Magoula Visviki revisited: comparing past excavations' data to recent geophysical research.

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Introduction.

Magoula Velestino 4 - Visviki is located on a flood plain at the foot of Mount Chalkodonion and to the south of Lake Karla, which used to be shallow resulting in various flooding episodes during the Neolithic but also in later periods. The magoula extends over an area of about 200x200m which is cultivated by cereals and corn. The site is to the west of the national road that connects Volos with Larissa. At the top of the magoula where most of the concentration of sherds is noticed, there is also a geodetic base of the Geographical Service of the Army. There are not any obvious architectural remains on the surface of the magoula. When surveyed for the first time in 1941, magoula Velestino4 – Visviki was reported to be about 7m in height and 200m in diameter (Alram-Stern, 2014a) -similar to what we notice even today-, which according to Johnson and Perles (2004) it is one of the smallest magoules of Thessaly.

Archaeological Background

Visviki Magoula belongs to one of the sites which have been excavated in 1941 by Hans Reinerth, head of the Department of Prehistory under the Special Task Force of Reichsleiter Rosenberg. The site has been first mentioned by Christos Tsountas (Tsountas 1908), but Reinerth's interest in the site probably goes back to the mapping of Neolithic Thessalian tells by Kimon Grundmann (Grundmann 1937). Following National Socialist ideology, aim of Reinerth's excavation was to prove the Nordic origin of Greek Neolithic culture (Benecke 1942).

From these excavations a comparatively rich documentation, including plans, profiles and photos, but also a large number of finds, including stone and bone tools as well as pottery have survived. According to the drawings, Reinerth excavated two deep soundings (trench A and B) (Fig. 1) at the Northern edge of the site as well as a grid excavation (area I) (Fig. 2) on the top of the tell. The excavations gave information on the history of the site.

Trench A produced a sequence of strata dating to the Early and Middle Neolithic period, followed by deposits and mud brick and stone walls dating to the Dimini phases of the Late Neolithic period (Fig. 1). In contrast, trench B produced irregular loam layers which were not connected to any architectural remains. The earliest pottery of this trench dates to the Earlier Late Neolithic Tsangli and Arapi phases and is connected to a steeply sloping clay layer which could represent a ditch dug into these Predimini layers. Furthermore, a sandy layer could originate in an unoccupied area outside the settlement. A stone setting came to light just below the surface. In contrast to the other excavated areas the

uppermost layers of this trench B produced substantial fragments of Brown on Cream Dimini pottery so that we should argue that architectural remains of this area possibly date to this final phase of the Late Neolithic period (C. Dürauer and E. Alram-Stern, in: Alram-Stern – Dousougli-Zachos forthcoming).

