern wall R5

SU W4*
Type: d
Topographic description: -
Archaeological characteristics: -
Interpretation: wall between R1 and R2

SU W5*
Type: d
Topographic description: -
Archaeological characteristics: -
Interpretation: the younger wall between R2 and R3

SU W6*
Type: d
Topographic description: -
Archaeological characteristics: -
Interpretation: wall between R1 and R4

SU 159*
Type: i
Archaeological characteristics: -
Interpretation: end of construction pit/lime pit

SU 160*
Type: i
Archaeological characteristics: -
Interpretation: surface before the renovation of the church

SU 161*
Type: i
Topographic description: R1
Archaeological characteristics: -
Interpretation: floor level Room 1

SU 162*
Type: i
Topographic description: R2
Archaeological characteristics: -
Interpretation: floor level Room 2

SU 163*
Type: d
Archaeological characteristics: mercury in sediment
Interpretation: filling of latrine pit

SU 164*
Type: d
Color: not taken - stones
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: R1
Archaeological characteristics: stone setting in the north and west of R1 - padstones
Interpretation: part of floor construction

SU 165*
Type: i
Archaeological characteristics: -
Interpretation: removal of historic topsoil - surface on which heritage was constructed

SU 166*
Type: i
Archaeological characteristics: interface of pit 124
Interpretation: interface of 124

SU 167 *
Type: i
Topographic description: path
Archaeological characteristics: -
Interpretation: begin construction of path

SU 168*
Type: i
Topographic description: pit 210
Archaeological characteristics: -
Interpretation: interface of pit 210

SU 169*
Type: i
Archaeological characteristics: floor level room 3
Interpretation: floor level room 3

SU 170
Type: d
Color: not taken - removal topsoil
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: complete trench without extension of the trench
Archaeological characteristics: topsoil, humus
Interpretation: topsoil

SU 171
Type: i
Topographic description: interface removal of humus 170
Archaeological characteristics: if of topsoil 170
Interpretation: if of 170

SU 172
Type: d
Color: dark grayish brown
Color Code: 10YR4/2

Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged, miscellaneous: hoher potteryamikanteil
Coarse material - size: 4,3
Coarse material in %: 60, 40
Texture: hardly any roots, homogeneous
Density: humid, 3
Topographic description: irregular; app. 2x 1.5 m; uneven surface
Archaeological characteristics: filling of the pit with brown loam, rich in finds
Interpretation: fill of latrine pit, waste

SU 173
Type: d
Color: light brownish gray
Color Code: 10YR6/2
Soil texture: sand
Code: S
Coarse material - shape: eckig, kantig,
Coarse material - size: 1,2
Coarse material in %: 90, 10
Texture: homogeneous, no rooting
Density: humid, 2
Topographic description: in the northwest of the trench; irregular; app. 3x1m; even surface; cut by trench limits
Archaeological characteristics: yellowish-grey grit deposit; finds: plastics, glass, aluminum foil
Interpretation: recent fill

SU 174
Type: d
Color: keine Bodenprobe vorhanden
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: rounded, Kies- Schotter
Coarse material - size: 2
Coarse material in %: -
Texture: no Bodenprobe-->humusrest
Density: dry, 3
Topographic description: above of pathway east to the altar; nearly circular
Archaeological characteristics: no finds
Interpretation: rest of the topsoil

SU 175
Type: d
Color: very dark gray
Color Code: 10YR3/1
Soil texture: sandy loam
Code: uL
Coarse material - shape: angular-edged, miscellaneous: Wurzeln
Coarse material - size: 2
Coarse material in %: 20
Texture: roots
Density: humid, 3
Topographic description: above of rubble in the center of the trench; circular
Archaeological characteristics: humic sediment; finds: recent nails, glass, charcoal flitter, pottery
Interpretation: rest of the topsoil

SU 176
Type: d
Color: grayish brown
Color Code: 10YR5/2
Soil texture: sand
Code: S
Coarse material - shape: angular-edged,
Coarse material - size: 1,2,3
Coarse material in %: 30,20,50
Texture: relative heavy rooting
Density: dry, 2
Topographic description: in the north of the trench; nearly elliptical; depth 5-10cm
Archaeological characteristics: bigger stone layer with grit; no finds
Interpretation: deposit

