ISAPNEWS

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Issue 63, November 2021

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Mapping Evidence of a Global Pandemic during a Global Pandemic

Otto Braasch 1936-2021

Editorial – Issue 63

A lot has happened in the world of Archaeological Prospection since the last issue of ISAP News. First of all there was arguably the greatest regular meeting in our discipline, the 14th ICAP 2021. Unfortunately, we were not able to see each other live in Lyon, but still we are very thankful to Christophe Benech's team at Archeorient for a superb online event.

Second, after ICAP we held the ISAP Annual General Meeting, during which the new Management Committee was elected. Thanks once again to all the outgoing ManCom members with a special farewell to Chris Gaffney, who chaired ISAP for the last four years, and was on ManCom in several other roles since its inception.

Third, we are very happy to announce that Rinita Dalan and Kenneth Kvamme have now become Honorary Members of ISAP. Congratulations!

And last, but not least, there was a change at the position of Editor. I hope to be able to carry this responsibility as well as Kayt and others did before. As Editor I have a request for you, ISAP Members: this Newsletter exists only thanks to you! Hence, if you have something to share (e.g. results, anecdotes from your fieldwork, workshops, or anything else related to our community) please send it to the address below!

Michał Pisz – ISAP Editor
editor@archprospection.org

The Cover Photograph is from Martina Hjertman and Bendt Westgaard, showing GPR on a lawn belonging to Gunnebo castle, outside Göteborg, Sweden.

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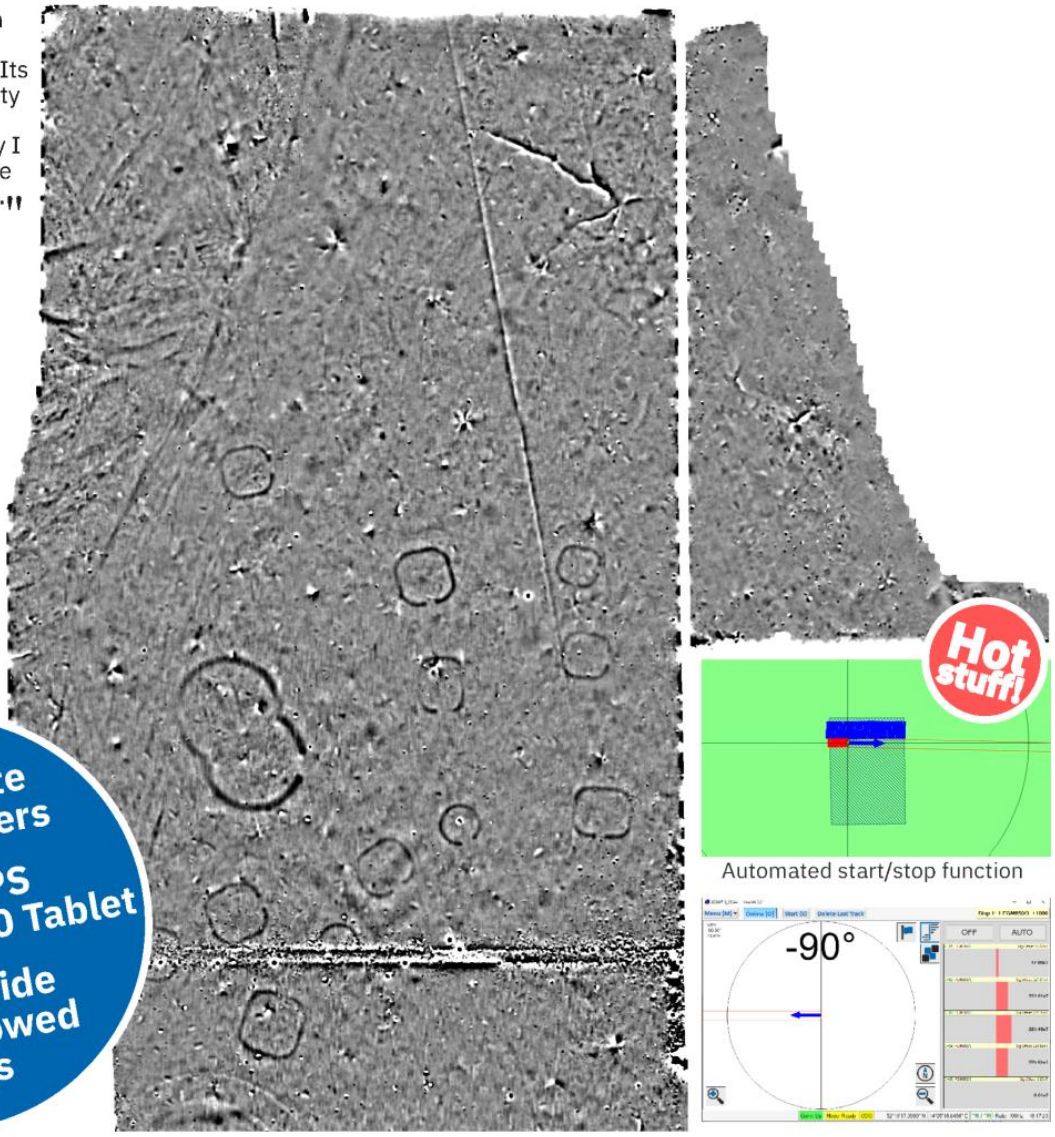

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Detecting Baroque Garden Architecture in a GPR Survey

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Introduction and chronology

A GPR survey was undertaken in 2020 for the search of buried walls of dismantled wings of the Tegernsee monastery (Landkreis Miesbach) in southern Bavaria. The monastery is located ca. 50 km south of Munich in a small town at the eastern shore of lake Tegernsee after which town and monastery were named. The Tegernsee formed in the Tertiary by melting glaciers at 750 m a.s.l. and is enclosed by mountains in the north and east (Figure 1). This resulted in a mild climate and the region was an ideal place for the foundation of a monastery in early Medieval Times.

Figure 1: Three-dimensional cadastral map of the modern town of Tegernsee with the position of the monastery marked by a red arrow, highlighting the sheltered location forming an ideal habitat (© Bayerische Vermessungsverwaltung, 2020).

In the middle of the 8th century the monastery was established as a Benedictine convent. From the beginning, Tegernsee had been a wealthy monastery with estates covering the whole of the Tegernsee valley, as well as lands in the neighbouring areas up to 20 km to the north, and into South Tyrol and the Wachau in Lower Austria. However, in the 10th century most of the estate was lost in the Hungarian Wars and the monastery burnt down in 970. In 978 Emperor Otto II. re-established the monastery and it quickly became wealthy again. Four centuries later, a new decline began caused by long-lasting mismanagement until 1426. Afterwards, Tegernsee was one of the most prominent and wealthy Benedictine monasteries for several centuries until its final dissolution during the secularisation in 1803 (Sage 1971; Kratzsch 1986; Götz 2008). During the 18th century, Tegernsee was the biggest monastic complex in Altbayern with a size of 86% of the Escorial near Madrid in Spain (Kratzsch 1986). After the secularisation, all parts of the monastery buildings that were not deemed necessary, were demolished. This affected those parts of the complex that were located in the north (the economical wing with workshops), in the west (the main portal and the guest wing with horse stables) and the south (the main hall and seminar wing) (Figure 2). In 1817 the Bavarian king Max I. Joseph bought the remains and made them his summer residence. Even today, the buildings are in the possession of the Wittelsbacher dynasty (Sage 1971; Kratzsch 1986; Götz 2008).

