



Preliminary Report on Field Research of the IAES – Italian Archaeological Expedition at Seleucia on the Tigris (October-November 2022 and April 2023)

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key words

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ABSTRACT

The Italian Archaeological Expedition at Seleucia on the Tigris (IAES) restarted field research in October 2022, after a break of more than thirty years. Activity was resumed in April 2023. These are the first steps of a new research project framed in a five-year agreement signed in 2022 by the State Board of Antiquities and Heritage of Iraq (SBAH), the Centro Scavi di Torino (CRAFT) and the University of Torino (UniTo). The expedition is co-directed by Carlo Lippolis and Vito Messina.

Two campaigns have been conducted in October-November 2022 and April 2023. According to a program jointly developed by all parties, the aim of these two campaigns was to update topography and acquire preliminary information on the site's geomorphology, so to conduct further extensive excavations.

Introduction

Seleucia on the Tigris was the most important city of West Asia in the period from the 4th century BCE to the 2nd century CE. It was claimed as a major capital of the *Oikoumene* in ancient Greek sources, a capital only comparable to Alexandria and Rome, and it was labelled as the city of kingship in Akkadian records. The city's dimension, location and centrality in ancient road systems made it a pivotal crossroad of trades, and the importance it has for our understanding of cultural interaction processes equals nowadays the prestige it had in antiquity.

Founded by Seleucus I in the last decade of the 4th century BCE in full respect of the Babylonian tradition, Seleucia embodied cultural trends that originated both in the local background and in the global milieu. The information so far acquired at the site is crucial for the history of the Hellenistic world; the information yet to be acquired has great potential to increase our knowledge in a frame of interculturality.

Excavations (Fig. 1) have been conducted at Seleucia by two expeditions: the



American expedition of the University of Michigan and of the Museums of Toledo and Cleveland, which worked from 1927 to 1936, and the Italian expedition of the CRAFT and UniTo, which worked from 1963 to 1976, resumed activity from 1985 to 1989, and is now restarted⁽¹⁾. The American team opened several trenches of different size in many points of the archaeological area: most of them are unpublished. Along with other buildings, the latter team particularly focused on one of the city's dwelling blocks. There can be little doubt that the longer and most important scholarly tradition on Seleucia is that of the Italian team from Torino. Materials of various type were recovered in large quantities (especially pottery, terracotta figurines and seal impressions), and different buildings were brought to light: public buildings like the theatre, the stoa and the city archive were discovered in the so-called north agora; workshops and houses were likewise identified in different parts of the city, along with a small temple of Mesopotamian type.

Since 1963, field activities conducted by the Italian team have been of different types: extensive excavations (Fig. 2), which allowed exposing more than 7,000 m² in different sectors of the site, alternated with ground surveys. The first type of intervention allowed us to unearth important public buildings and spaces, the second to produce the most up-to-date topographic maps of the site and its environment. Innovative approaches were also experienced since the beginnings of the Italian research: for instance, our team completed in 1971/72 one of the first geophysical surveys⁽²⁾ ever conducted in Iraq, identifying ancient canals that predate the city foundation. Research on Seleucia was continuously conducted down to present days by UniTo and the CRAFT. The outcomes of such research have impacted on scholarship greatly.

October-November 2022 Campaign

The aim of this campaign was to update topographical information and open a small test trench to verify the stratigraphy of the northern part of the archaeological area. Digital records were likewise acquired on an underground tomb accidentally discovered many years ago and still undocumented.

To update topographical information, an integrated approach was followed that combined different 3D survey methods, such as optical and multispectral UAV photogrammetry, and terrestrial laser scanning. This survey was conducted by a team of the Polytechnic of Torino. The accurate 3D survey aimed to offer a detailed surface model able to support archaeological research and understand landform and archaeological subsurface contexts.

The technologies used allowed a quick acquiring phase. Optical UAV photogrammetrical application has been performed by the fixed wing eBeeX Sensefly system, while the multispectral survey has been performed by the DJI Phantom 4 RTK Multispectral UAV system. LiDAR acquisitions have been accomplished by the Focus3D X330 Faro technology. The data so far acquired allowed to generate an integrated multi-sensor 3D model and related orthophoto of the site (Fig. 3).

A topographic Network for plano-altimetric referencing was established using GNSS technique according the international standard UTM WGS 84 reference system. The extension of a site such as Seleucia is a challenge for surveys. To obtain 3D documentation at large scale, drone photogrammetry was identified as the most suitable survey technique: a fixed-wing drone model, with a high-resolution RGB camera (Ebee x with SODA 3D camera, by SenseFly), has made this goal achievable. To integrate this first



overall flight performed over the whole archaeological area of Seleucia, a set of insights was planned at different portions of the city thanks to multispectral flights performed with a DJI Phantom 4 RTK Multispectral drone. Dense and accurate 3D models will be obtained by integrating multi-sensor methods, to extract representation models at different scales, suitable for different studies and applications.

Multispectral flights (Fig. 4), carried out using multirotor UAVs, were envisioned to constitute insights into the overall flight and being prefigured to possibly provide information not directly observable in the visible spectrum. These were planned at a decidedly lower flight altitude compared to the flight of the fixed wings drone. The established altitude was about 60 m, with GSD comparable with that of the flight at higher altitude, due to the different resolution of the cameras. In this case, the drone used was equipped with six CMOS sensors, of which one RGB and five monochromes for the acquisition of multispectral images of the single bands of blue ($450 \text{ nm} \pm 16 \text{ nm}$), green ($560 \text{ nm} \pm 16 \text{ nm}$), red ($650 \text{ nm} \pm 16 \text{ nm}$), red-edge ($730 \text{ nm} \pm 16 \text{ nm}$) and near infrared ($840 \text{ nm} \pm 26 \text{ nm}$).