SU 177
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: flocking, inhomogeneous, hardly any roots
Density: -
Topographic description: grayish-brown SU; in the southeast of the trench; loamy
Archaeological characteristics: not very thick; SU underneath is lighter; finds: pottery, glass, metal
Interpretation: waste area

SU 178
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: miscellaneous: Wurzeln
Coarse material - size: -
Coarse material in %: 70
Texture: heavy mit feinen roots durchzogen
Density: humid, 3
Topographic description: dark-humic, semicircular SU at the southern trench limits (southern third)
Archaeological characteristics: differentiation to the next SU was done by contents
Interpretation: rest of the topsoil

SU 179
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged

Coarse material - size: 1,2,3,4,5
Coarse material in %: 5,15,20,30,30
Texture: heavy rooting, humus, very many große stones
Density: humid, 2
Topographic description: semicircular SU at the northwestern trench limit; rests of humus - lots of stones
Archaeological characteristics: no finds
Interpretation: rest of the topsoil

SU 180
Type: d
Color: grayish brown
Color Code: 2.5YR5/2
Soil texture: sand
Code: S
Coarse material - shape: angular-edged
Coarse material - size: 2,3,4
Coarse material in %: 90,5,5
Texture: medium rooting, homogeneous
Density: humid,4
Topographic description: longitudinal SU until the northern trench limits
Archaeological characteristics: difference to next SU: no grit, more loam, darker, partially loam concentrations; finds: mainly recent objects (can caps)
Interpretation: gravel path?

SU 181
Type: d
Color: very dark gray
Color Code: 10YR3/1
Soil texture: silty loam
Code: uL
Coarse material - shape: angular-edged, miscellaneous: Wurzel
Coarse material - size: 2
Coarse material in %: -
Texture: -
Density: humid, 4
Topographic description: underneath of SU 175 in the center of the trench; circular
Archaeological characteristics: humic filling surround rubble (<20cm); finds: glass, charcoal, daub
Interpretation: deposit

SU 182
Type: d
Color: dark grayish brown
Color Code: 2.5YR4/2
Soil texture: silty loam
Code: uL
Coarse material - shape: angular-edged
Coarse material - size: 1,2,3
Coarse material in %: 80, 10, 10
Texture: homogeneous, no rooting
Density: humid, 2
Topographic description: 90x50x15cm; half-oval ; in the center deeper
Archaeological characteristics: roof tile fragments (Eternit)
Interpretation: debris?

SU 183
Type: d
Color: grayish brown
Color Code: 10YR5/2
Soil texture: sand
Code: S
Coarse material - shape: angular-edged
Coarse material - size: 1,2,3
Coarse material in %: 70, 20, 10
Texture: heavy rooting in the east
Density: dry, 3
Topographic description: longituinal grit-layer; 3x0,25-0,50; depth 10cm; in the center bigger concrete lumps; dm 40cm; limited by a stone bloc in the east; shallow in the west
Archaeological characteristics: strip-shapes SU; yellowish-grey gritty sand; in the east interspersed with loam; finds: beverage carton (TetraPak)
Interpretation: refilled tracks of a small construction vehicle

SU 184
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 1,2,3,
Coarse material in %: 65,20,15
Texture: slight rooting, inhomogeneous
Density: dry,3-4
Topographic description: superficial but compact pebble gravel; partially like mortar with sand and grit
Archaeological characteristics: partially interspersed with (clayey) loam; finds: recent (plastics)
Interpretation: refilled tracks of a small construction vehicle

SU 185
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged, miscellaneous: Lehm 70, Humus 10
Coarse material - size: 1,2
Coarse material in %: 5, 5, 10
Texture: inhomogeneous
Density: humid, 4
Topographic description: smaller nearly quadrangular SU
Archaeological characteristics: increased presence of humus and charcoal flitter and chunks; dens; finds: pottery, glass
Interpretation: filling of flat pit

SU 186
Type: d
Color: dark grayish brown
Color Code: 10YR4/2

Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1,2,3,4
Coarse material in %: 30, 10, 20, 5/ 10, 10, 10, 5
Texture: rooting only in the western part
Density: dry, 5
Topographic description: 5mx30-50cm; depth max 15cm; longitudinal depression filled with stones of different sizes
Archaeological characteristics: linear; homogeneous; finds: recent can caps, glass
Interpretation: refilled tracks of a small construction vehicle