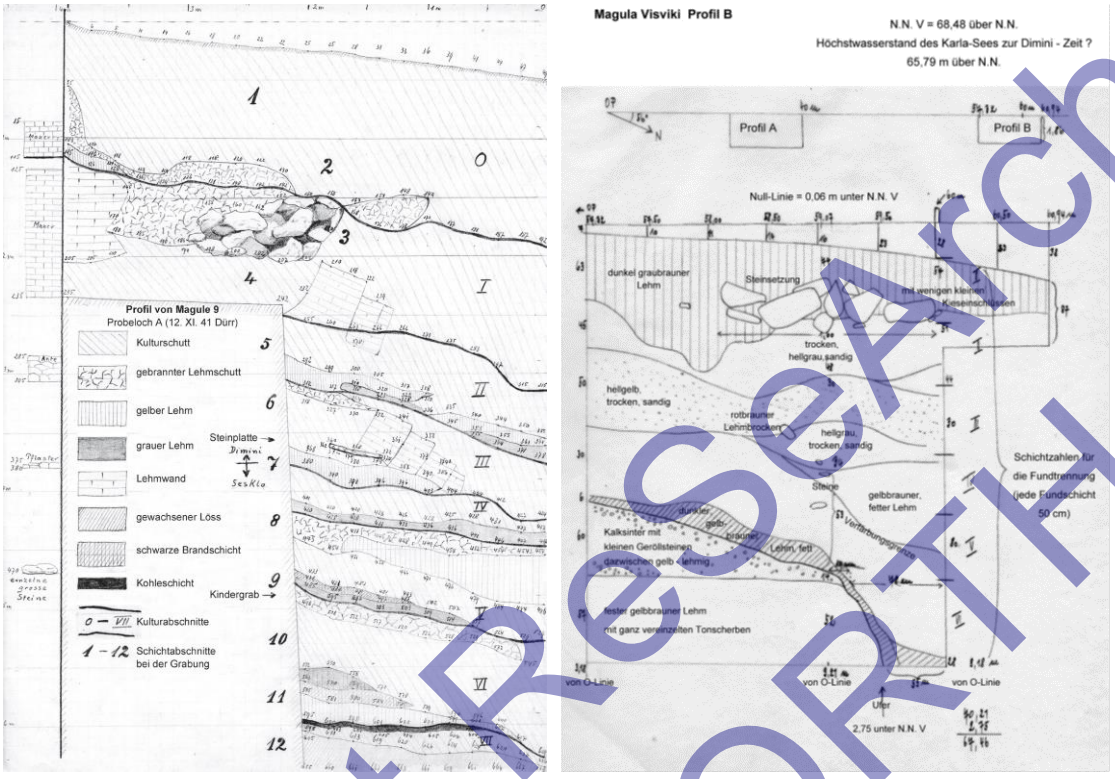

Figure 1: Section of Trench A (left) and Section of Trench B (right)

A simplified ground-plan of Area I has first been published in the "Völkischer Beobachter" (Benecke 1942) (Fig. 2). It consisted of a sequence of rooms ending in antae and a large hearth surrounded by four columns evoking a Mycenaean hearth room and therefore one of the earliest so-called megaron buildings. However, a detailed ground-plan found in 1990 (Hänsel 2001) as well as profiles show that the plan connected stone and mud brick walls most probably belonging to different architectural phases. The ground plan suggests that the remains possibly belong to a sequence of rooms as they are known from Late Neolithic Northern Aegean sites like Pefkakia Magoula and Dikili Tash (Koukouli-Chrysanthaki 1993: 68–75; Weisshaar 1989: 9–12; Andreou et. al. 1996: 546). Concerning a retrieval of the excavated remains we have to take into consideration, that according to a contract between the brothers Visviki and Reinerth all stone remains were removed after excavation. According to pottery, the architectural remains may date to the Arapi and Dimini phases, the small-sized rooms with mud brick walls possibly being earlier than the stone walls. However, the final phase of the Late Neolithic Dimini phase, proved in Trench B, is not at all well attested in this area. Major features connected to the house remains are a small oven of clay which was surrounded by an area of food preparation, a large oven with a number of spit supports as well as a round hearth (E. Alram-Stern, in: Alram-Stern – Dousougli-Zachos forthcoming).

The archaeozoological and archaeobotanical record specifies the existence of domestic ruminants, cattle and pig, constituting the main subsistence of the Neolithic population, surviving in a landscape cultivated with einkorn and emmer (A. Galik and F. Bertsch, in: Alram-Stern – Dousougli-Zachos forthcoming). From the pottery it should be argued that Visviki Magoula was mainly supplied with local production, but imports point to contacts with Dimini area, Tyrnavos area and eastern Thessaly

(A. Pentedeka, in: Alram-Stern – Dousougli-Zachos forthcoming) (Fig. 3). While obsidian and chipped stone tools were probably not produced on-site a spondylus ring production has been proven (A. Galik, in: in: Alram-Stern – Dousougli-Zachos forthcoming).