Ground data collection using Terrestrial Laser Scanning (TLS) technique has been achieved with the Focus3D by Cam2 / Faro Technologies (maximum range 330 m). We collected a considerable amount of data: 5 scans with a very high density (density of 1 mm at 10 meters) have been placed on the top of several tells; we also carried out a TLS 3D survey of an underground tomb accidentally discovered south of the city main canal (using a traditional architectural survey resolution equal to 6 mm at 10 m: Fig. 5). The laser scanner is equipped with a high resolution integrated digital camera that allows to acquire the images necessary to asso-

ciate the radiometric tone of each laser point acquired of the point cloud. In the tomb's area, two markers and several natural control points have been measured via total station to have the point cloud georeferenced. In this way, the registration of the scans in the chosen reference system contemporary to guarantee the final accuracies will be fulfilled.

A test trench (T1; Figs. 6, 7) measuring 4 x 6 m has been opened south of a previous excavation conducted by the American team between 1927 and 1936. In this place, an erratic epigraph in Greek referring to the presence of a Seleucid *heroon* was found. Archaeologists were indeed able to unearth a building of the Parthian period probably used as a manor house. Seleucid levels are instead almost totally unknown. The aim of our trench was to check stratigraphy in this specific area of the site, not far from the monumental buildings and squares already discovered by the Italian team, and possibly to intercept the presence (and depth) of the underground water-table, as the latter could hinder excavation in depth (and thus in the Seleucid layers) in the forthcoming years.

Trench T1 has been excavated down to a depth of 4.5 m. The first stratigraphic unit (SU) identified under the topsoil is a thick deposition (SU3) of potsherds with all evidence coming from the nearby old American trench. Below this modern intervention, we only found layers of depositional origin mainly composed of clay, and very scattered fragments of brick (baked and mud) and pottery sherds of Parthian date. These are clearly the result of natural accumulation. At a depth of around 3 m from the topsoil, we encountered decayed remains of occupational phases of squatting type that clearly post-date the Parthian phases documented at the city. Among the materials found in these occupational remains there are also

bricks and pottery coming from earlier periods (Parthian) that were reused probably to level the ground.

The first clear floor, in beaten clay (SU10) and later than the Parthian occupation of the city, was reached at depth of 3.3 mts. This was characterized by the presence of traces of reed mats. In this phase, the area investigated by our trench was likely an open area. Below this floor, that can be again referred to squatting phases, we reached occupational layers of the (late) Parthian period, composed by an assemblage of decayed materials (SU14+18), probably the texture of a collapsed wall, and mudbrick walls (SU17, 19, 20). In this assemblage, baked bricks coming from a building that included columns of two sizes (40 and 60 cm in diameter) were found atop mud brick walls, reached at a depth of 4.24 m. Rectangular baked bricks of two sizes have been found in this layer of decay: 32x13x8 cm and 29x13x8 cm.

The mudbrick walls found below this assemblage follow the orientation of the structures already discovered at the site, NE to SW. These walls, which indeed delimit a small room 3.5 m large (Room 1), have been only partially unearthed, as they continue beyond all the excavation limits. Based on the pottery found in layers related to the walls, they can be dated to the late Parthian period. All walls are made of squared mudbricks measuring 33x33 cm. Wall SU17, the one discovered to a wider extension, is about 1.5 m wide and more than 2.5 m long, being oriented NE to SW. It is thus made of 4 rows of bricks. It was cut at the corner with wall SU20 to place a *chytra* (cooking pot). It was partially broken by the baked bricks there collapsed (SU14+18) but it is quite probable that it ends northwards to open a passage between Room 1 and other rooms yet to be discovered. Walls SU19 and SU20 have been exposed for a

very limited extend, as they run beyond our excavation limits almost completely: both are orthogonal to SU17.

Along with excavation works, we also completed the documentation of an underground funerary chamber (Fig. 8), occasionally discovered in the south half of the city about 470 mts east of the dwelling block (G6) excavated by the American team on the '1930s. The presence of this tomb, located at 33° 5'29.27"N and 44°31'29.78"E (in the WGS84 system), was reported to us and to the representatives of SBAH by the local people. This is a vaulted chamber built in baked bricks of (32 x 18 cm), roughly measuring 2.7 x 2.7 x 2 m that could be entered in antiquity by a stepped pit-entrance. It contained the remains of three funerary benches and fragments of baked clay sarcophagi that were arguably placed on the benches. Human remains have been also detected that were incoherently mixed with the filling materials laying on the chamber's floor. On the back wall, three small niches probably originally contained lamps. The vaulted ceiling is broken in the middle, probably in consequence of heavy rain, because the top of the ceiling almost coincides in that point with the topsoil. Decayed bricks, originally part of the ceiling, are still visible on the chamber's ground. These bricks have probably broken the sarcophagi contained in the chamber. The tomb was only documented and not excavated at the decision of the co-directors and SBAH representatives. Documentation was performed using a LIDAR stand-alone scanner (see above). It must be noticed that such a tomb probably corresponds to an underground structure already mentioned in the declassified report delivered by the commander of a unit of the US army, which surveyed the area during military operations in 2006.

A drill-test was done in an open area of the northern part of the site, located at 33°



5.927°N and 44°31.671°E (in the WGS84 system). This was done to estimate the elevation of the underground water table extending in central Mesopotamia (Fig. 9). The water table was reached in that point at a depth of roughly 5.5 meter below topsoil. The presence of baked bricks just few centimeters below shows that the more ancient layers of the city are probably affected by the presence of water.

Based on findings and considering the pottery sequence established during the previous archaeological research of the CRAST and UniTo at Seleucia, the sherds and vessels found during the present campaign (Figs. 10, 11, 12), except for two sherds of Hellenistic date, can be confidently dated to the Parthian period (second half of 2nd century BCE – 2nd century CE).

April 2023 Campaign

The aim of the 2023 (spring) campaign was to conduct a magneto-geophysical survey to acquire information on some points of the northern part of the site. The survey was based on grids of 40x40 m that were extended at need. A CS-Magnetometer Geometrics G-858 was used. The geological background in Seleucia consists of mud-brick debris on alluvium from the Tigris sediments (magnetic vol. susceptibility ca $0.5 - 1.2 \times 10^{-3}$ SI; total earth's magnetic field ca. 46.660 +/- 30 nT). The ground was never ploughed or considerably overprinted by modern features. Except for small erosion canals, we found no serious destruction or disturbance in the topsoil. Exposure to rain could make work more difficult and time consuming since the muddy ground slows down the walking speed significantly but will not affect furthermore the results of the magnetometer measurements.