SU 187
Type: d
Color: not taken - removal topsoil
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged, miscellaneous: 30% Wurzel
Coarse material - size: 1,3,5
Coarse material in %: 20, 40, 5
Texture: heavy rooting
Density: humid, 4
Topographic description: trench extension in the southwest - because of the high frequency of finds in the area
Archaeological characteristics: removal of topsoil - many finds: tiles of the tiled oven, pottery, glass, rubble (< 20 cm)
Interpretation: topsoil

SU 188
Type: d
Color: very dark grayish brown
Color Code: 10YR3/1
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 3,4,5
Coarse material in %: 15,75,10
Texture: rooting
Density: humid, 3
Topographic description: in the western corner of the trench
Archaeological characteristics: many stones, roots, and humus; hardly any finds
Interpretation: rubble/scree?

SU 189
Type: d
Color: dark grayish brown
Color Code: 2.5YR4/2
Soil texture: silty loam
Code: uL
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: humid, 3
Topographic description: semicircular SU at the southern trench limit; app. 1,5m; greyish-brown with some charcoal flitters
Archaeological characteristics: above of 2 terraces; underlying: light, a material with less loam; finds: pottery, metal
Interpretation: part of SU 177

SU 190
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1,2
Coarse material in %: 10, 20/ 10, 10
Texture: -
Density: dry, 4
Topographic description: 5mx30-60cm; depth 10cm; longitudinal SU filled with stones
Archaeological characteristics: depression filled with stones; easily distinguishes from the surrounding material; finds: plastic, fiber cement (Eternit)
Interpretation: refilled tracks of a small construction vehicle

SU 191
Type: d
Color: very dark gray
Color Code: 10YR3/1
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged, rounded, miscellaneous: Holzkohle
Coarse material - size: 1,2,3
Coarse material in %: 10,0,10/ 35,5,0/ 10,10,20
Texture: homogeneous
Density: humid, 4
Topographic description: similar to SU 185; nearly quadrangular; differing depth of charcoal
Archaeological characteristics: packing of charcoal with loam, some mouse dens; mainly loamy, partially humic sediment with charcoal flitter and chunks; interspersed with lots of pottery and burned chunks of loam; few glass fragments
Interpretation: filling of flat pit

SU 192
Type: d
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: unregelmäßige Flecken von Mörtel
Density: humid, 4
Topographic description: at the eastern trench limit; semicircular

Archaeological characteristics: dark brown SU interspersed with grit; underneath: mortar layer in the south; brown SU in the north; limestone rubble in the western part; finds: many tiles of tiled oven; glass, metal, bricks
Interpretation: waste deposit

SU 193
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 95,5
Texture: inhomogeneous, slightly roots
Density: humid, 4
Topographic description: irregular outline; underneath of grit layer; SU reaches until the trench extension; in the northeast limited by grit and bigger stones
Archaeological characteristics: dark brown, loamy SU differing from the lighter grit layer; only a few mm - new SU 199 established underneath
Interpretation: deposit

SU 194
Type: d
Color: dark gray
Color Code: 7.5YR4/1
Soil texture: sand
Code: S
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 80, 20
Texture: hardly any roots
Density: humid, 3
Topographic description: nearly rectangular
Archaeological characteristics: mixed with humic material; in the northern area, grit from another deposit
Interpretation: deposit

SU 195
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1
Coarse material in %: 70/ 30
Texture: -
Density: humid, 5
Topographic description: in the east of the trench; 8-shaped
Archaeological characteristics: same as SU 196
Interpretation: gravel path?

SU 196
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1
Coarse material in %: 70/ 30
Texture: -
Density: humid, 4
Topographic description: big, irregular Su in the northern area of the trench
Archaeological characteristics: gravel deposit; in the east above of loamy sediment; very compact; finds: glass, nails, pottery
Interpretation: gravel path?