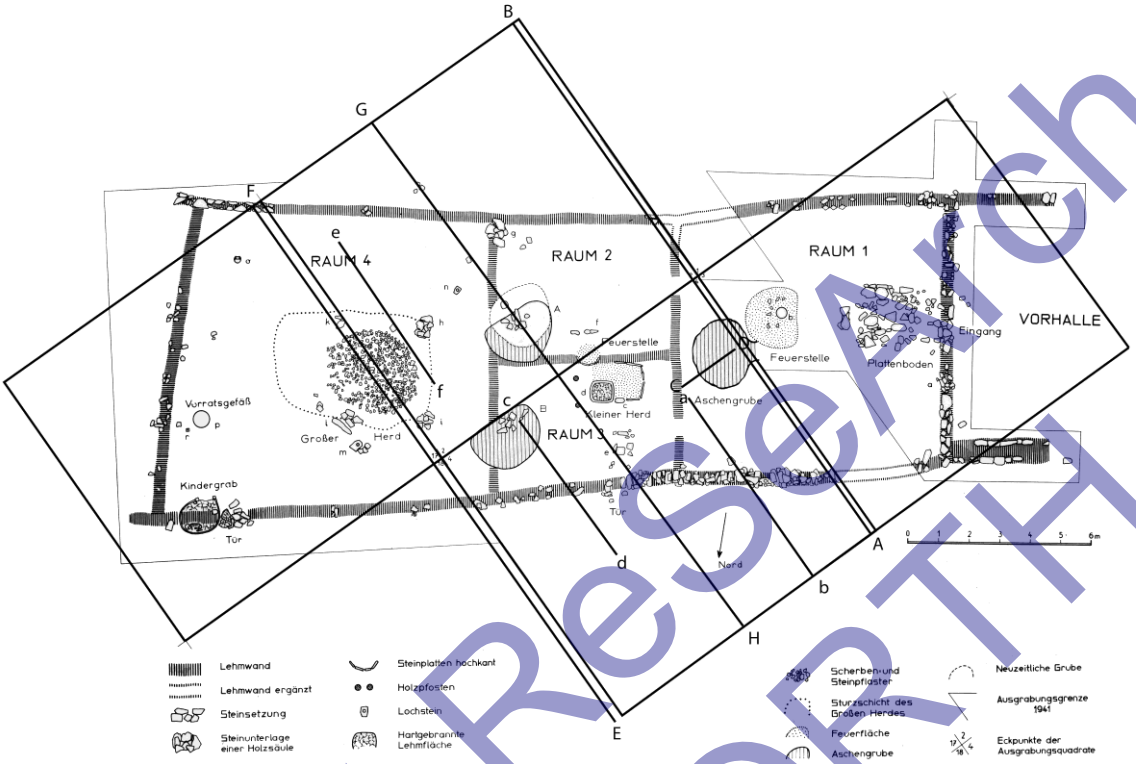

Figure 2: Plan of the "megaron" in Area I.

Years BCE	Chronological subdivision	Important contexts and typological subdivision	Major pottery wares
4500 4800	Late Neolithic II	Otzaki B/C - Dimini Otzaki A	• Brown on Cream • Incised • Black on Red • White on Red
5300	Late Neolithic I	Arapi Tsangli-Larissa	• Black on Red • White on Red • Arapi Polychrome • Arapi Bichrome • Brown on Buff • Black Burnished
5800	Middle Neolithic	Sesklo I-III	• Red on White • Red Monochrome
6500	Early Neolithic	Sesklo A-B Argissa	• Early Painted • Monochrome

Figure 3: Thessalian chronology and pottery wares (A. Pentedeka)

Satellite Remote Sensing & Historical Aerial Surveying

A GeoEye-1 image from 4 May 2010 was used for satellite remote sensing at Velestino 4 (Visviki). The satellite image has an off-nadir angle of 9.9° and a ground sampling distance (GSD) of 0.50 m (panchromatic) and 1.81 m (multispectral). In addition to the satellite imagery, an aerial photograph from 26 August 1960 was used with a scale of 1:15,000.

The environment around Velestino 4 (Visviki) is level agricultural land that rises gradually toward the west beyond the National Road (500 m away) and the town of Velestino (2.5 km away). The eastern topography rises more sharply toward the foothills of Mt. Pelion where there are a large quarry (1.2 km away) and military base (800 m away). Various streams, irrigation channels, and roads leading to Volos pocket the terrain. There are some modern constructions, including large industrial installations especially toward the south. Several other prehistoric settlements are located in the same area. These include Nikonanou (800 m to the northwest), Velestino 3 (Mati) (1.8 km to the west), and Magoula Bakalis (3.1 km to the southwest). Cultivation in the region is predominantly wheat and corn. There are also some olive and citrus orchards. Elevations around Velestino 4 (Visviki) range from 60-70 masl.

The local environment and land use around Velestino 4 (Visviki) have changed during the second half of the 20th century following intensive farming activities and industrialization. Field boundaries and field orientations are different in the 23 August 1960 aerial photograph than they appear in the 4 May 2010 GeoEye-1. During the 50 year interval, the landscape has been heavily altered to include industrial facilities, a military base, and the National Road. This activity has clearly affected the local environment around Velestino 4 (Visviki). Moreover, the 23 August 1960 aerial photograph documents streams and river beds that are no longer a part of the landscape (Figure 4). In 1960, two rivers passed 200-300 m from the prehistoric tell at the north and south. Now these rivers are covered over and the land has been converted for agricultural purposes. A smaller branch of the northern river appears to pass by the prehistoric tell at a distance of only 50 m.