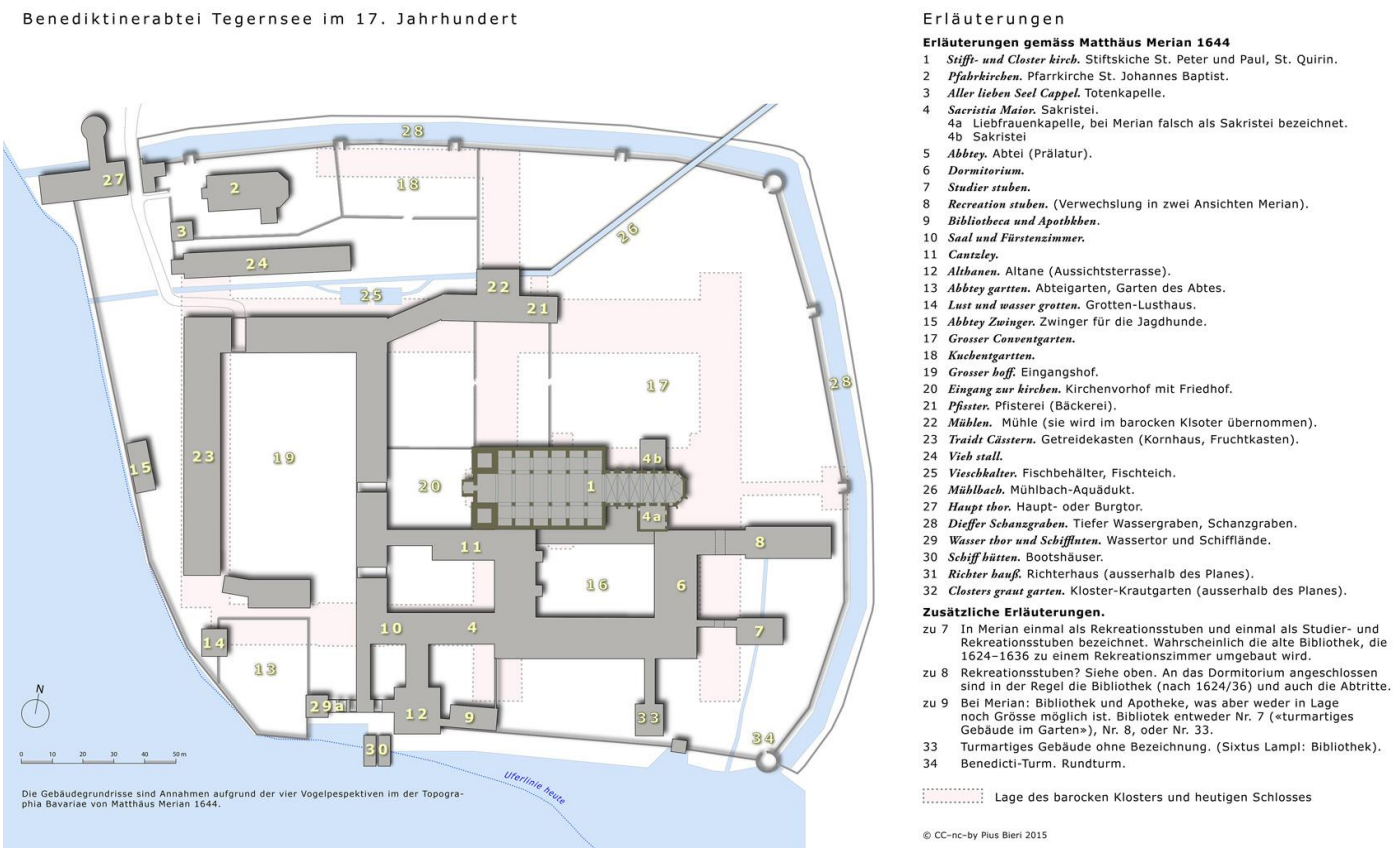

Figure 2: Map of the Baroque Benedictine monastery at Tegernsee showing the former layout including the now removed wings in the north, west and south (© Pius Bieri, 2015; CC-nc-by license).

Results of the survey

Most of the area of the demolished wings was never built over in the last two centuries and nowadays it is used as a park between the residence and the lake shore. The parts accessible for the GPR survey covered an area of 94 x 76 m. The geological subsoil consists of brown earth with a high clay content. Nevertheless, due to a long period without rain the soil was dry enough to provide good survey conditions for the GSSI SIR-4000 instrument, equipped with a 400 MHz antenna. The archaeological remains are preserved over a depth of 50 to 180 cm below the modern ground surface (Figure 3). This large depth range can be explained by the long period of occupancy over several centuries; not every wall appears at the same depth. Especially in the topmost 60 cm, modern activities can be seen, causing severe disturbances. Therefore, in some parts a clear interpretation of the results is not possible.

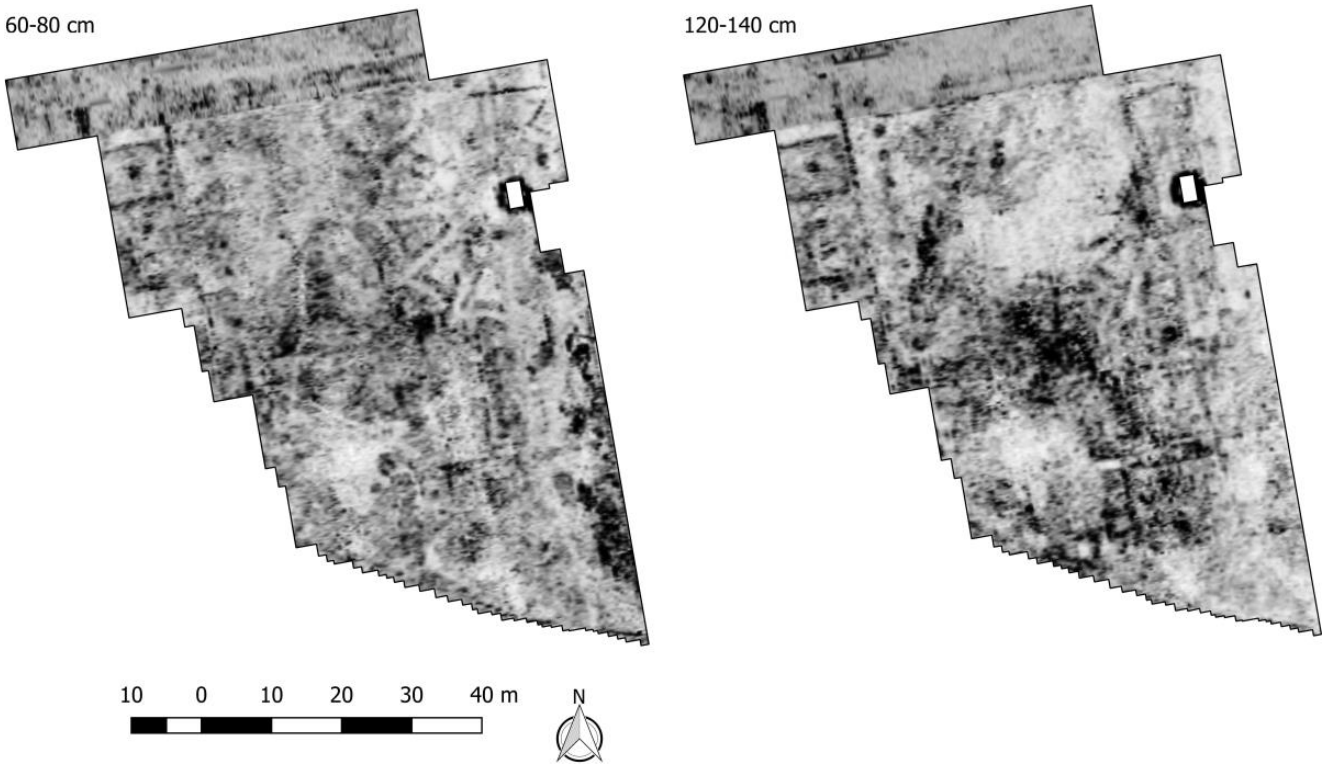

Figure 3: Selection of two depth slices (60 – 80 cm and 120 – 140 cm below the modern surface, strong reflections are dark) showing the now removed monastery wings (mainly at greater depth) as well as the newly detected Baroque garden design (especially at shallower depth) (© BLfD, 2020).

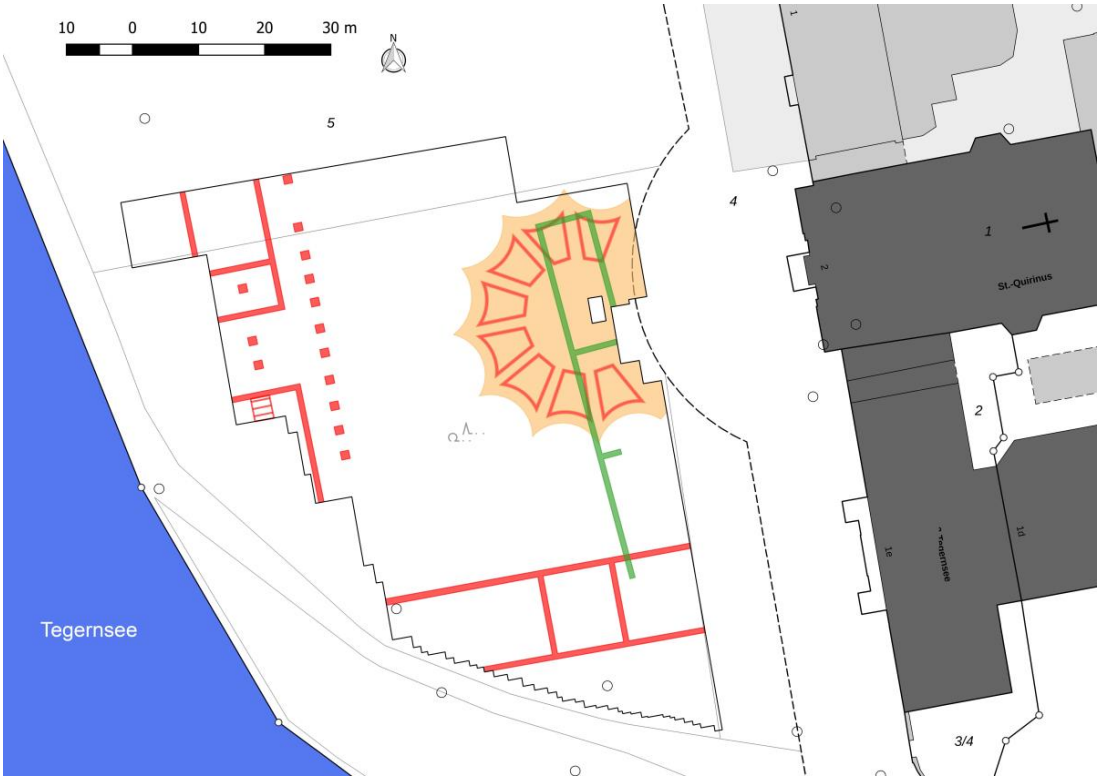

Figure 4: Digital interpretation plan of the GPR survey. Colour coding: red = Baroque walls of monastery, green = pre-Baroque building phase, orange = garden architecture, black = survey grid (© BLfD, 2020).