At least 5 ha at five different locations at the site have been surveyed over an archaeological surface extended for more than 600 ha (Fig. 13). The area was mag-

netically scanned by a sampling interval of ca. 10 cm (10 measurements by second and normal walking speed of 5-6 km per h) and 50 cm traverse interval (resampling to 25 cm x 25 cm). Total profile length is $30 \times 3200 \text{ m} = \text{ca. } 100 \text{ km}$ which compares to 50 km walking distance with the cesium Duo-sensor magnetometer.

Magnetometry, among other geophysical methods, is a successful and cost-effective tool for detailed mapping of large areas in a reasonable time, more reliable than a GPR survey according to the specific features of the terrain in Seleucia. To reach the highest possible sensitivity combined with a maximum speed of prospection, we applied 2022 the Geometrics G-585 magnetometer units. We applied them as total field magnetometers in a so-called “duo-sensor” configuration. The profiles were oriented preferably in east west in direction order to minimize technical disturbance of the magnetometer probes. During the measuring period 11/2022 solar activity and the diurnal variation frequency induced by the solar wind were comparatively low. Such conditions allowed us to reduce the diurnal variations to the mean value of all data of each $40 \times 40 \text{ m}$ grid.

The magnetometer prospection on the area TUM23a (Fig. 14) lies right in the south of the Italian excavation house. It revealed very clear and sharp ground plans of houses probably of the Seleucid-period, typical features of workshops like kilns, walls, and roads. We found also large, monumental buildings ca. 40 x 60 m wide and other archaeological features. In the south-western part we excluded an old excavation trench but covered parts of the Agora. We will try to classify these findings by further analysis and data processing in the Munich lab by their shape, by their intensity and by their different remnant and induced magnetization.

By the measurement of the second



prospecting area TUM23b (Fig. 15) we aimed to test a tell-like plateau area which situates south of the football ground and the location of the old American excavation house to find further features beneath this area. Here we measured an area of 4 x 40m grids and covering ca. 0.8 ha. The results clearly reveal the traces of the former American excavation house, further pits which cannot be assigned to any archaeological or modern period and the possible border of the tell.

Measurement of the third prospecting area TUM23c (Fig. 16) aimed to complete the layout of the archive's squares and tries to find the limits in the southern border of the agora. Here we found a dense layout of buildings oriented as all the others towards the direction of the insula.

Measurement of the fourth prospecting area TUM23d (Fig. 17) lies west of Tell Umar and was heavily contaminated by magnetic rubbish and overgrown by bushes. Finally, our colleagues were able to prepare an area of ca. 65 x 30 m for prospection. Results were surprisingly positive about the detection of archaeological features. Two linear features cross the magnetogram image from northwest to southeast, in between of them some rectangular pits and walls. If this could be a part of the fortification or a gate cannot be solved by the magnetogram only and could be explained by future excavations.

By the measurement of the fifth prospecting area TUM23e (Fig. 18), we covered a tell-like hill elevation. Beside a linear feature in the southern part of the magnetogram which could be ascribed to a street and or simply to the southern border of the tell and some pits, it was nearly impossible to identify further ground maps of house constructions.

The geophysical results discussed above reveal several archaeological features that are concentrated on the select-

ed survey area. Almost all the features can be clearly identified as archaeological and some of them can be ascribed already to different archaeological periods. Besides of that, we clearly identified the layouts of insulae, mudbrick and baked brick buildings, probably from the Seleucid period as well as workshop areas. The shapes of some archaeological features are in general very variable and not very typical nor specific for an archaeological period – therefore we were not able to ascribe all these structures to a distinct date or archaeological layer apart from what is known from the archaeological survey results. Further interpretation work must be done in the laboratory after inserting and overlaying the magnetograms in a satellite or drone image of the site and combining the data with old excavation maps.

Endnotes

- 1-For all previous bibliography on American and Italian field research, see <https://www.centroscavitorino.it/siti-di-scavo/seleucia/>
- 2-Lanza, Mancini, Ratti 1972, 27-42.

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Figures



Fig. 1, Seleucia on the Tigris: general topographic map of the city



Fig. 2, Seleucia on the Tigris: Italian excavation at Tell Umar in the 1970s

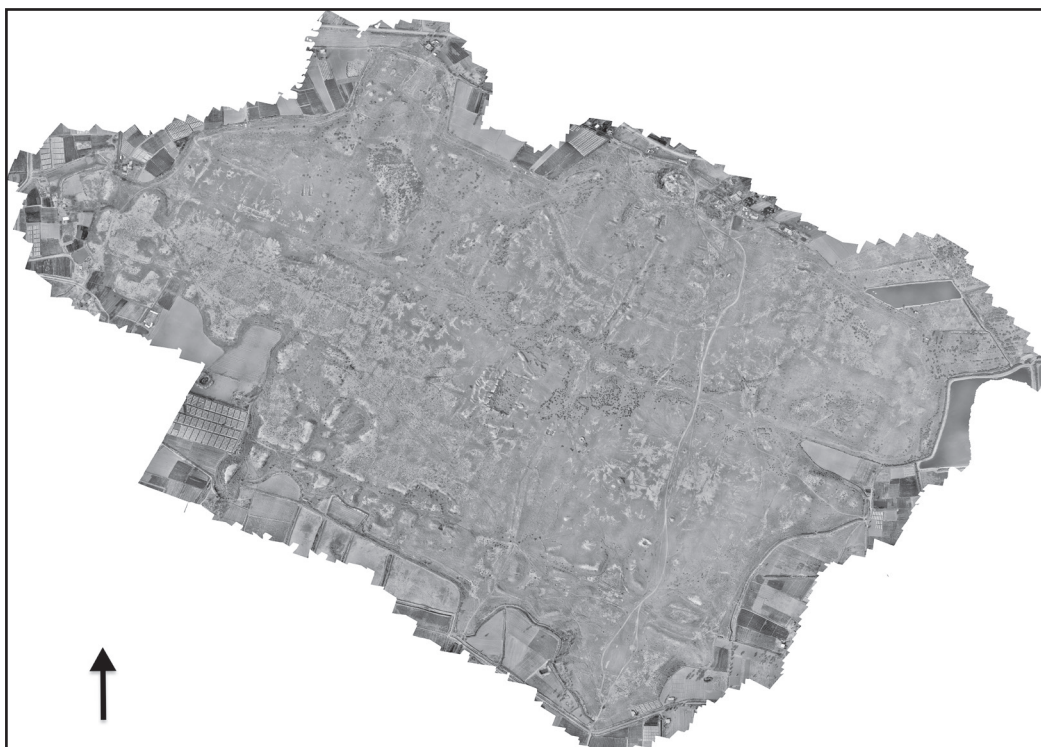


Fig. 3, Orthophoto mosaic of the site of Seleucia (November 2022)