Satellite remote sensing within a 1 km radius around Velestino 4 (Visviki) produced some interesting results. The majority of features correspond to palaeochannels associated with the rivers and streams that once pocketed the terrain. Palaeochannels that appear as soil and crop marks to the immediate north and south of the site were still rivers in the 23 August 1960 aerial photograph. Most of these are now agricultural fields with little evidence of past hydrological activity. Other anomalies relate to agricultural activity, such as former field divisions and plow lines. A third category of anomalies is unclassified. Surface anomalies in the satellite imagery and in various combinations of spectral filters indicate the outlines of the circular shape of the prehistoric tell. The evidence suggests that the mound is nearly 200 m in diameter. Vegetation stress and soil marks appear in true color (RGB) images, and define, in particular, what would appear to be a smaller circular feature around 60 m in diameter at the top part of the settlement.

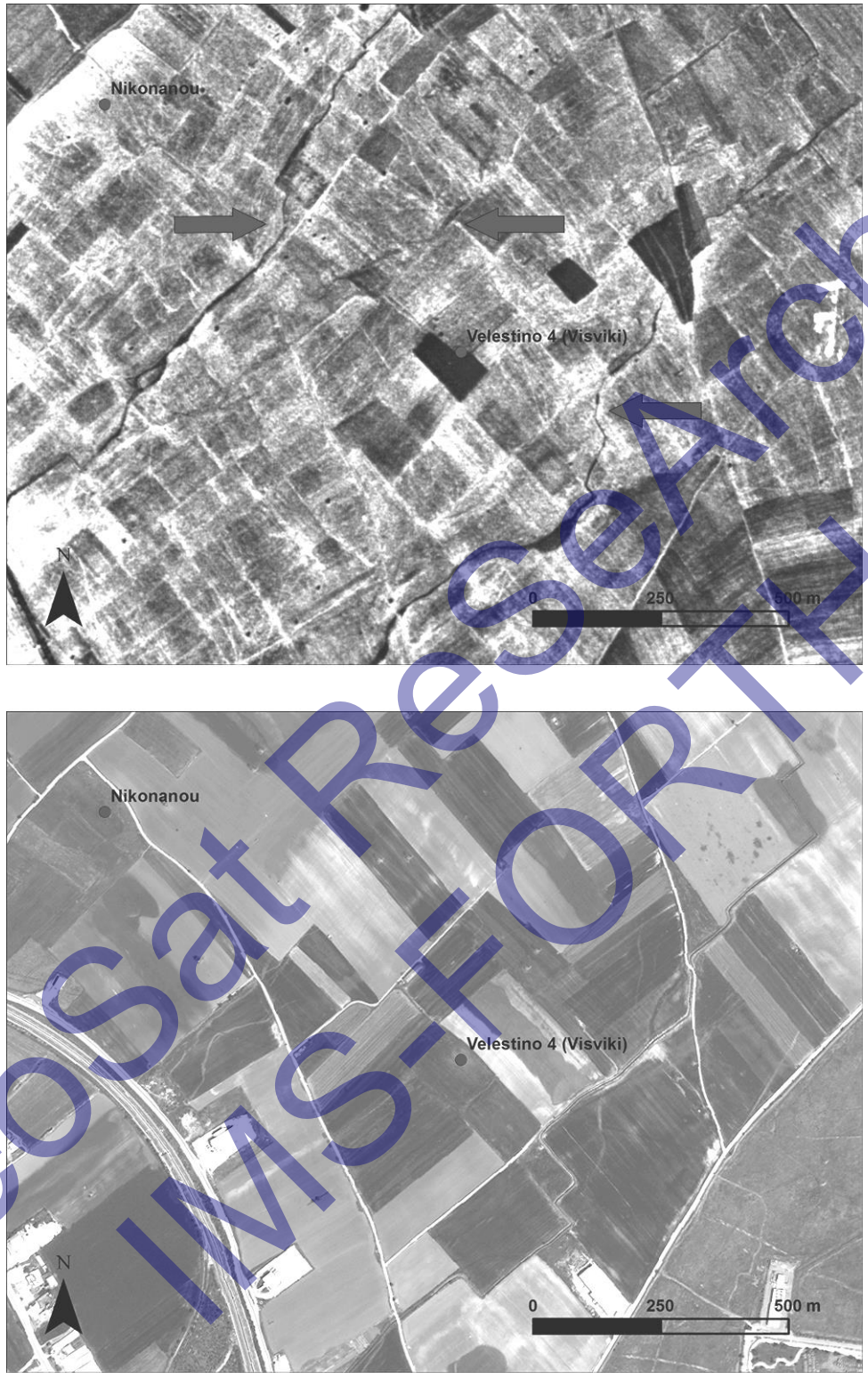

Figure 4. Comparison of the 26 August 1960 aerial photograph (top), and 4 May 2010 GeoEye-1 (bottom) around Velestino 4 (Visviki). The aerial photograph identifies several rivers and streams (arrows) that are no longer a part of the local topography by 2010

Geophysical Surveying

The geophysical survey at magoula Velestino 4 - Visviki was carried out by GeoSat ReSeArch Lab of IMS-FORTH using the SENSYS configuration for the measurement of the vertical magnetic gradient and two GPR systems, the Noggin Plus with a 250MHZ antenna and the MALA with a 400MHz antenna. The later one produced very noisy signals and it did not offer any useful information. In contrast, the Noggin Plus GPR verified the results of the magnetic survey that produced a detailed image of the plan of the magoula (Fig. 5). More specifically, the core habitation zone seems to be confined by an enclosure (A5) of oval shape having a diameter ranging from 70-80m. Within this area of about 4,500 square meters a few architectural remains are shown. The most extended on is a long compound (A28) consisting of various compartments at the NW side of the core habitation zone and very close to the inner enclosure. The dimensions of the compound are about 38mx9m and it is most probably the particular feature that has been identified with the megaron type building resulting from the German excavations of 1942. The intense magnetic signature of the outline of the compound suggests residues of burn mud brick and also hot targets within the rooms. In a close distance from the long house, two more architectural features (A29 and A30) are indicated, having a similar magnetic signature with the