SU 197
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 95, 5
Texture: slight rooting
Density: dry, 3
Topographic description: small, longitudinal-circular SU
Archaeological characteristics: dark loamy sediment with grit; charcoal flitter; few recent finds
Interpretation: deposit

SU 198
Type: i
Topographic description: flat pit in the southeastern trench corner; nearly quadrangular
Archaeological characteristics: -
Interpretation: interface of 191

SU 199
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 123
Coarse material in %: 90, 5, 5
Texture: very inhomogeneous, isolated some rooting
Density: humid, 3
Topographic description: irregular, longitudinal SU at the western trench limit
Archaeological characteristics: dark brown, loamy SU, inhomogeneous - interspersed with stone grit; modern finds
Interpretation: deposit

SU 200
Type: d
Color: light brownish gray
Color Code: 10YR6/2
Soil texture: sand
Code: S
Coarse material - shape: angular-edged

Coarse material - size: 1
Coarse material in %: 100
Texture: no rooting, homogeneous
Density: humid, 4
Topographic description: longitudinal next to SU 199
Archaeological characteristics: stone grit above of possible wall east of the altar; few finds
Interpretation: deposit

SU 201
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: rounded
Coarse material - size: 1,2,3,4,5
Coarse material in %: 30, 20, 10, 5, 5
Texture: medium rooting
Density: humid, 3
Topographic description: semicircular SU at the western trench limit
Archaeological characteristics: humic deposit with bigger stones, finds: pottery, glass
Interpretation: deposit

SU 202
Type: i
Topographic description: interface of 183, 184, 186, 190
Archaeological characteristics: -
Interpretation: interface of 183, 184, 186, 190

SU 203
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged (Grus)
Coarse material - size: 1
Coarse material in %: 100
Texture: homogeneous, no roots
Density: humid, 5
Topographic description: in the northeast of the altar; nearly u-shaped; limited by trench limit
Archaeological characteristics: light SU with grit; easily differentiated from the underlying darker SU; finds: recent
Interpretation:?

SU 204
Type: d
Color: light brownish gray
Color Code: 10YR6/2
Soil texture: sand
Code: S
Coarse material - shape: angular-edged, rounded
Coarse material - size: 1
Coarse material in %: 70/ 60
Texture: very rough
Density: dry, 5
Topographic description: extensive; in the center of the trench; like a cone of debris; thick in the west (15cm), thinn in the east (1cm)
Archaeological characteristics: extensive SU; yellow fine sand and gravel; very compact; few finds: mostly recent
Interpretation:?

SU 205
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged
Coarse material - size: 3,4,
Coarse material in %: 90,10
Texture: inhomogeneous
Density: humid, 4
Topographic description: loamy SU at the edge of the trench extension; light brown spots above SU 192; little limestone debris; irregular outline
Archaeological characteristics: yellow loam chunks
Interpretation: waste deposit

SU 206
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 30, 10
Texture: homogeneous
Density: humid, 3
Topographic description: nearly quadrangular with extensions in the south
Archaeological characteristics: a few sherds, glass, bones, humöse lockerer Schicht
Interpretation:?

SU 207
Type: d
Color: very dark gray
Color Code: 10YR3/1
Soil texture: silty loam
Code: uL
Coarse material - shape: angular-edged
Coarse material - size: 2,5,
Coarse material in %: 30, 10
Texture: partly heavy rooting
Density: humid, 4
Topographic description: semicircular SU, thinner in the east; beginning at the western trench limit
Archaeological characteristics: im Westbereich die großen Bruchstück, humose schawrze Verfüllung (Waldhumus), im südl. Bereich teilsweise schottrige Einschlüsse, finds: hauptsächlich glass, verzeinzelt ältere pottery (SMA)
Interpretation: -

SU 208
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 5, 95
Texture: inhomogeneous, slight rooting
Density: humid, 3
Topographic description: directly underneath of SU 203; homogeneous
Archaeological characteristics: especially in the northwest isolated charcoal flitter; finds: recent
Interpretation: debris deposit?

SU 209
Type: d
Color: grayish brown
Color Code: 2.5YR5/2
Soil texture: loamy sand
Code: ls
Coarse material - shape: angular-edged
Coarse material - size: 1
Coarse material in %: 100
Texture: homogeneous; no rooting
Density: dry, 2
Topographic description: app. 1,50mx50cm; depth 3cm
Archaeological characteristics: grit filling; no finds
Interpretation: deposit

SU 210
Type: d
Color: very dark gray
Color Code: 10YR3/1
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 3,4,5
Coarse material in %: 10, 20, 70
Texture: partly slight rooting
Density: humid, 4
Topographic description: circular filling
Archaeological characteristics: teilweise stark Holzkohle + Flitter, finds: sehr many rezente nails, many geschmiedete nails (Barock?)
Interpretation: verstürzte Feuerstelle

SU 211
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 85,15
Texture: partly rooting, inhomogeneous
Density: humid, 4
Topographic description: irregular; around a small wall(?)
Archaeological characteristics: dark brown, loamy, partly with some grit; surrounding four concrete foundations; finds: glass, metal
Interpretation:?