The preserved foundation walls of the dismantled monastery wings can be traced clearly (Figures 3 & 4). At the western boundary of the survey area the remains of the guest wing are mapped. North of the main entrance (marked by two big square pillars), towards the lakeshore, two cellar rooms are visible. South of the gate building the top part of a staircase is preserved. This building wing formerly had an arcade aisle in the east that shows up as 11 square pillars of 1.3 m width. The overall width of the western wing was 17 m, as shown by the radar depth slices. Its exact length could not be determined as the northern part is not accessible for a GPR survey due to a highly frequented parking area.

The seminar wing in the south of the monastery is also marked by its outer walls. In the interior, two walls are visible. Here, a former width of 14 m can be reconstructed. The fact that parts of the building in the southwest of the survey area are only vaguely visible is explained by a modern mound of some metres height, which led to a much greater burial depth of the remains.

North of the seminar wing another rectangular structure of 9 m width and a minimum length of 56 m, divided by two walls in the interior, can be identified (green in Figure 4). Due to their larger depth and a slightly different orientation, these features likely date to pre-Baroque or medieval times.

Spectacular, since not expected, is the discovery of an elaborate garden design in the centre of the former court of the monastery. The interpretation diagram (Figure 4) shows that there had been a dodecagonal star-shaped flowerbed of 39 m diameter. The paths in the interior are visible as negative, i.e. lower reflective, regions in the radargrams. In regular distances flowerbeds that incorporate the concave shape of the star-structure at their outer side and have a straight border at the inner side, accompany these small paths. This construction that probably dates to Baroque times was built at a prominent position directly in the axis between the main entrance and the church. A comparison with 17th and 18th century illustrations reveals that this garden ornament was also depicted in these engravings (Figure 5). Until now it had been assumed that this was ‘artistic license’ and that nothing had actually been constructed there.

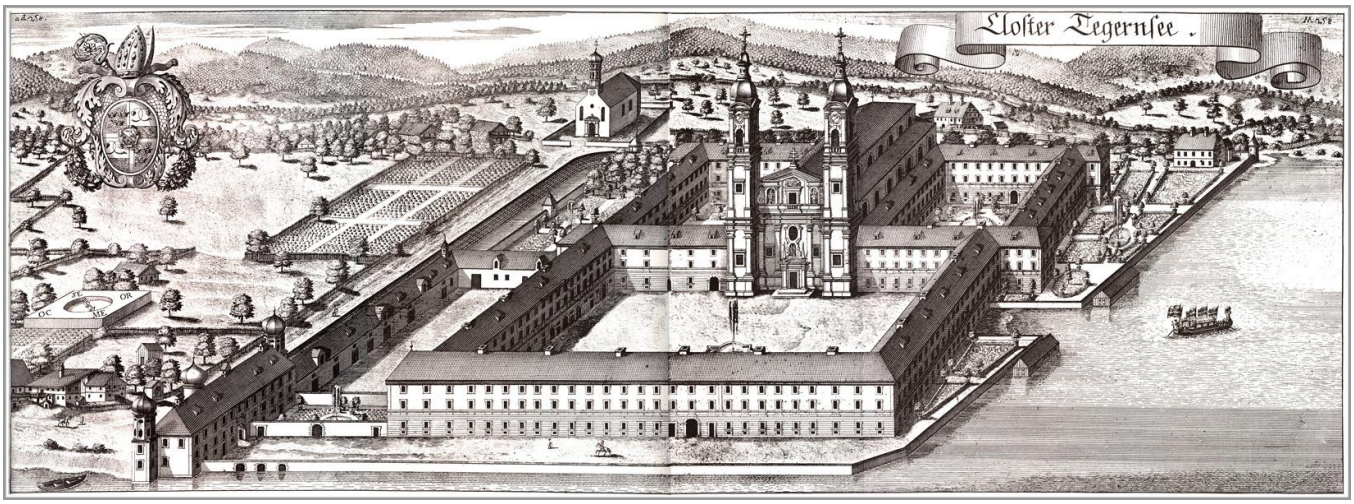

Figure 5: Copper engraving by Michael Wening (ca. 1705) showing the layout of the Baroque monastery Tegernsee including the now removed wings. In the court in front of the church some evidence for a flowerbed can be detected (© Bayerische Vermessungsverwaltung, 2020).

Conclusions

The GPR results demonstrate that archaeological prospection can often provide unexpected findings. While searching for buried foundations of a demolished monastery an elaborate garden design was revealed. This is a further indication for the prosperity and prominence of the Tegernsee monastery in Baroque times. Despite the generally unfavourable soil in this area, a GPR survey was the only viable geophysical survey option. The large number of modern utilities and other disturbances made magnetometer surveys virtually impossible, and the partly sealed ground prohibited the application of geoelectrical measurements. The results confirm that it was best to use GPR.

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Not all the magic is in the grey (scale): Colour scale magnetograms from Sudan

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For magnetic prospection, it is common to plot the results – the magnetograms – in greyscale. This avoids confusion and "pseudo-limitations" caused by different values and colours. For interpreting the collected data, one can play around with inverting as well as minimizing and maximizing nano-Tesla-ranges of the greyscale version to discover even weak magnetic features like palisades or mud(-brick) architecture. For magnetograms created from total field magnetometer data usually a high-pass filter is applied, which can be overlaid with the total field data additionally. In some cases, even this is not enough to understand the buried features. I would like to illustrate how to apply colour scales in a case study from northern Sudan.

The first campaign of the Munich University Attab to Ferka Survey Project (MUAFS; directed by Julia Budka) in northern Sudan 2018/2019 – focusing on archaeological surveying as well as drone mapping – included magnetometer prospection. First results are already published (Budka 2019), showing the first interpretation of the data produced directly after the field season. In 2020, first test excavations were carried out at two of the four magnetically investigated sites (Budka 2020). Due to the Covid-19 pandemic, no fieldwork was carried out after March 2020. The data collected so far were reconsidered based on the excavation results and the photogrammetric data from 2020.

However, before looking at the data, we have to consider where the data was generated! The shape and intensity of every single anomaly is depending especially on the Inclination of the Earth's Magnetic Field, whose effects are shown in Ostner *et al.* 2019, 181 Fig. 2. While the Inclination in Munich is around 64°, the Inclination in the MUAFS concession area is 27-28° and shallower. The components of the Earth's Magnetic Field at the MUAFS concession area are illustrated in Figure 1, showing a Declination of almost 4 ° and a total field intensity of around 39.000 nT (in Munich: 48.585 nT).