longhouse. With the exception of a small feature (A25), the center of the core habitation zone has been left empty reminding the central country yard in Dimini. This was also confirmed by the signals of the GPR survey which registered intense reflections from the area of the large compound at A28 mainly from a depth of about 90-100cm below the surface and no reflections at all from the central area of the magoula. A strong magnetic feature (A24) representing a smaller longhouse of dimensions 10.6mx6m is also evident to the opposite side within the enclosure. Two more vague anomalies are included within the inner enclosure: A26 and A27, the first being most probably associated to a structure and the second possibly representing residues of modern activities.

More enclosures are also noticed as we move outwards from the inner core of the magoula. There are at least two enclosures around the magoula and sections of them can be seen clearly at the magnetic traces A3, A4, A20, A21, A22, A23 and A32. A few more extended enclosures (A14 and A15) expand further to the north and NE, where the terrain is flatter with respect to the south. A two room (12.5mx6.5m) and a single room (3.5mx4.5m) structures (A17) are located between the probable ditches A14 and A32 towards the NE, and another candidate structure (A18) can be found inside ditch A15. At least three more structures (A7, A8 and A9) are located towards the SW, between the inner enclosure and the second enclosure in an area that may constitute one of the gates of the settlement. To the east, a rectangular structure (A10) of dimensions 9mx6m, together with some large dipole anomalies (probable pits, A11), seems to constitute another smaller habitation core, as there are signs of two almost concentric enclosures (5-12m apart) that run around the particular features to the north and east directions. The traces of these enclosures are lost as they project towards the center of the magoula, suggesting they probably belong to an earlier habitation phase than the one of the magoula itself.

Both clusters at A17 and at A10/A11 are located at the lower elevations of the terrain and it is possible that the accompanied enclosures of them (A14/A15 and A12/A13 respectively) acted as defensive constructions against flooding, as the simulation models have proven that the northern and western sides of the magoula are more susceptible to flooding. If we take into account that the habitation at these lower elevations at A10/A11 and A17, and even at A18, predates the occupation phase of the magoula, as it is suggested from the magnetic survey, it is logical to suggest that we notice a dispersed settlement in the earlier phase of occupation and a tendency of aggregation within the magoula in later phases.