SU 212
Type: d
Color: not taken
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged, miscellaneous: bricks/tiles
Coarse material - size: 1,2,3,4,5
Coarse material in %: 5,15,20,30,30
Texture: inhomogeneous
Density: humid, 4
Topographic description: loamy, brown SU; limestone debris
Archaeological characteristics: dens, light brown, loamy patches; finds: potter, tiles of the tiled oven, glass
Interpretation: waste deposit

SU 213
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: silty loam
Code: uL
Coarse material - shape: angular-edged
Coarse material - size: 1,2,3,4
Coarse material in %: 80,10,5,5
Texture: largely homogeneous
Density: humid, 3
Topographic description: dark SU with fine grit/mortar; in the southeast corner of the trench extension; part of 192?
Archaeological characteristics: inclusions of mortar - increasing towards the bottom; many bricks, some charcoal, finds: tiles of tiled oven; at the bottom pottery, glass especially in the east.; metal
Interpretation: waste deposit

SU 214
Type: d
Color: very dark grayish brown
Color Code: 10YR3/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: miscellaneous: charcoal flitter
Coarse material - size: 1
Coarse material in %: 2
Texture: geringfügig rooting
Density: humid, 3
Topographic description: in the center-east; nearly circular or octogonal; dm app. 30cm; depth 3cm;
Archaeological characteristics: dark brown, darker than surrounding material; partly with charcoal flitter; no finds; filling of posthole?
Interpretation: filling of posthole?

SU 215
Type: d
Color: very dark grayish brown
Color Code: 2.5YR3/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 2,3,4,5
Coarse material in %: 60,10,20,10
Texture: slight rooting, inhomogeneous
Density: humid, 4
Topographic description: extensive SU in the center of the trench
Archaeological characteristics: grey loam, partially many charcoal flitters
Interpretation: waste deposit

SU 216
Type: d
Color: very dark grayish brown
Color Code: 2.5YR3/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: den
Interpretation: den

SU 217
Type: d
Color: not taken - stone layer
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: angular-edged
Coarse material - size: 5, und größer
Coarse material in %: 20, 80
Texture: nearly no rooting
Density: humid, 3
Topographic description: elongated, even stone setting; 2mx30-40cm; limestones of different size
Archaeological characteristics: fine material, humic, interspersed with stone grit
Interpretation: paving?

SU 218
Type: -
Color: not taken - mortar
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: deleted
Interpretation: ?

SU 219
Type: d
Color: not taken - mortar
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: in the western half of the trench; northwestern foundation
Archaeological characteristics: concrete foundation 1 with a recess in the center; arranged in a rectangle; app. 40 x 35 cm, recess: app. 14x 12 cm
Interpretation: foundation for a bench

SU 220
Type: d
Color: not taken - mortar
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: in the western half of the trench; southeastern one
Archaeological characteristics: concrete foundation 2 with a recess in the center; arranged in a rectangle; app. 40 x 35 cm, recess: app. 14x 12 cm
Interpretation: foundation for a bench

SU 221
Type: d
Color: not taken - mortar
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: in the western half of the trench; southwestern one
Archaeological characteristics: concrete foundation 3 with a recess in the center; arranged in a rectangle; app. 40 x 35 cm, recess: app. 14x 12 cm
Interpretation: foundation for a bench

SU 222
Type: d
Color: not taken - mortar
Color Code: -
Soil texture: -
Code: -

Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: in the western half of the trench; north western one
Archaeological characteristics: concrete foundation 4 with a recess in the center; arranged in a rectangle; app. 40 x 35 cm, recess: app. 14x 12 cm
Interpretation: foundation for a bench

SU 223
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: no roots
Density: humid, 4
Topographic description: rectangular
Archaeological characteristics: partly above of concrete foundation SU 222
Interpretation: deposit