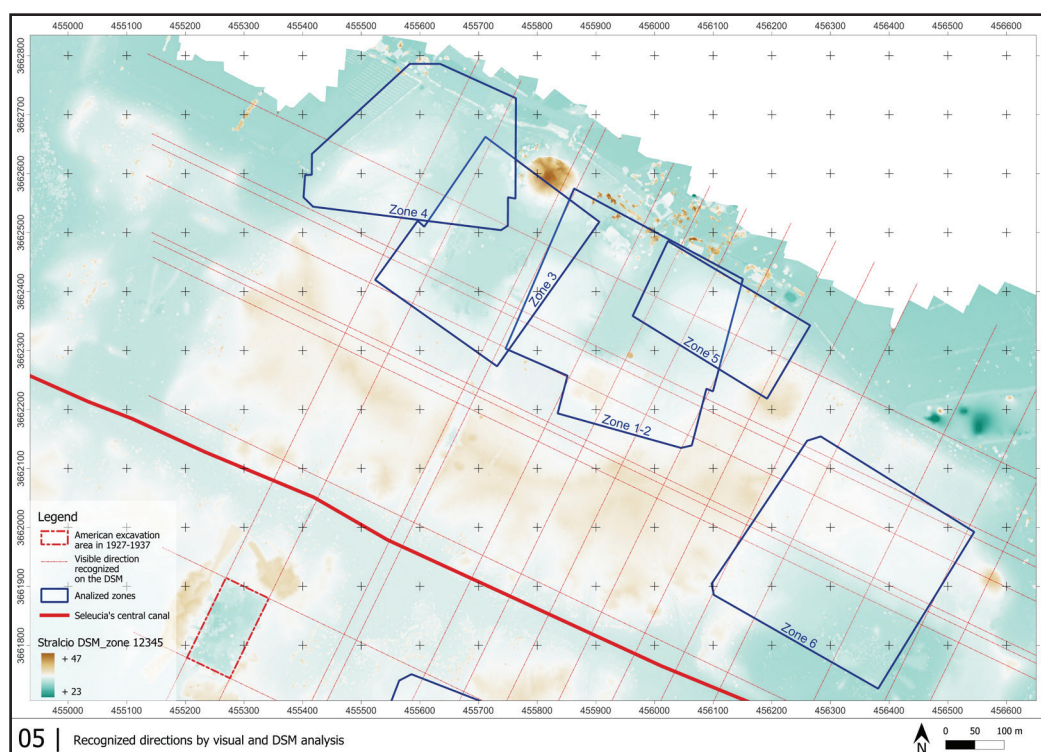


Fig. 4, Area of the northern part of Seleucia interested by multispectral flights (November 2022)



Fig. 5, Terrestrial Laser Scanning for documenting the vaulted tomb



Fig. 6, Seleucia on the Tigris: test trench 1 from above



Fig. 7, Seleucia on the Tigris: test trench 1, section E



Fig. 8, Seleucia on the Tigris: 3D model of the vaulted tomb in the
south half of the city