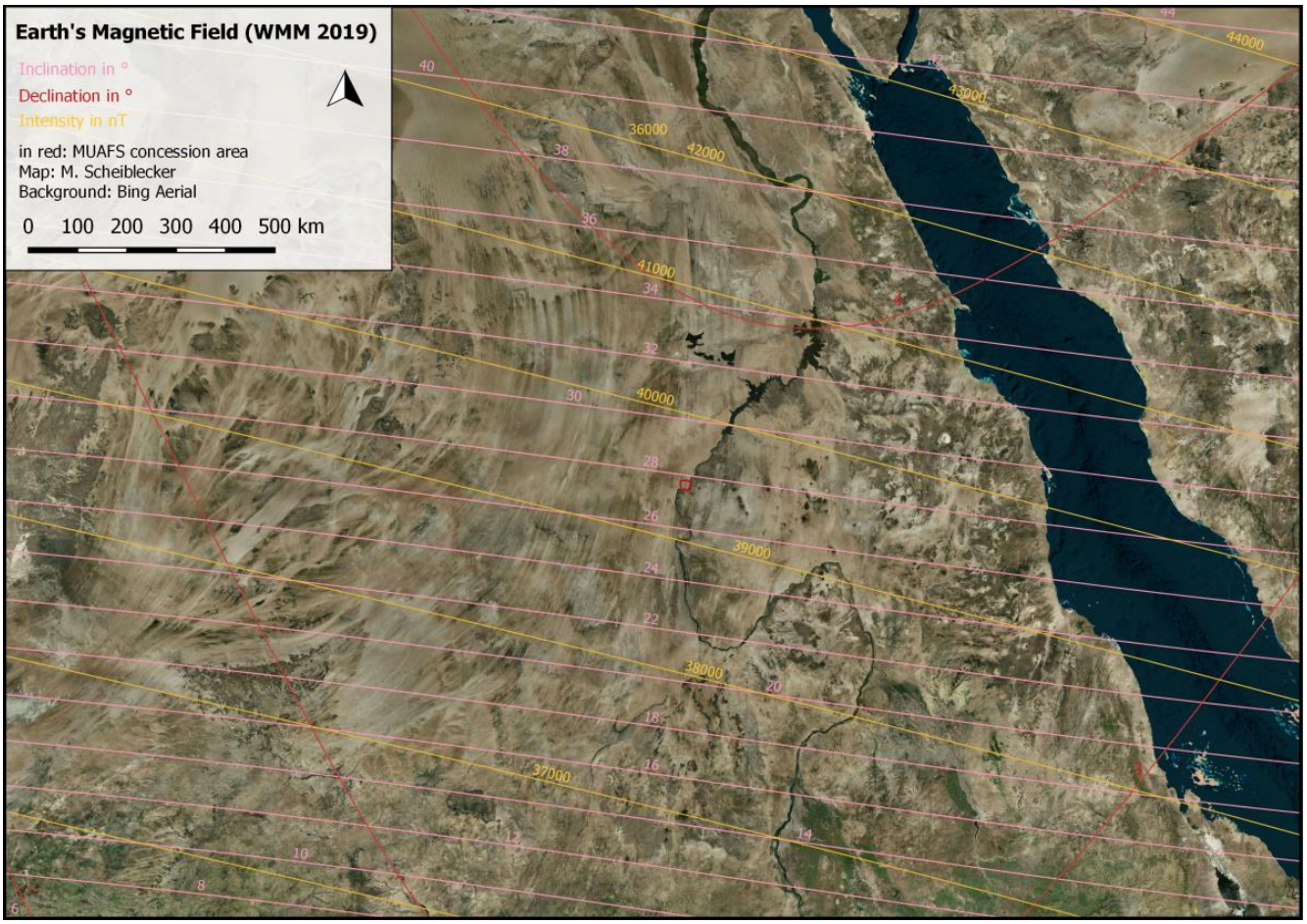

Figure 1: The Earth's Magnetic Field in Sudan according to the World Magnetic Model (WMM) 2019. Highlighted in red: the MUAFS concession area (M. Scheiblecker).

The archaeological and geological features revealed during magnetic prospection are showing contrasts of sometimes less than 1 nT. Due to different inclinations, the same archaeological feature would result in a different anomaly in Sudan compared to Munich. While the anomaly in Sudan would be wider than in Munich, it would cause lower intensities as well as showing a greater negative part than the Munich one. This means that while in Bavaria the negative part of an anomaly is regarded more as a small "white shadow", in Sudan it would be almost equal to the positive part of the anomaly. Furthermore, with wider anomalies closer to the geomagnetic equator like in Sudan, it is more likely that anomalies are overlapping so that it is not easy to distinguish features lying next to each other. Regarding the used magnetometer in this study – a fluxgate vertical component gradiometer, the intensities are additionally lower than for example with a single sensor total field magnetometer, which makes it more difficult to interpret the data and is the reason why sometimes low-contrast features like pisé walls are more difficult to detect with gradiometers.

When looking at the collected data in detail, the presumed new interpretation based on the greyscale visualisation was not satisfying at all. To map archaeological features, different methods are applied from just highlighting some areas of interest to detailed value-related drawings of architecture, installations etc. But is it always that easy? And do we need it in each and every case? Anyway, it is a question of which site you are looking at. For example, Roman architecture is well explored and offering suitable comparisons, whereas the interpretation of geophysical prospection data in untouched and uninvestigated regions is more complicated.

In the MUAFS concession area four sites could be magnetically surveyed, including one settlement and three cemetery sites. GiE 002 is a cemetery site. The usual greyscale plot (Figure 2) shows clearly traces of the recent and former Wadi/Khor, tumuli-like features in the southern part and features of different shapes covering the northern area. They are interpreted as graves: their edges and/or stone borders are resulting in positive anomalies of different amplitudes, accompanied by negative halos.

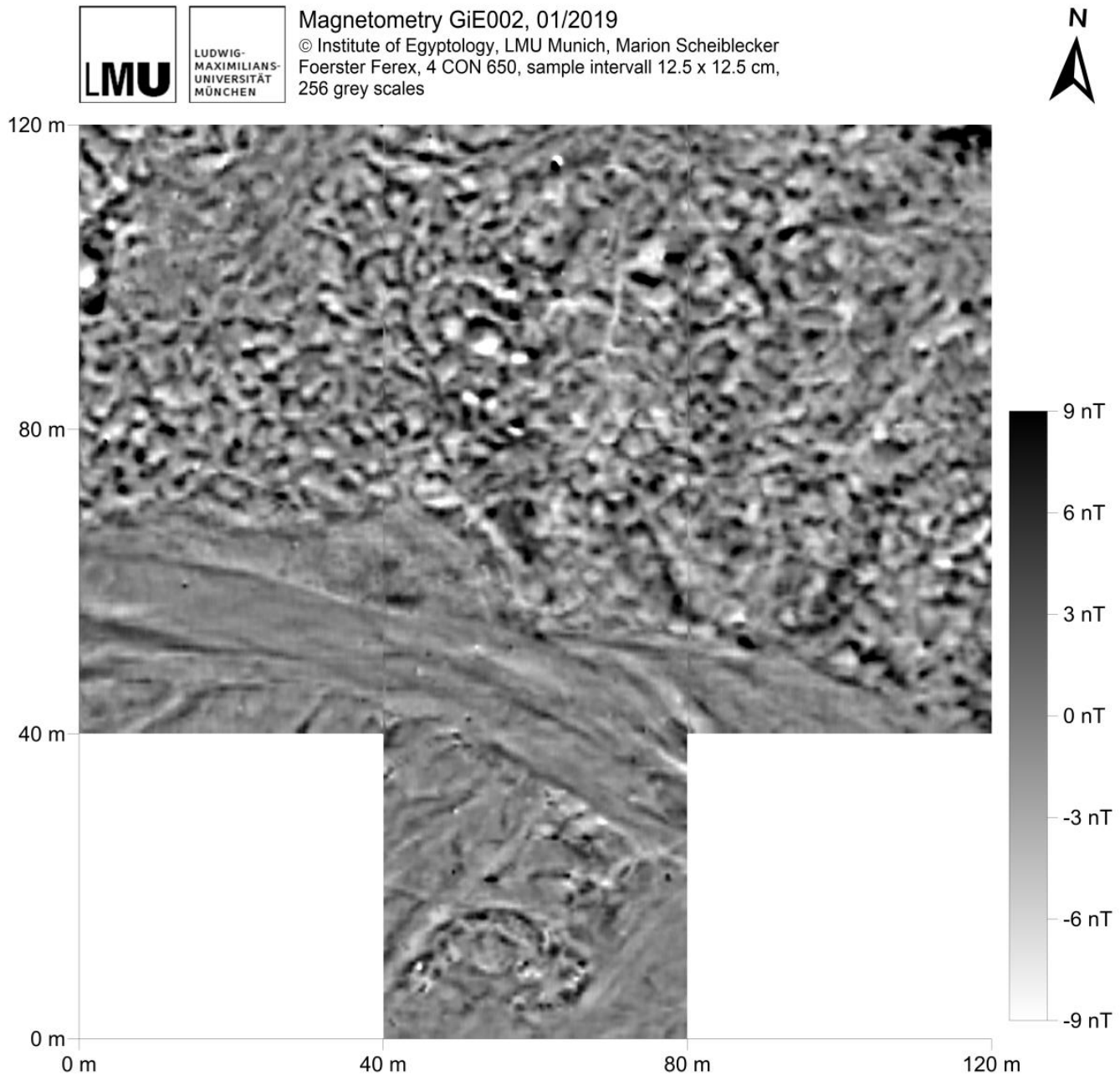

Figure 2: Magnetogram of GiE 002 in greyscale (M. Scheiblecker).

To understand the single burials better it is helpful to change to a blue-red colour scale (Fig. 3). In this way, it is easier to differentiate the single anomalies consisting of the positive (red) and negative (blue) part.