SU 224
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 1,2,3,4,5
Coarse material in %: 75,5,5,5,10
Texture: -
Density: dry, 5
Topographic description: whitish mortar layer interspersed with dark brown loam; at the eastern trench limit of the trench extension
Archaeological characteristics: chunks of mortar; tiles of tiled ofen, glass, metal, gunflintstone
Interpretation: waste deposit

SU 225
Type: d
Color: brown
Color Code: 10YR5/3
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged
Coarse material - size: 3,4
Coarse material in %: 90, 10
Texture: fine sediment homogeneous, no roots; stones app. 60 % of SU
Density: humid, 3
Topographic description: small area of limestone debris in a brown, loamy matrix
Archaeological characteristics: 3 dens; no finds
Interpretation: stone deposit

SU 226
Type: d
Color: not taken - den
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: den
Interpretation: den

SU 227
Type: d
Color: dark brown
Color Code: 10YR3/3
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged
Coarse material - size: 2,3,4,5
Coarse material in %: 10,80,5,5
Texture: Tiergänge mit Mörtel
Density: humid, 4
Topographic description: arc-shaped; dark loamy sediment with limestone debris and charcoal flitter
Archaeological characteristics: above of rectangular pit; finds: lots of pottery, glass, bones, metal
Interpretation: waste/debris

SU 228
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: silty loam
Code: uL
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: loose, lehmig
Density: humid, 3
Topographic description: in the southwest of the trench reaching to the trench extension in the south
Archaeological characteristics: loose filling; more shallow in the east; finds: brooch, little pottery
Interpretation: deposit

SU 229
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged
Coarse material - size: 3,4,5
Coarse material in %: 70,25,5
Texture: hardly any Wurzel, Feinsediment homogeneous, Anteil der stones 60%
Density: humid, 2

Topographic description: irregular circle; base irregular; very shallow
Archaeological characteristics: in association with SU 210; might lie above 215?; very few finds
Interpretation: shallow pit filling

SU 230
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: some roots, hardly any stones
Density: humid, 4
Topographic description: nearly circular; pit was supposed but not affirmed - very shallow, few finds
Archaeological characteristics: partly charcoal flitter; greyish-loamy filling
Interpretation: shallow pit filling

SU 231
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: no stones, hardly any Wurzel
Density: humid, 3
Topographic description: longitudinal, irregular; base following the natural slope; shallow in the west, sharp edge in the east
Archaeological characteristics: im O schließt als geolog. Untergrund fetter, dicht gepackter, oranger Lehm an, unterhalb bildet locpottery gepacktes, lehmiges Feinsediment den Untergrund
Interpretation: -

SU 232
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: sandy loam
Code: ~sL
Coarse material - shape: angular-edged
Coarse material - size: 2,3,4
Coarse material in %: 10,10,5
Texture: homogeneous
Density: humid, 4
Topographic description: nearly rectangular; in the corner of the trench deeper
Archaeological characteristics: dense, regular sherd distribution, many animal bones, some glass
Interpretation: waste pit, filling

SU 233
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged
Coarse material - size: 2,3,5
Coarse material in %: 20, 70, 10
Texture: humid, 5
Density: longitudinal filling
Topographic description: in the west many stones until 30 cm depth; gets bigger to the south
Archaeological characteristics: no finds
Interpretation: erosion chanel

SU 234
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: miscellaneous: charcoal
Coarse material - size: -
Coarse material in %: 5
Texture: no rooting , quite inhomogeneous
Density: humid, 2
Topographic description: 15mx 0.5m; depth 30cm; irregular depression
Archaeological characteristics: destroyed by animal burrow, charcoal in the bottom, no finds:
Interpretation: ?

SU 235
Type: d
Color: dark grayish brown
Color Code: 10YR4/2
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged, miscellaneous: charcoal
Coarse material - size: 3,4
Coarse material in %: 70, 30
Texture: homogeneous
Density: humid, 3
Topographic description: rectangular SU; vertical walls
Archaeological characteristics: dark brown interspersed with stones; difference to the side walls (light and loamy), the bottom (reddish) easily visible; charcoal; finds: bricks, many bones, pottery at the surface, glass, metal
Interpretation: pit filling

SU 236
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged
Coarse material - size: 1,2
Coarse material in %: 90,10

Texture: slight roots, große stones
Density: humid, 3
Topographic description: longitudinal SU above of erosion gully
Archaeological characteristics: dark sediment, some big stones
Interpretation:?