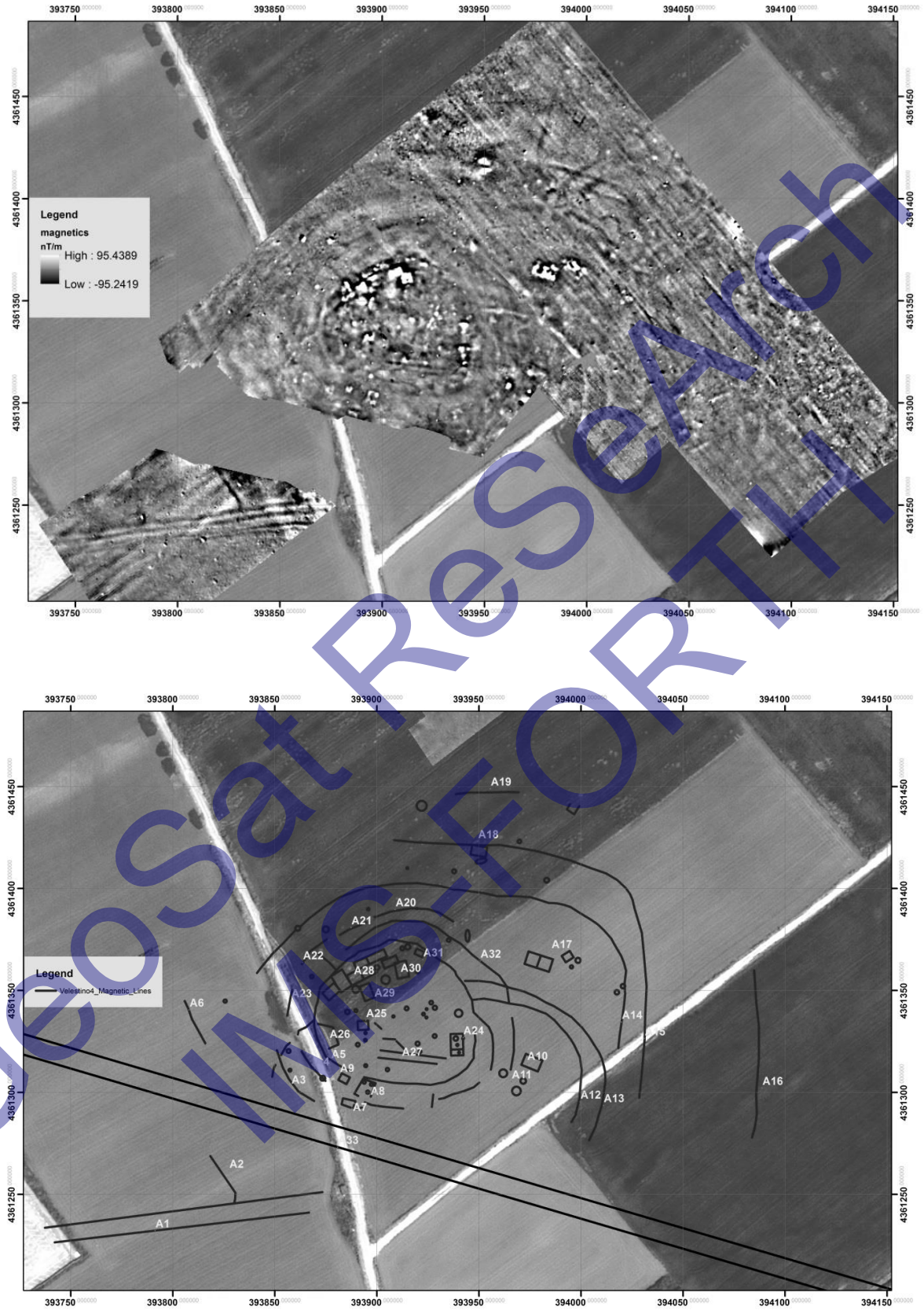

Figure 5. Resulting map of the high resolution magnetic data (up) and interpretation of the geophysical anomalies (down). The diagrammatic interpretation of data was based on the results arising from all the geophysical methods.

Finally, the large linear anomalies (A1, A2 and A33) which are located to the southern region of the magoula, are caused by recent human interventions. A33 is the most recent one and it is caused by the ditch that has been constructed for the water pipe network that leads towards the city of Volos.