Fig. 9, Seleucia on the Tigris: drill-test

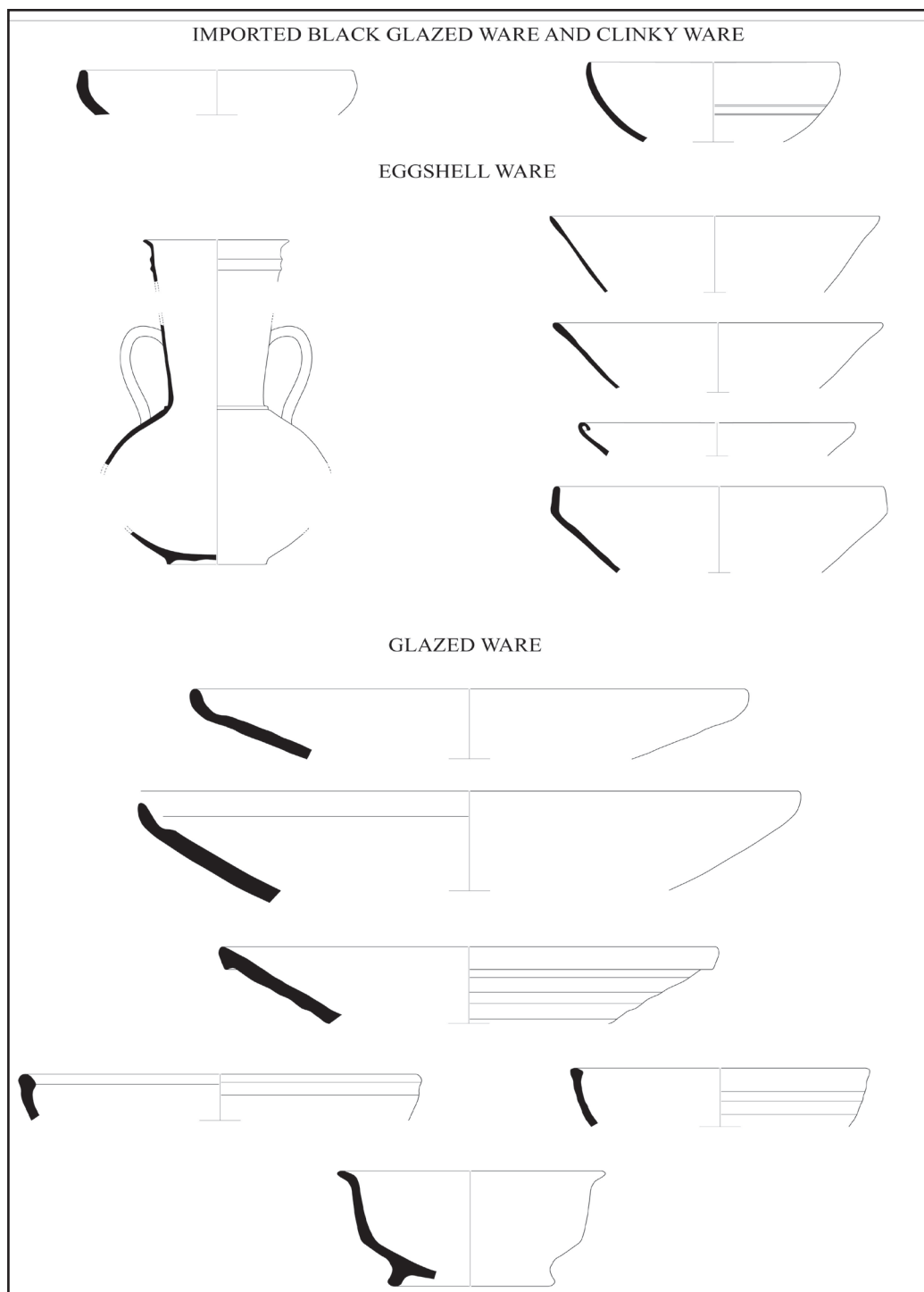


Fig. 10, Seleucia on the Tigris: pottery from Trench 1 (scale 1:3).

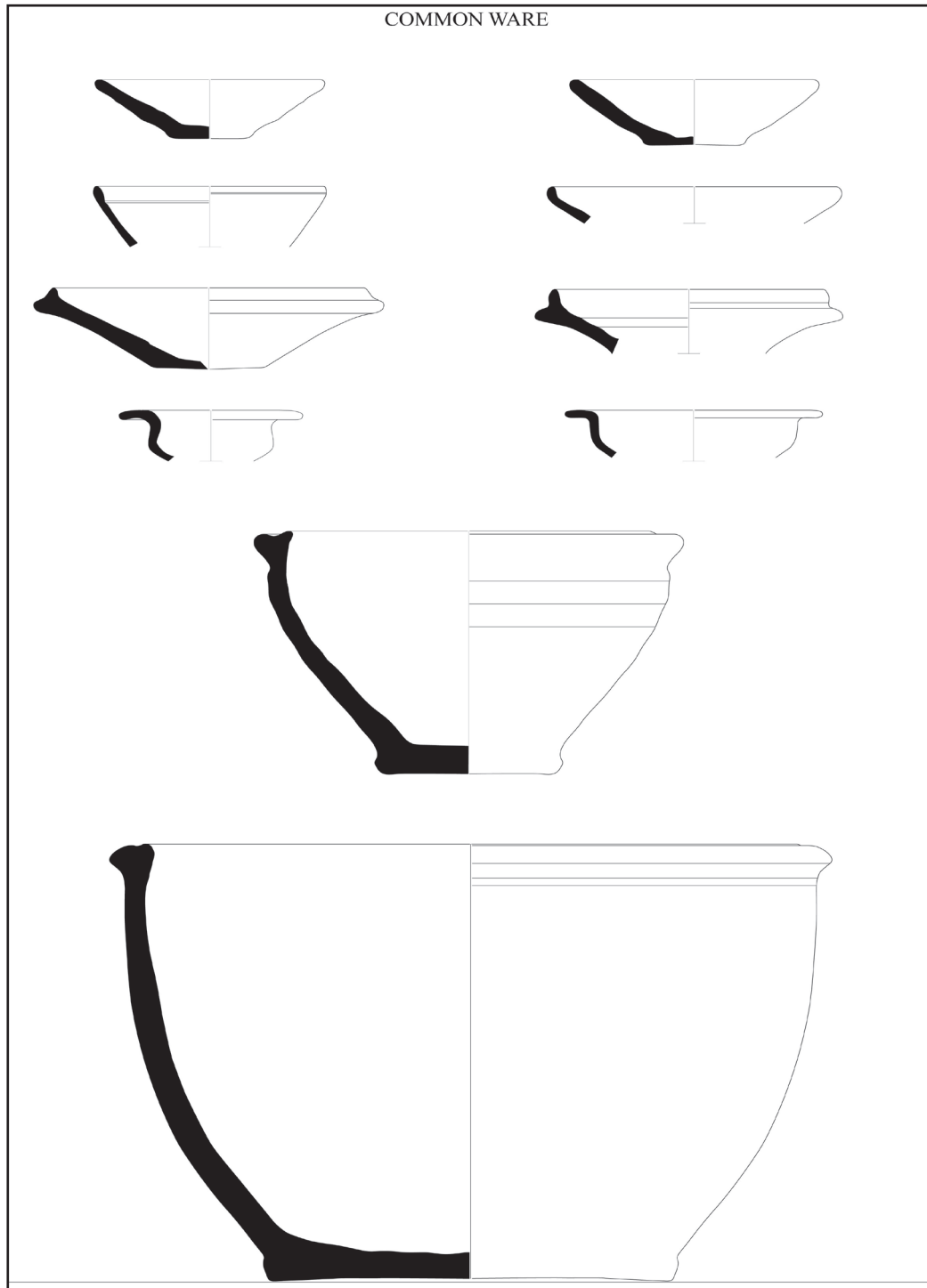


Fig. 11, Seleucia on the Tigris: pottery from Trench 1 (scale 1:3).