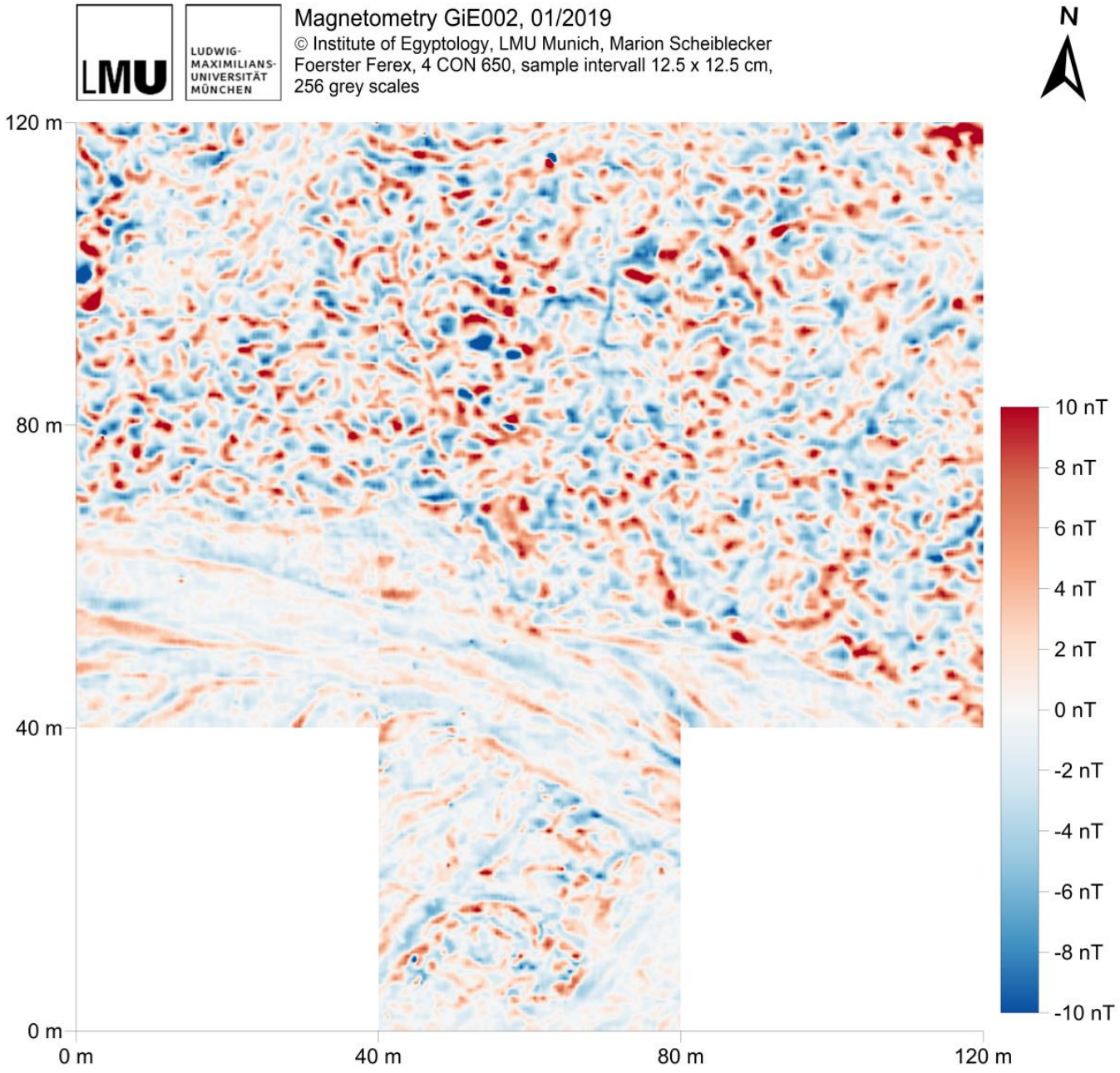

Figure 3: Magnetogram of GiE 002 in blue to red colour scale (M. Scheiblecker).

Highlighting the minimum and maximum values – in yellow resp. red – helps; for example to focus on the probably best-preserved archaeological features located in the centre of the measured area, visible in Figure 4.

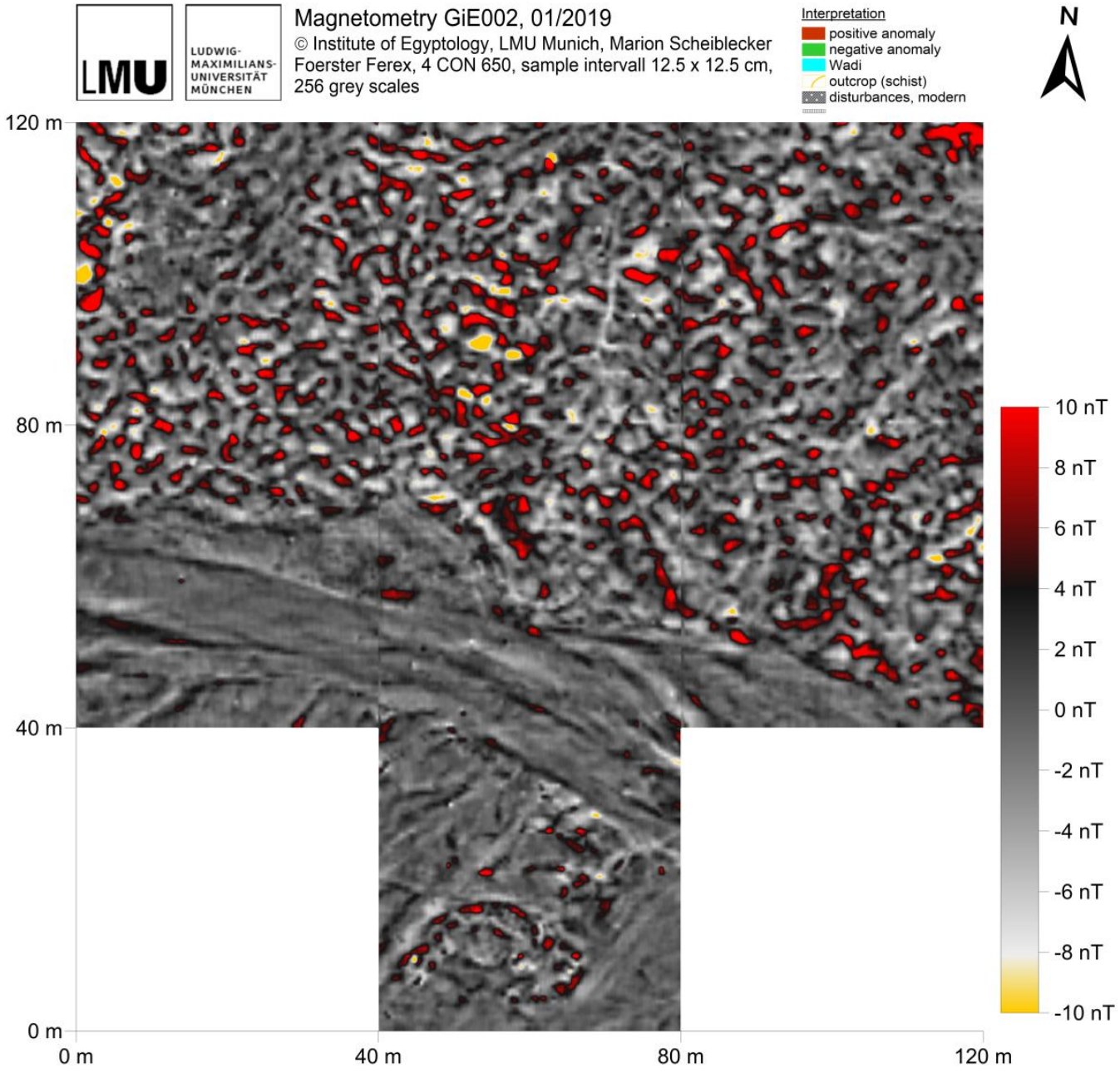

Figure 4: Magnetogram of GiE 002 in highlighted greyscale, showing maximum values in red as well as minimum values in yellow (M. Scheiblecker).

The greyscale plot of GiE 001 (Fig. 5) reveals the modern destruction of the site: tracks from cars as well as the pillars of the power line are overlapping many archaeological traces. Additionally, the core part of the site couldn't be investigated due to dense bushes.

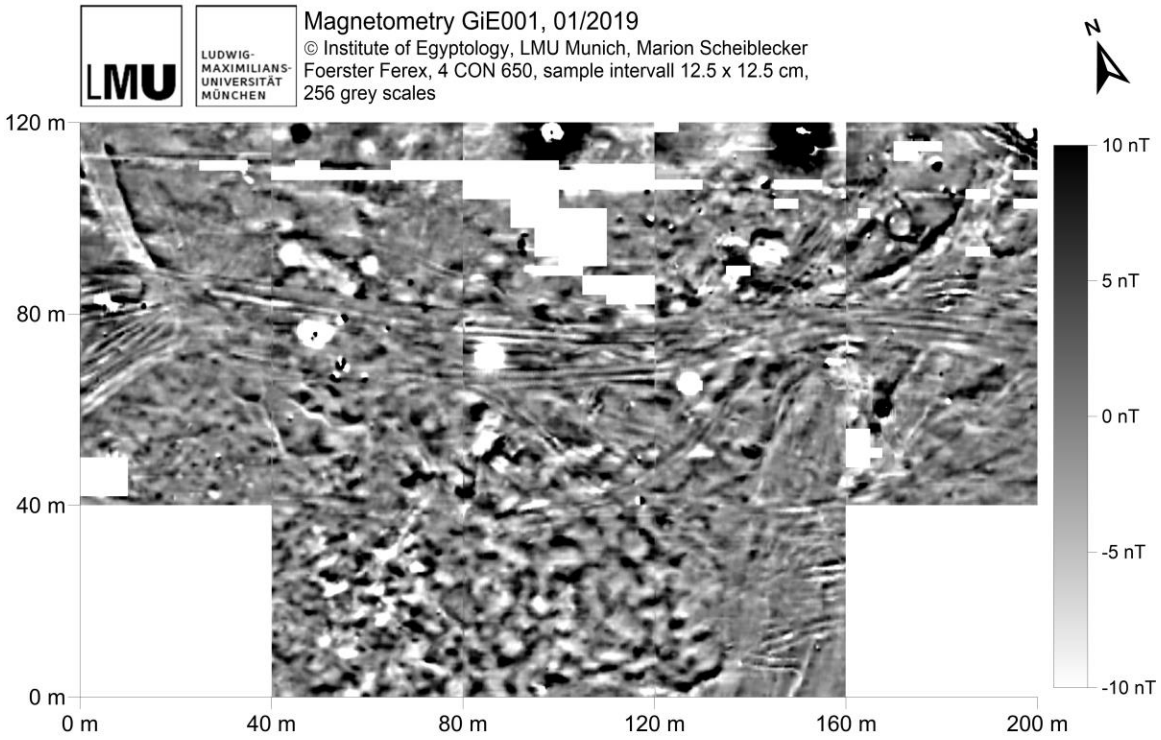

Fig. 5: Magnetogram of GiE 001 in greyscale (M. Scheiblecker).