Final Remarks

Despite the lack of detailed information and ground controlled points, the simplified plan of the long house, which was the only one depicted in the excavations together with the iso-elevation lines, was rectified based on the interpretation of the results of the magnetic (SENSYS multisensor configuration) and GPR surveys, though the matching of the orientation of the complex and taking in account its dimensions. The RMS error of the rectification was kept lower than 4m. It has to be mentioned that extended magnetic anomalies do not exist at the highest elevation point, and that if the results of the geophysical survey are compatible with the plan of the excavated long building, the trenches should not exist at the pre-mentioned distance from the highest elevation of the mound. Instead they should be located at a distance of about 20m and 46m correspondingly for trenches A and B from the longhouse (or 57m and 82m correspondingly from the highest elevation of the magoula).

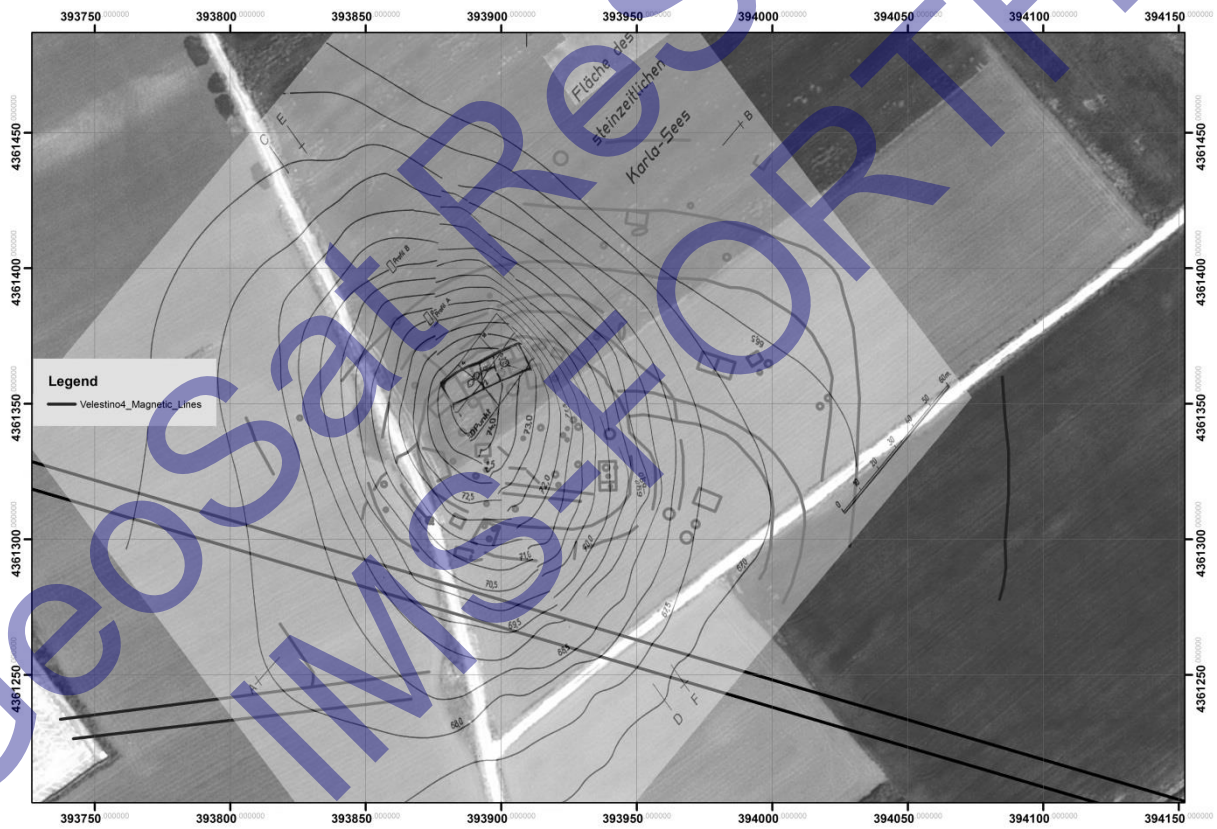

Figure 5. Registration of the old excavation plan in Area I with the topographic data and magnetic results.

In general, the geophysical data contributed in relocating the older excavation trenches and outlining the limits of the magoula itself through the definition of the enclosures which seem to have acted as a precaution measure against flooding episodes. The settlement shows evidence of a more dispersed occupation in the early phases of habitation which gradually concentrated within the top of the

magoula. Even within the core habitation zone most of the structures seem to be located around an empty central place and close to the inner enclosure.

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