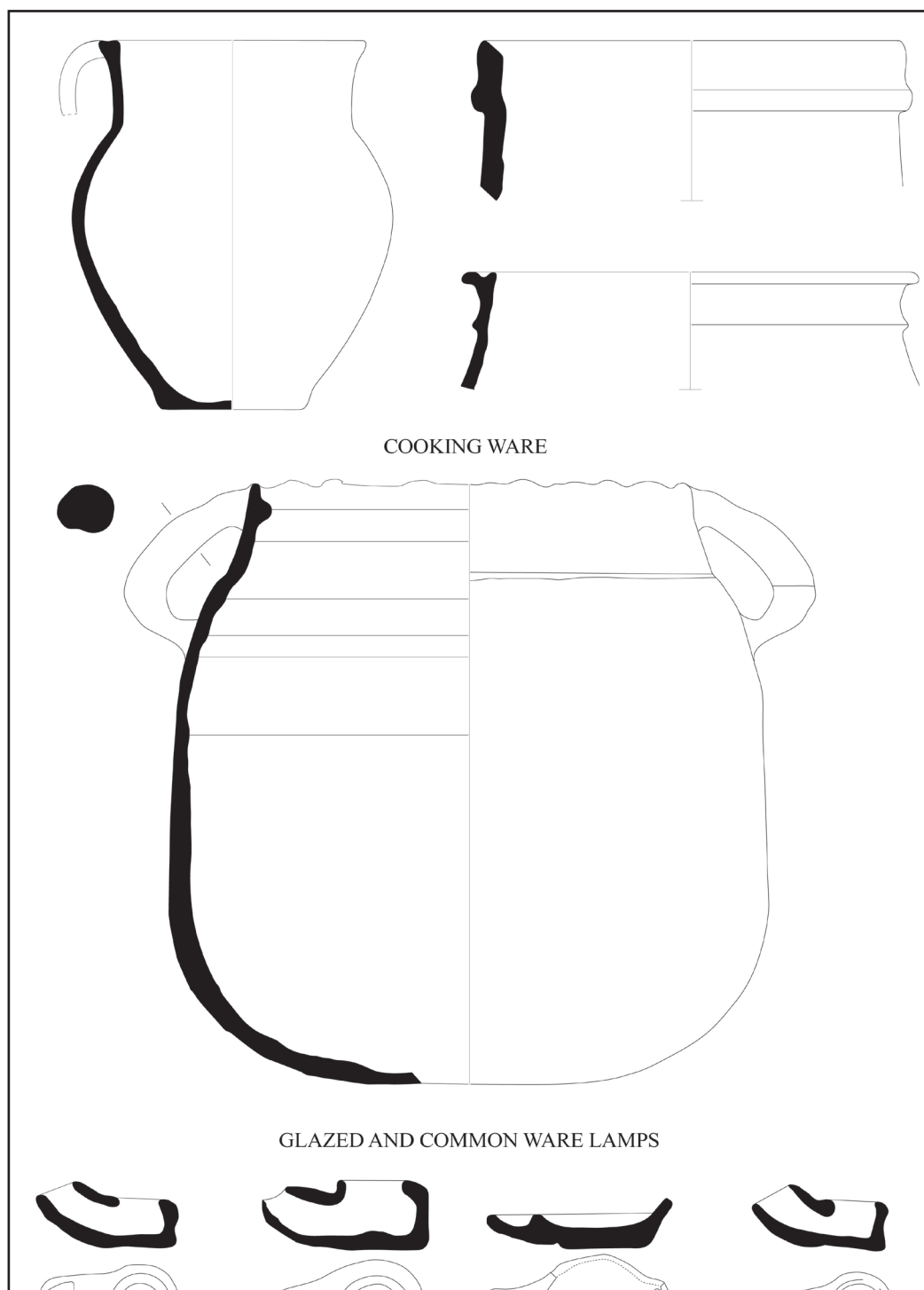


Fig. 12, Seleucia on the Tigris: pottery and lamps from Trench 1 (scale 1:3).



Fig. 13, Seleucia on the Tigris: areas in the northern half of the site magnetically scanned (April 2023)