Applying a blue to red colour scale (Fig. 6) exposes especially the magnetic noise caused by the power line in the north as well as car tracks and helps to understand the archaeological features in the southern part. In the north-eastern part, linear architectural features, represented by weak positive anomalies (red), are visible as well.

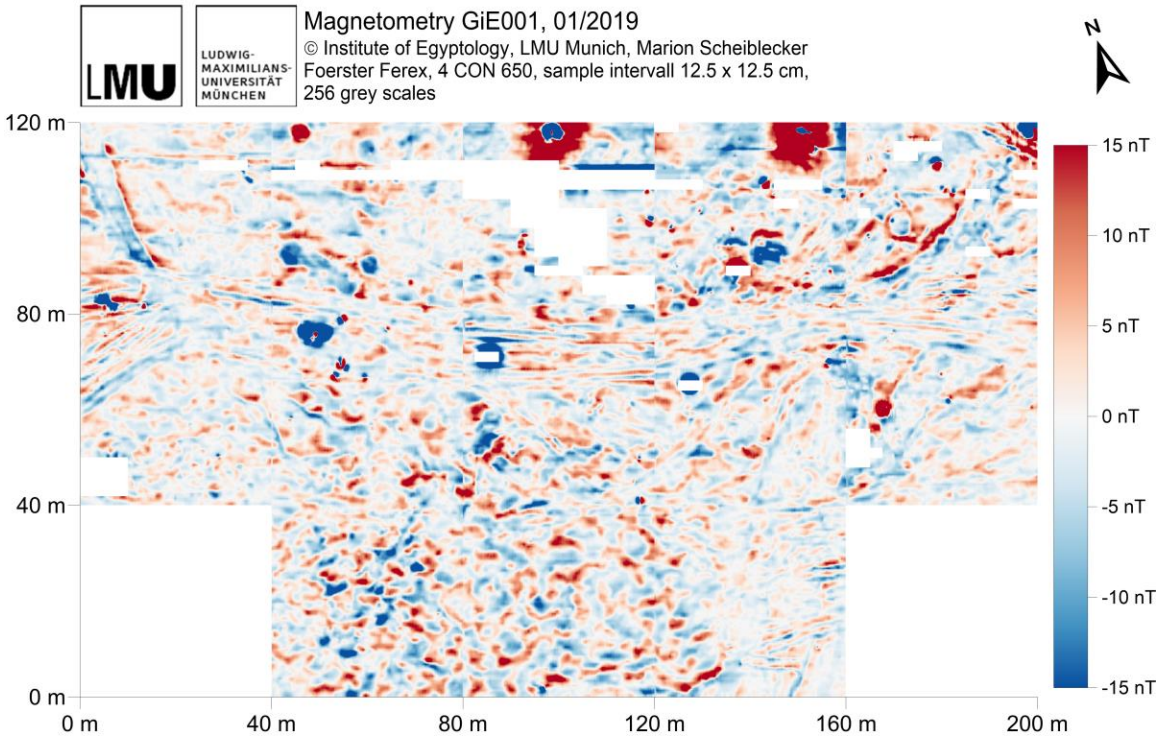

Fig. 6: Magnetogram of GiE 001 in blue to red colour scale (M. Scheiblecker).

The discussed magnetograms show clearly that it is worth playing around with different colour scales and that there is more than one magnetogram important for interpreting the data for archaeological and geological purposes. Some features are easier to identify in colour scale or highlights can be set for maximum and minimum values. If the surrounding area is noisy, for example due to metal fences, iron rubbish on the site etc., colour scales are not useful anymore, because they are showing especially the disturbances due to their high amplitudes and less of the archaeological features themselves. Nevertheless, it is possible and worth to adjust the colour scale for every site separately.

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Obituary: Otto Braasch, an Aerial Archaeology Pioneer

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Sad news for the ISAP community: Otto Braasch, one of the aerial archaeology pioneers in Germany, passed away at the age of 84 in Lahr, Black Forest, Germany on 5th August 2021. Otto Braasch was born in 1936 in Kutenholz near Hamburg and grew up in Cloppenburg, Lower Saxony. From an early age, he was interested in historical remains, as he often recounted.

In 1956, when he was only 20 years old, he acquired a glider pilot license and joined the newly founded German Air Force two years later. During his career as an officer, he became qualified as a tactical aircraft pilot on Starfighter and Phantom jets. Some years later, in 1974, his second career as an aerial archaeologist began, when he became interested in the historical remains in southern Germany that he detected during his flights with small propeller aircrafts at the weekends. His archaeological interest was further stimulated by his contact with Irwin Scollar, one of the other pioneers in archaeological prospection in Germany.

In 1980, he left the Air Force as a Lieutenant Colonel to concentrate solely on aerial archaeology. Otto Braasch was an autodidact in archaeological sciences, but stood his ground on the subject. Between 1975 and 1989 he was the aerial archaeologist for the Bavarian State Department of Monuments and Sites (BLfD). His work in cooperation with Rainer Christlein, the first field executive of the Landshut BLfD department, formed the base for the BLfD's aerial archive. With currently more than 800,000 images it is now one of the biggest archives of this kind worldwide. His new discoveries from aerial pictures formed not only the basis, but were often also the most important starting point for geophysical prospecting in Bavaria (Fig. 1).

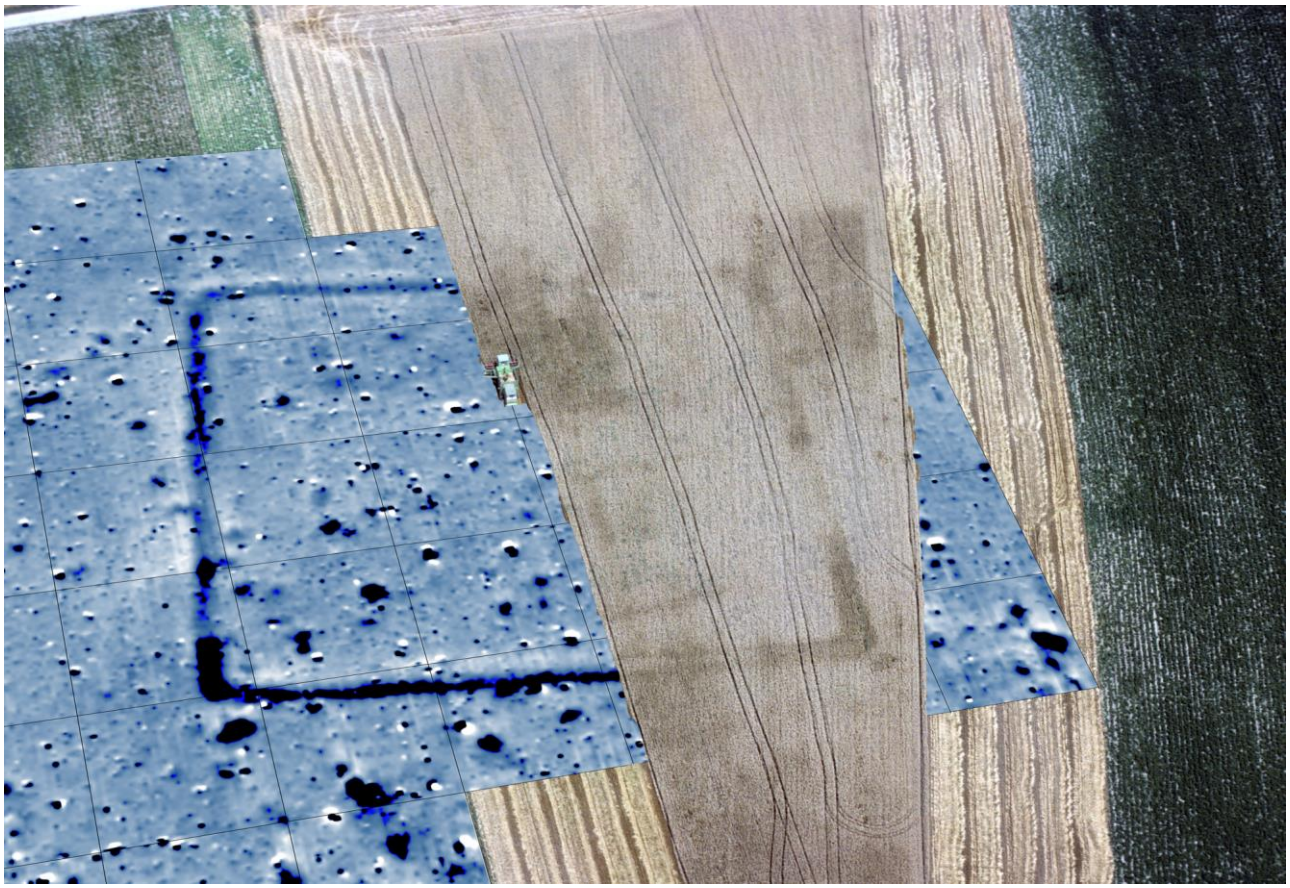

Fig. 1: Aerial photograph of the Celtic square enclosure Oberhaimbuch taken by Otto Braasch and overlain with the magnetic survey results. This example shows very well how aerial archaeology and geophysical prospection work together. Aerial photo: BLfD Aerial Archaeology Archive, Photographer: Otto Braasch, Date: 26.07.1983, Image-Nr. 3232-25. Magnetogram: Scintrex CS-2 in duosensor configuration, Dynamics: ± 4 nT in 256 greyscales, Point spacing: 10 x 50 cm, interpolated to 25 x 25 cm, 40-m-grids. Archive-Nr. Obh98a.