SU 237
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged / rounded
Coarse material - size: 1,2,4/1
Coarse material in %: 20,15,2/ 40
Texture: homogeneous
Density: humid, 4
Topographic description: nearly quadrangular; pottery in the center
Archaeological characteristics: with loamy patches; finds: many animal bones, pottery, some glass
Interpretation:?

SU 238
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged / rounded
Coarse material - size: 1/ 1
Coarse material in %: 20/ 20
Texture: homogeneous
Density: humid, 4
Topographic description: longitudinal, nearly triangular; SU on an oblique plane
Archaeological characteristics: homogeneous, brown SU; finds: a lot of pottery, few bones; pottery equally distributed
Interpretation:?

SU 239
Type: d
Color: brown
Color Code: 10YR4/3
Soil texture: sandy clay
Code: sT
Coarse material - shape: angular-edged / rounded
Coarse material - size: 5 / 4,5
Coarse material in %: 5/ 10,5
Texture: homogeneous
Density: humid, 3
Topographic description: semi - elliptic
Archaeological characteristics: part of a waste deposit
Interpretation: filling of latrine pit

SU 240*
Type: i
Topographic description: -
Archaeological characteristics: -
Interpretation: end of backfilling of latrine

SU 241*
Type: i
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: -
Interpretation: if of 219

SU 242*
Type: i
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: -
Interpretation: if of 220

SU 243*
Type: i
Color: -
Color Code: -
Soil texture: -
Code: -
Coarse material - shape: -
Coarse material - size: -
Coarse material in %: -
Texture: -
Density: -
Topographic description: -
Archaeological characteristics: -
Interpretation: if of 221

SU 244*
Type: i
Topographic description: -
Archaeological characteristics: -
Interpretation: if of 222

SU 245*
Type: i
Archaeological characteristics: -
Interpretation: if of 229

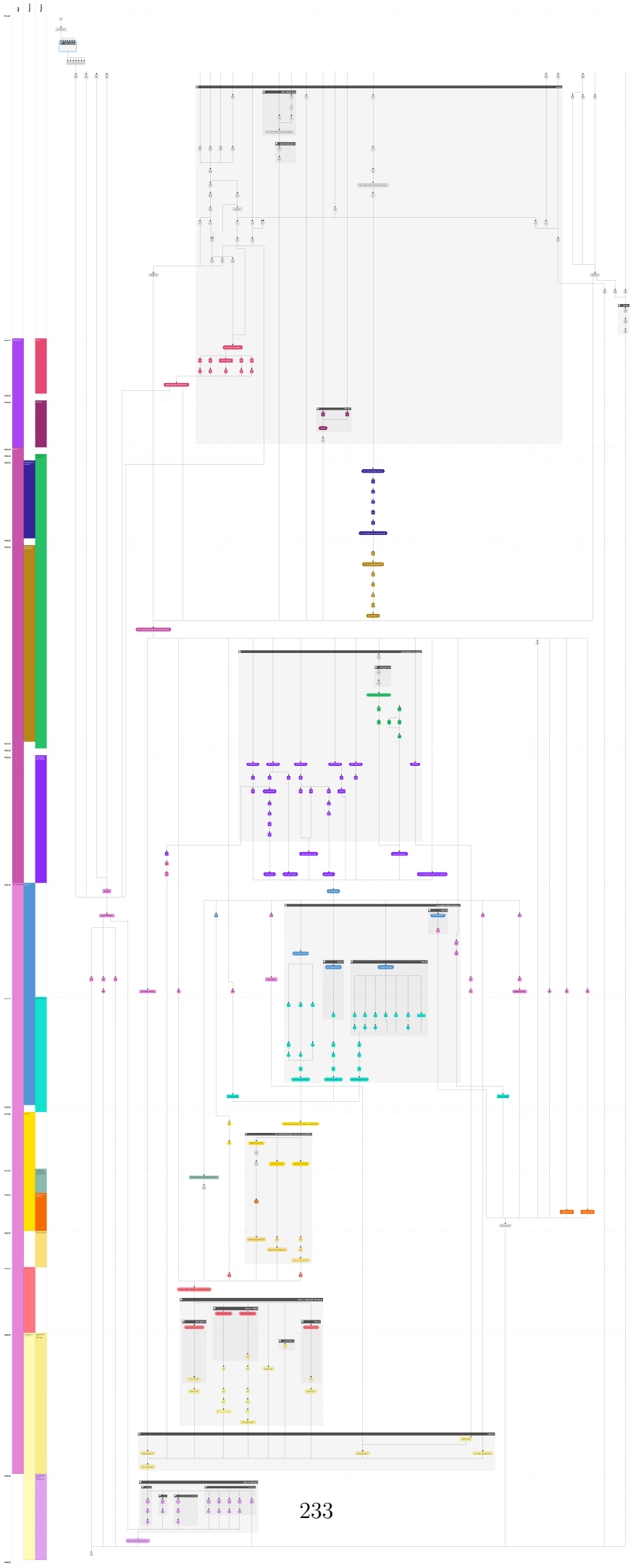
SU 246*
Type: i
Archaeological characteristics: -
Interpretation: if of 230