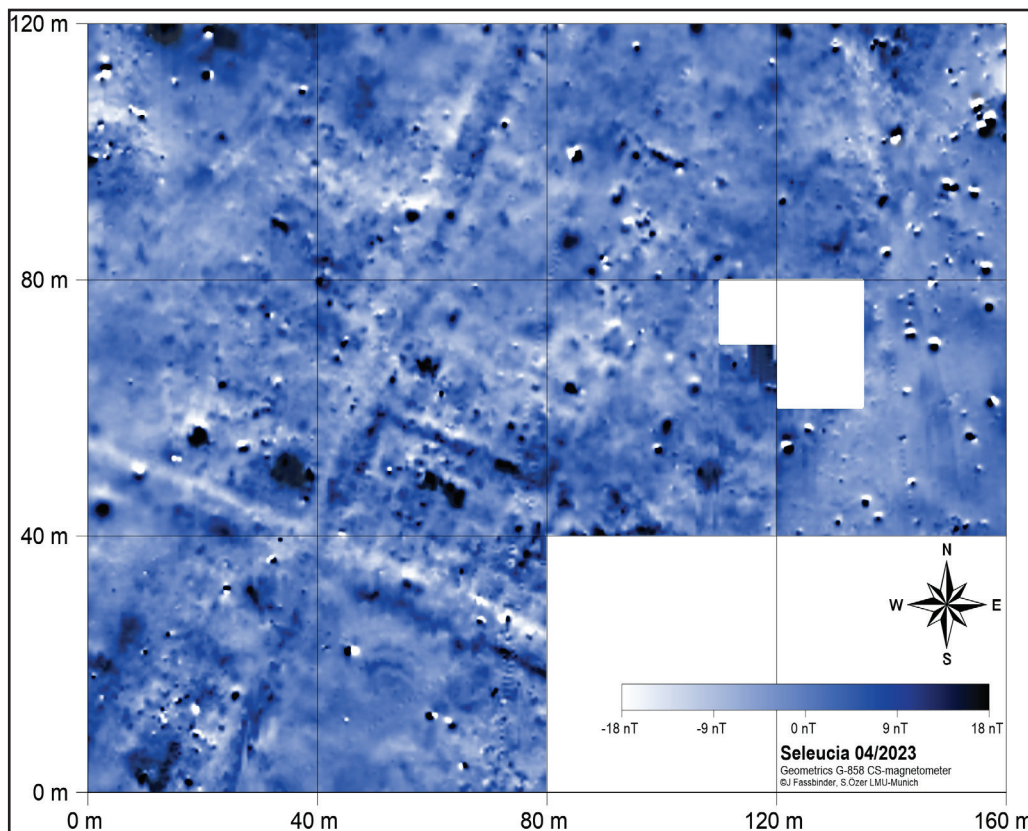


Fig. 14, Seleucia on the Tigris: magnetometer prospection on the area TUM23a

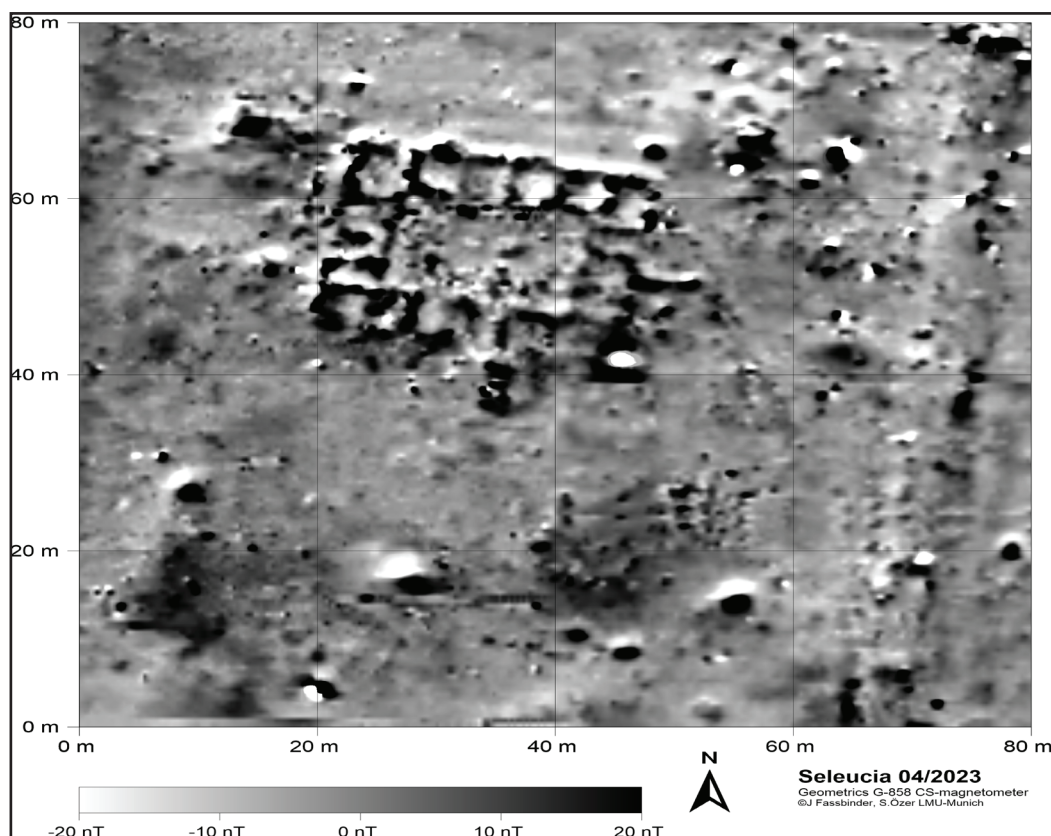


Fig. 15, Seleucia on the Tigris: magnetometer prospection on the area TUM23b

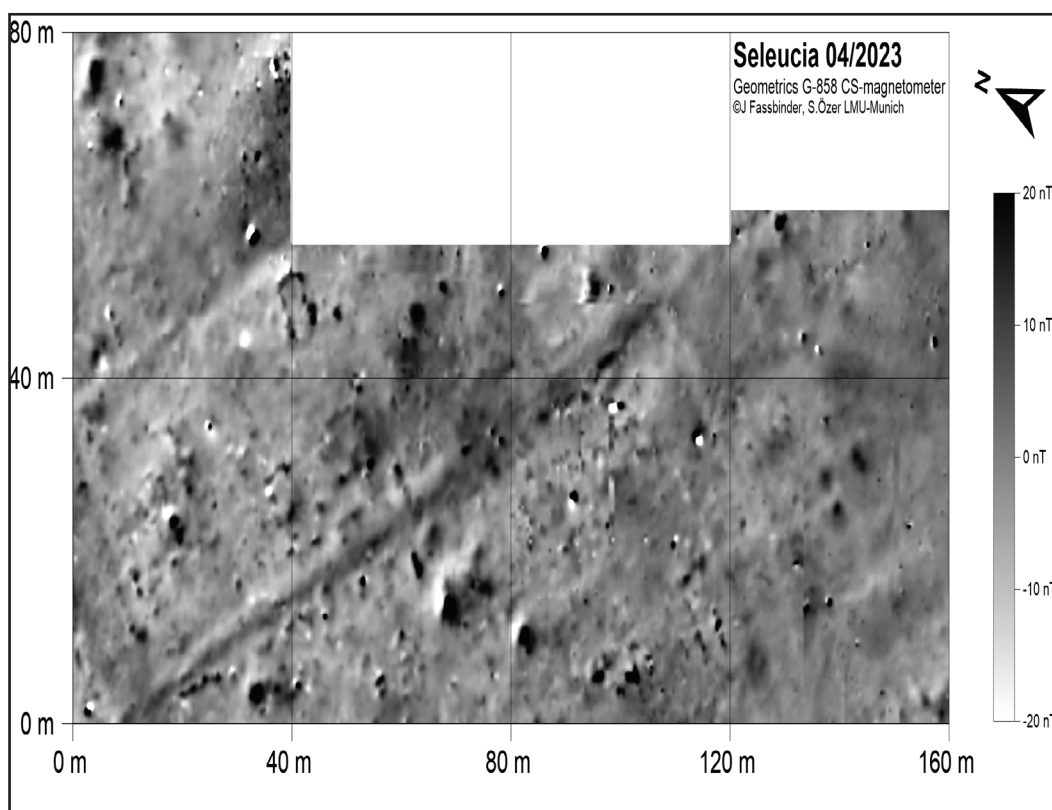