Even in the later years of his life he provided the archaeological prospecting group of the BLfD with new discoveries that he had made during occasional flights to Landshut. Many of these pictures formed the basis of the exhibitions ‘Blick unter die Erde’ at the Museum Reich der Kristalle in Munich in 2013 and ‘Unter Wiesen und Wadis - Archäologische Geophysik im Ries und anderswo’ at the Ries-Krater Museum in Noerdlingen in 2014-2015.

After his work for the BLfD, he flew in different other German federal countries like Baden-Wuerttemberg and Saxony, as well as in many foreign countries mainly in the former Eastern Bloc. Among his most famous discoveries were Neolithic ring ditches (Fig. 2), the Roman fortress of Marktbreit (Bavaria), the Neolithic ring ditch of Goseck (Saxony-Anhalt) and the monumental Celtic burial mound at the Ipf (Baden-Wuerttemberg).

Fig. 2: Neolithic ring ditch monument of Künzing-Unternberg that was detected by Otto Braasch during his flights for the BLfD. This was amongst his first discoveries ever. BLfD Aerial Archaeology Archive, Photographer: Otto Braasch, Date: 27/04/1977, Image-Nr. 0000-01.

During his entire career as an aerial archaeologist, he was in contact with scientist all over the world, especially in France and the U.K. One of his most important concerns always was the training of junior scientists, like, for example, Klaus Leidorf (his successor at the BLfD) or Baoquan Song. Otto Braasch passed on his enormous knowledge in aerial archaeology as a lecturer at the Ludwig Maximilians University Munich and the Humboldt University Berlin, and in a multitude of conferences (Fig. 3).

Fig. 3: Otto Braasch at the Conference 'Pioneering in Archaeological Prospection' in Laa a.d. Thaya (Austria) in October 2011 (© Photo by Roland Linck, BLfD).

During his career, he published more than 100 articles in several scientific journals and books. Amongst them are his monographs 'Das unterirdische Bayern' (1982) and 'Das unterirdische Baden-Württemberg' (1994). Even decades after his retirement, he published his work until the early 2000s. All of his published works proofed that Otto Braasch was an excellent photographer and provided insightful interpretations of the archaeological features visible in his pictures. One of the most important aspects he instilled in his students was that the work in the office is also paramount in aerial

archaeological research: each flight hour subsequently requires eight hours of image processing.

Due to his contributions to archaeological research, he was awarded an honorary doctorate of the Freie Universität Berlin in 1999.

As long as possible, Otto Braasch flew with his camera in search for new archaeological sites. After his pilot license could not be extended for health reasons, he continued taking aerial archaeological images as a passenger. His interest in aerial archaeology never disappeared. Otto Braasch's contributions to aerial archaeology in Germany and worldwide, especially his pioneering work, will never be forgotten.

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Cholera in the Time of COVID: Mapping Evidence of a Global Pandemic during a Global Pandemic

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Introduction

In December 2020, during the second surge of the COVID-19 global pandemic, we investigated a burial site of victims of the 1832 Irish cholera pandemic. The project, "A Confined Anomaly in the 'Cholera Field': Characterizing Urban Mass Graves of the 19th Century Cholera Epidemic Victims" was part-funded by the ISAP Fund. This interdisciplinary project sought to characterize the survival and morphology of unmarked mass pits from a 19th century burial ground, known as 'the Cholera Field', on the estate of Sligo University Hospital (SUH) in the northwest of Ireland.

Sligo was the worst affected provincial town during the 1832 Irish cholera epidemic. The disease was an overwhelmingly urban phenomenon, largely attributed to the poor sanitary conditions of the time, which necessitated the rapid burial of infected corpses at the grounds of the Sligo Fever Hospital. Over 500 people were unceremoniously interred in an unknown number of mass pits. This once semi-rural hilltop burial ground has since been gradually encroached upon by the modern hospital (Figure 1).

The location of the Cholera Field burial ground was recreated within a GIS that had to rely on georectification of the wider Sligo area, as all potential ground control points that appeared on contemporaneous historic maps were absent due to extensive development associated with the modern hospital, which was built in the 1970s. The nearest control points were

located 318 m southwest of the site. Once rectified, surviving elements of the Cholera Field north and northeast boundary walls were clearly identified, as were two undisturbed parcels of land that were available for survey. Area 1, a small strip of land (18 m x 6 m), was overgrown with a bramble thicket, while Area 2 was a small rectangular green area (26 m x 11 m) adjacent to a modern ambulance station. These comprise the only visible surface remains of the Cholera Field at Sligo University Hospital, representing 24% of the original walled burial ground that was enclosed in 1847 and mapped in 1875. An ambulance station, car park, minor access road, drain and helipad were constructed on the remainder of the historic Cholera Field.

Figure 1: Location of the Cholera Field at Sligo University Hospital. Basemap: Google Satellite.

Methodology

The field wall located in Area 1 was cleared of ivy, brambles and other vegetation, exposing a 1-2 m high wall and a suitable surface on which to carry out an Electrical Resistivity Imaging (ERI) survey. Other survey methods were considered unsuitable due to the presence of widespread ferrous material and modern interference (e.g. a car park, traffic, buildings, construction activities) and EM interference from the hospital and helipad broadcasting transmitters. A 2D Earth resistance survey was discounted due to the impact of a small survey area on the twin-probe array geometry, whilst the Square and Wenner arrays limited depth penetration for mass grave features to upper deposits only. The ERI survey was the most appropriate geophysical technique to characterise the surviving elements of the burial ground.

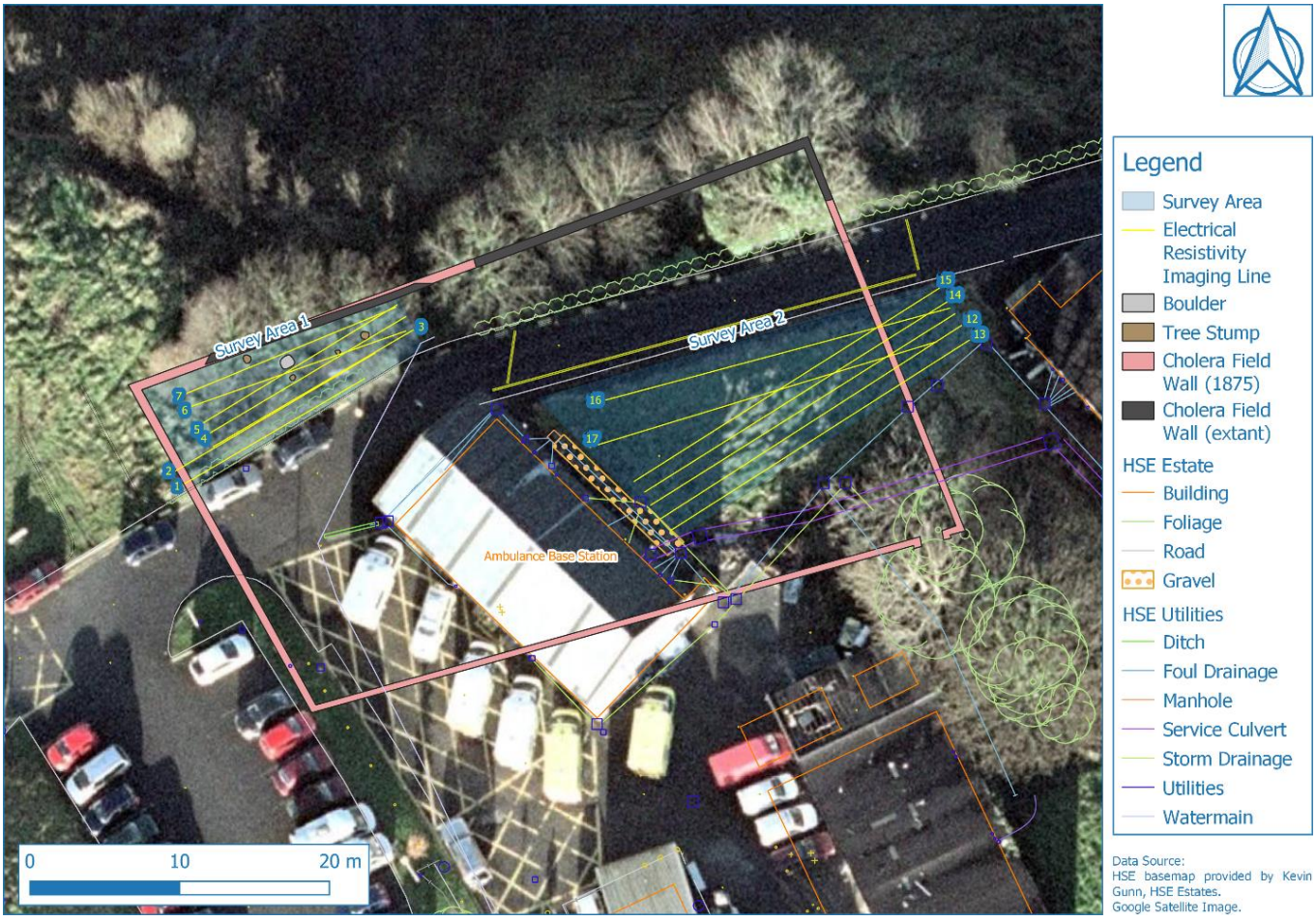

Figure 2: ERI survey lines across the 19th century burial ground.

