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THE FIRST GEOPHYSICAL INVESTIGATIONS AT ASSERIA

Summary

The first geophysical investigations using geo-radar were performed in April and May 2005. The aim was to detect solid underground elements, such as walls and other remains of architectural structures, and to map them systematically. As this is a site with a surface area of almost 8 hectares (80,000 m^2), the possibility of mapping and studying the architecture or architectural phases prior to archaeological procedures seemed highly useful and rational.

Such non-destructive geophysical methods have been successfully applied to the present at sites of these dimensions (and importance) in the majority of technologically advanced countries. The English, in particular, have been at the forefront of pioneers in utilizing geophysical methods in archaeology. In some cases three-dimensional models have been computer generated on the basis of the geophysical research before excavation, which greatly increases the attractiveness of presentation of the site and further enables better orientation and comprehension in the actual excavations.

As is indicated by the experiences of our predecessors in the application of geophysical methodology to archaeology, it is most important to establish a suitable geophysical method. This decision depends on the pedological and geomorphological features of each individual terrain. The application of several methods also enables their mutual verification and the correlation of results, as well as a better specification of structures and other phenomena underground.

Experimental investigation

The first visit to the site at the end of April 2005 was used to survey the profiles of the archaeological trenches in order to establish the type and composition of the soil as the first prerequisite for application of any geophysical method. The soil is a quite loose sandy humus, with quite a lot of limestone (10-40%) ranging in dimensions from 1 to 100 cm, which represent the surface remains of architecture recycled and fragmented throughout the centuries /Fig. 1/.

On that occasion, a total of 120 meters of radar profiles were measured at various places within the walls /Fig. 2/. We used the geo-radar Sir 2 of the American GSSI firm and an antenna of 400 MHz. The time window or period of recording radar samples of 40 nanoseconds (ns) corresponds to a depth of 2.5 to 3.5 m, and this range was confirmed by the hyperbola analysis.

Under ideal conditions, the depth of measurement with such specifications is 4-5 meters, while in media with increased clay or granite, the depth is around 1.5 m. The results showed the adequacy of the methodology and the likelihood of successful research. Profiles 187 and 188 exhibited several vertical solid structures, which we interpret as the remnants of walls or similar architectural remains /Fig. 3/.

Trench 1

At the beginning of May, we began systematic investigation. Trench 1 was placed in the immediate vicinity of the northeastern gate alongside the archaeological trench /Fig. 4/. The dimensions of the trench, adapted to the configuration of the terrain, were 13 x 7.5 m. Sixteen parallel profiles were measured in a length 13 m, with an interval of 0.5 m. The time window was 40 ns. The profiles were processed in the GPR Process program, which enables the generation of plan sectors (Z – slices) at specified depths /Fig. 5/. The time window of 40 ns was converted into a depth measuring around 240 cm and divided into 16 plan sectors; each 2.5 ns.

Tracing the sequence of plans from the surface downward, it was possible to see a certain grouping of solid material in the first three plans /Fig. 6 and 7/. This phenomenon appeared to a depth of approximately 50 cm. This probably represents the stone remains of architecture destroyed through the course of time. Only on plan 7 and deeper were there

more clearly visible linear remains of solid material that indicates a possible anthropogenic origin.

Through inspection of individual profiles it was noted that these phenomena stand almost perpendicularly, and hence it is probable that they remain in their original position, that they are "in situ". Such a condition represents a quite typical archaeological situation, where the majority of elements – structures or their walls – collapse to a lesser or greater extent over time, while the foundations are preserved. Depending on the dynamics of the pedological and climatic processes, occasionally a certain extent of the above ground construction of a given structure can be preserved. As can be seen /Fig. 8/, remains of walls and foundations were preserved in some places in trench 1 to a height of between 1 and 1.5 meters.

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The application of geo-radar at Asseria has proven suitable, and the results indicate the presence of architectural remains. The geo-radar trench placed in the vicinity of the archaeological (excavation) trench confirmed almost exactly the same stratigraphic relations and depths at which walls were discovered through excavation. The necessary depth correction as well as full confirmation of these results will be made possible by excavating a small test trench at a particular spot precisely defined according to the map resulting from the geophysical investigations.

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