Fig. 16, Seleucia on the Tigris: magnetometer prospection on the area TUM23c

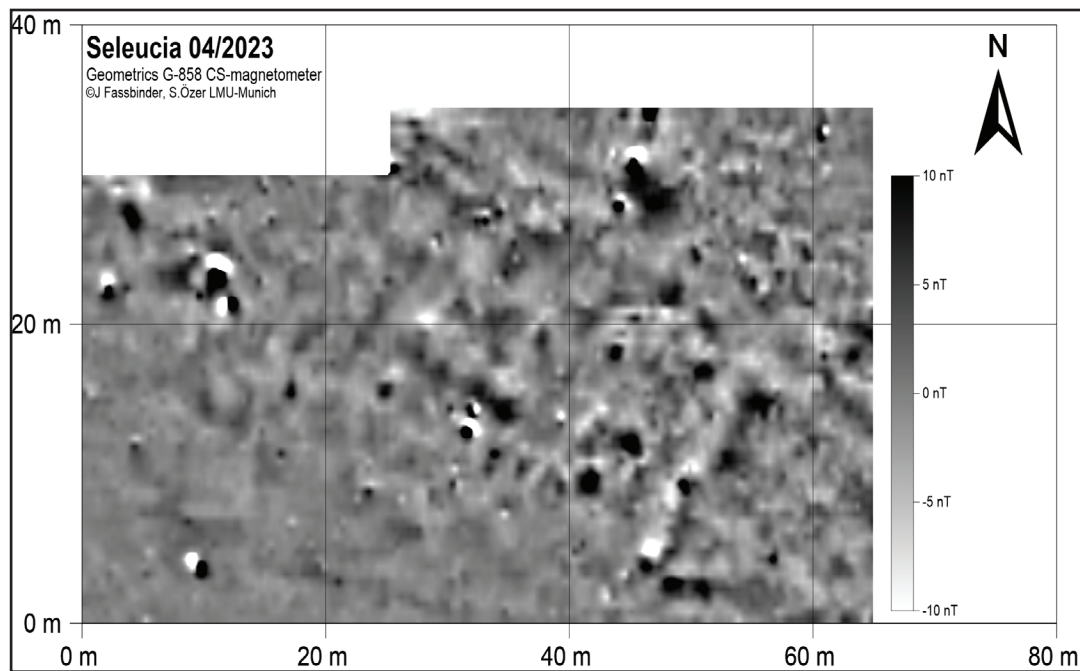


Fig. 17, Seleucia on the Tigris: magnetometer prospection on the area
TUM23d

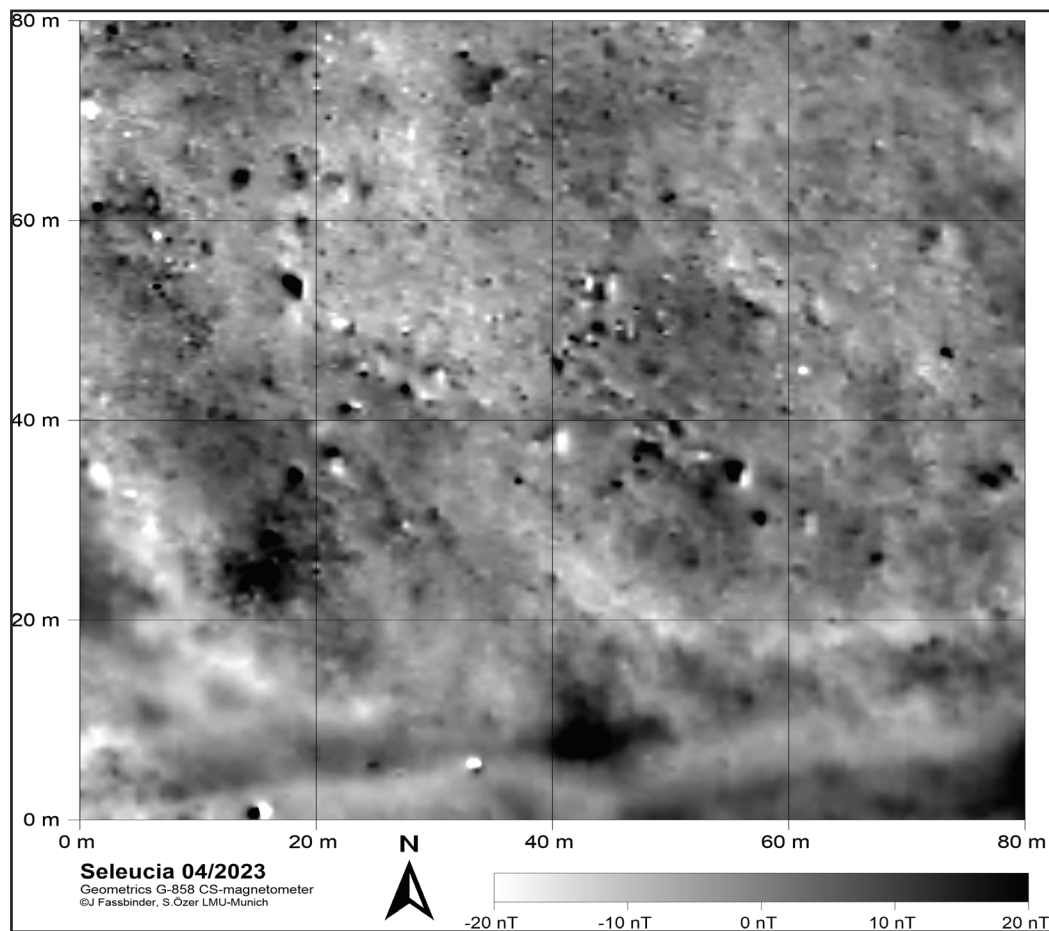


Fig. 18, Seleucia on the Tigris: magnetometer prospection on the area
TUM23e