The size of the survey areas meant that a maximum probe spacing of 0.5 m could be used in Area 1, and a slightly larger spacing of 0.8 m could be used in Area 2. Topographical corrections were applied based on RTK GPS points gathered for each probe location. In total, 14 ERI profiles were collected;

where possible, a 1 m profile spacing was used (Figure 2). Area 1 was particularly difficult to survey due to the presence of construction works on the adjacent helipad; recently installed concrete pipes created such strong contrasts at one end of the survey line that the profile was shifted slightly to avoid it. The ERI survey used an Allied Tigre system with 32 takeouts (Figure 3).

Figure 3: ERI survey across Area 1 – a 18 m x 6 m strip of land. Hospital ambulance bay to the left; construction of new helipad in background; an extant portion of the 1847 Cholera Field Wall on right.

COVID-19

The survey occurred over four days during a period of lockdown in Ireland known as 'Level 3' – a moderate set of restrictions that permitted some outdoor work. Other than hand hygiene and the now common mask-wearing that we've all adapted to, the COVID-19 pandemic also affected some of the fieldwork elements. Given the restricted size of the survey areas, the number of people on site was limited to three, which prevented the widespread student participation that we had hoped for from the IT Sligo Applied Archaeology degree programmes. This also meant that many of our planned outreach activities, such as site visits from local schools, could not take place. To compensate, we recorded extensive video diaries, site tours, detailed explanations and 'live reactions' to 'exciting data' ('all geophysical data is

exciting', Bonsall 2021, pers. comm.), which will be used on our own social media channels and potentially in a television series. As our fieldwork was completed, the Republic of Ireland closed its borders to Great Britain due to the threat of the highly transmissible U.K. variant of COVID-19, which posed some logistical challenges for returning the hired ERI equipment to English-based Allied Associates Geophysical Ltd.

Results

Five pits were identified within the survey areas of the Cholera Field Burial Ground (see interpretation in Figure 4 and selected ERI lines in Figure 5). A berm separates two distinct areas of pits in the northwest corner of the survey area. Attempts were made to counter depressions by additional in-fill; however, surface depressions remain at some of the pit locations. A ditch (probably the 1832 Cholera Field boundary) and wall footings (of the 1847 Cholera Field wall) were both mapped in the southeast corner of the survey area. The burial pits survive at depth, however each of the five pits (and the berm, ditch and wall) continue beyond the area of investigation. The mapped pits have been encroached upon by construction works since the 1970s. Further, it is highly likely that the developed areas of the Cholera Field – 76% of which has been built upon – also once contained burial pits.

A key objective for the survey was to assess the nature and depth of the burial pits. The minimal volume of the pits varies between 14 m^3 and 70 m^3, data that will assist in the estimation of burial capacity. The size and shape of the pits will assist us to gauge the potential number of pits that may have been destroyed by the hospital buildings constructed in the 1970s, a time that pre-dates modern archaeological planning legislation.

The investigation of the Cholera Field will be published in more detail in two papers. The first will provide an in-depth examination of the urban site challenges and ERI characterisation of the mass graves. The second publication will utilise the ERI data as one of many work packages that assess the wider implications of the medical, social and political responses to the 19th century cholera pandemic in Sligo and other Irish provincial towns.

Figure 4: ERI Interpretation of the Cholera Field.

Acknowledgements

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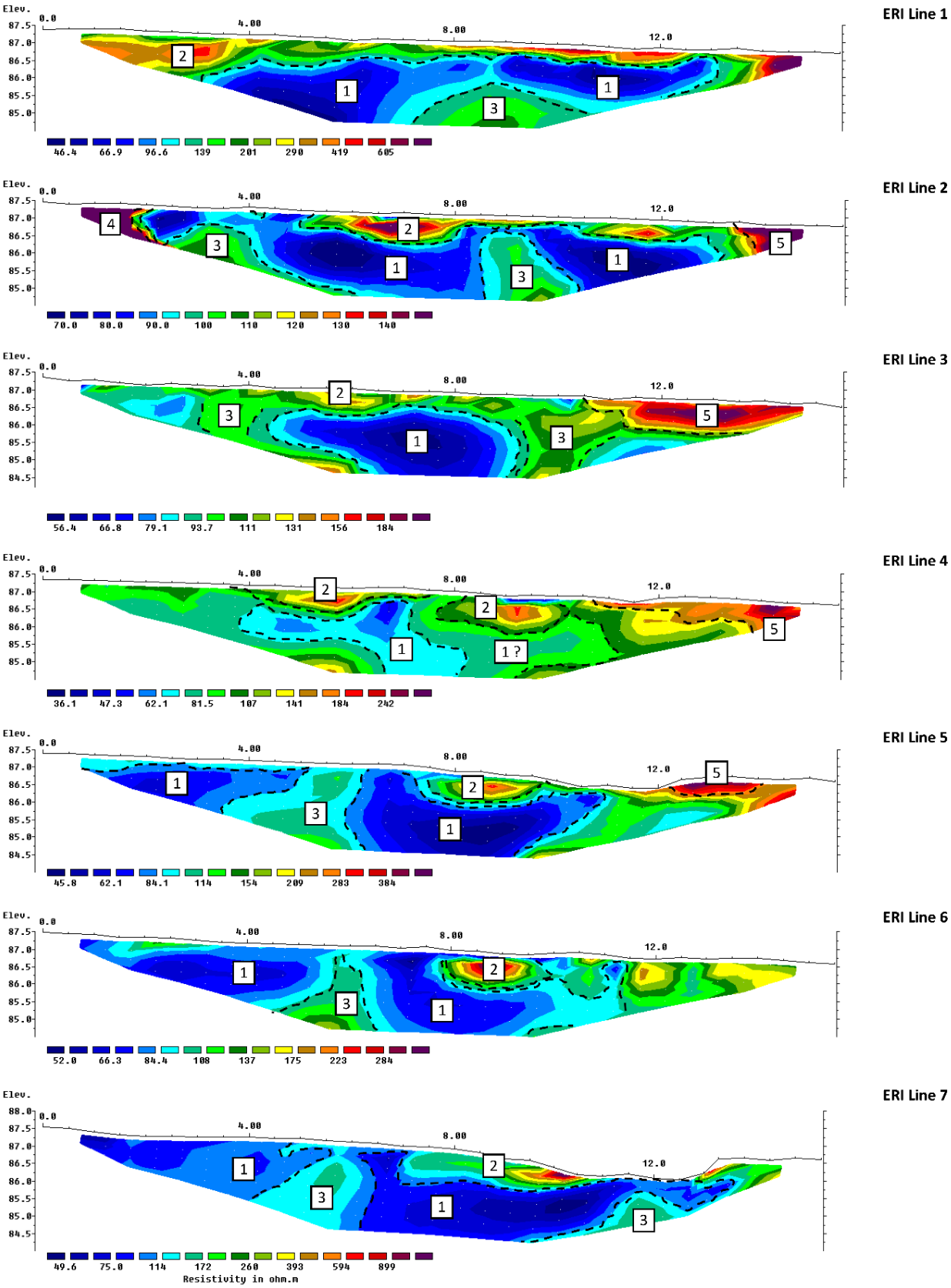

Figure 5: Interpreted model resistivity with topography for Lines 1-7 in Survey Area 1. Anomaly key: [1] pit infill; [2] secondary infill to counter surface slump; [3] a berm dividing the pit(s); [4] modern concrete surrounding a pipe; [5] pit infill/stony deposit.

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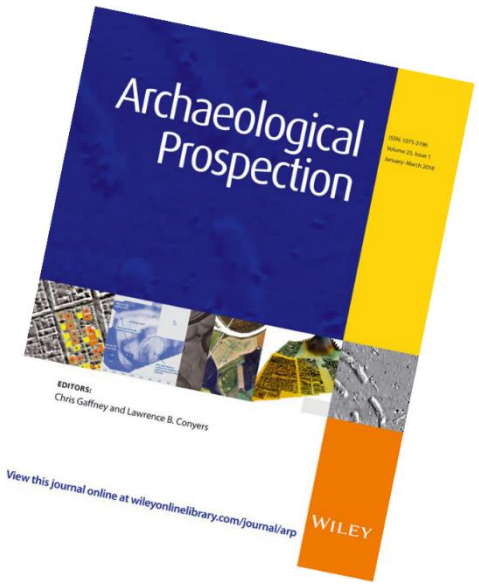

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