SU 247*
Type: i
Archaeological characteristics: -
Interpretation: if of 234 and 228

SU 248*
Type: i
Archaeological characteristics: -
Interpretation: if of 235

SU 249*
Type: i
Archaeological characteristics: -
Interpretation: big pit in the trench extension, east area

SU 250 *
Type: i
Archaeological characteristics: -
Interpretation: ?



Abstract

The area next to the Falkenstein chapel on the Falkenstein in St. Gilgen (Salzburg) is known from historical sources as the location of a hermitage in early modern times. The site was subject to two georadar surveys and two archaeological excavations to obtain more information about the hermitage. The present thesis aims to analyze the stratigraphic record of the excavation and its combination with the historical record. A workflow for the processing and the visualization of the collected 3D data of every deposit as 3D volumes and 3D surfaces is presented. The 3D record of every single stratigraphic unit of the excavations was used for the analysis of the stratigraphic sequence and a comparison with the GPR data. The analysis of the stratigraphic record contributed to the structuring of the excavated archaeological stratification into phases and periods and the integration in an absolute chronological scheme. Combining archaeological and historical sources led to the attribution of a primary room function and the use of spaces. The result is a detailed building history of the hermitage and an insight into the pilgrimage traditions at the Falkenstein. The developed workflow has since been successfully applied to other excavation data and is an addition to a standardized 3D documentation process. The integration of the 3D stratigraphic data in archaeological and historical research shows the potential of this kind of data in terms of analysis, visualization, and a broader understanding of the stratigraphic record.

Zusammenfassung

Der Bereich um die Falkensteinkirche am Falkenstein in St. Gilgen (Salzburg) wurde mit Georadaruntersuchungen und zwei archäologischen Ausgrabungen erforscht, um mehr Wissen über eine aus historischen Quellen bekannten Klause am Falkenstein zu erhalten. Das Ziel der vorliegenden Masterarbeit ist die Analyse der archäologischen Stratifikationseinheiten der Grabungskampagnen und ihre Verknüpfung mit den historischen Quellen. Ein Workflow zur Prozessierung und Visualisierung der aufgenommenen 3D Daten der Stratifikationseinheiten zu 3D Volumen und 3D Oberflächen wurde entwickelt und vorgestellt. Diese 3D Elemente jeder einzelnen stratigraphischen Einheit waren essentiell in der Analyse der stratigraphischen Abfolge und für einen Vergleich der Grabungsdaten mit den Georadardaten. Die Analyse trug zur Strukturierung der ausgegrabenen archäologischen Stratifikation in Phasen und Perioden und ihrer Einordung in ein übergeordnetes chronologisches Schema bei. Das Zusammenführen von archäologischen und historischen Daten ermöglichte unter anderem eine Zuordnung von Raumfunktion und eine Bestimmung des Verwendungszwecks von einzelnen Bereichen. Das Ergebnis ist eine detaillierte Baugeschichte der Klause und ein Einblick in die Pilgertraditionen am Falkenstein. Der entwickelte Workflow wurde bereits erfolgreich auf weiteren Grabungsdaten angewandt und ist eine Erweiterung eines standarisierten 3D Dokumentationsprozesses. Die Integration der dreidimensionalen stratigraphischen Daten in eine archäologische und historische Auswertung zeigt das Potential dieser in Bezug auf Analyse, Visualisierung und für ein erweitertes Verständnis der archäologischen Stratifikation.