GEOPHYSICAL INVESTIGATIONS IN THE SALSOVIA SUBMERGED ARCHAEOLOGICAL SITE

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Abstract
We carried out magnetometric and resistivity measurements in the Salsovia archaeological site, located in the Dobrogea region of Romania. We analyzed the results to see if we could find the orientation of the walls or any other evidence of a former human presence within a limited area submerged beneath the Danube River. We showed the estimated depth of the site and the possible orientation of a wall.

Introduction
The fortress at Salsovia functioned as a military camp in the first half of the III century A.D. (Antonini Itinerary and Tabula Peutingeriana), and later it was an annex to the Romanian Military Legions. To the south of the fortress, on a linear plateau, there was a civil settlement deployed from three parts of natural valleys with steep banks in the Roman era. The castrum was probably destroyed in the time of Valens. Occupation resumed near the fortress in the early feudal period (after the probable destruction of the castrum in the time of Valens) as a rural settlement was developed based on the testimony of recovered coins dating to the 11th to 19 th centuries.

Figure 1. Photograph of the Salsovia area for the Salsovia area, Romania, showing the remains of the ancient city

Description of the analyzed magnetic field data

The magnetic data was acquired on the water (Danube River) within the submerged zone using marine equipment designed for that purpose (G822 device with cesium)with a gradient array (Fig. 2). The area of investigation was 100 by 50 meters, and it was located in the NW part of the site, having a grid density of 10 by 10 meters.

Figure 2. Photograph showing the device used for data acquisition and also the submerged area that was investigated.

Analysis of the electrometric data

The resistivity measurements were done with an AGI superSting resistivity meter. We planned to acquire profile, but due to bad weather conditions, only two were done (Georgescu and Gavrilă, 1989). The profiles had a length of 50 meters and a depth of 6 m, and they were obtained using the vertical electrical profiling (VSP) method with a Schlumberger array (Radulescu et al., 2006). The vsp points were located 10 m apart, the MN distance was 2 meters, and the AB distance started at 2 meters, then it was enlarged by 4 meters each time until it reached 12 m during the course of the measurements (Fig. 3).

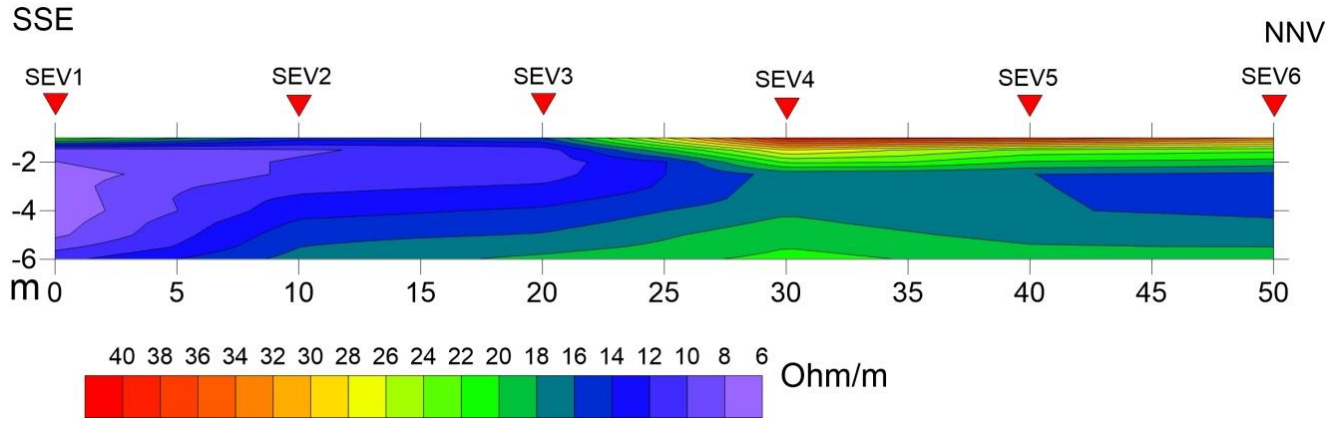

Figure 3. Apparent resistivity section.

Analysis of the magnetic data

The resultant magnetic gradient map (obtained using Oasis montaj) can be seen in Figure 4. The grid values are in meters and the anomaly values are displayed in the color legend bar in nT. We observe the first positive anomaly near the negative anomaly that is located in the southern part of the area. This anomaly correlates well with the existing city remains because it is a continuation of Fig. 1 and indicates a continuation of the wall. Modeling using PotentQ (Fig. 5) has also shown a buried structure that can be approximated to the remains of a wall (Buselli et al., 1990).

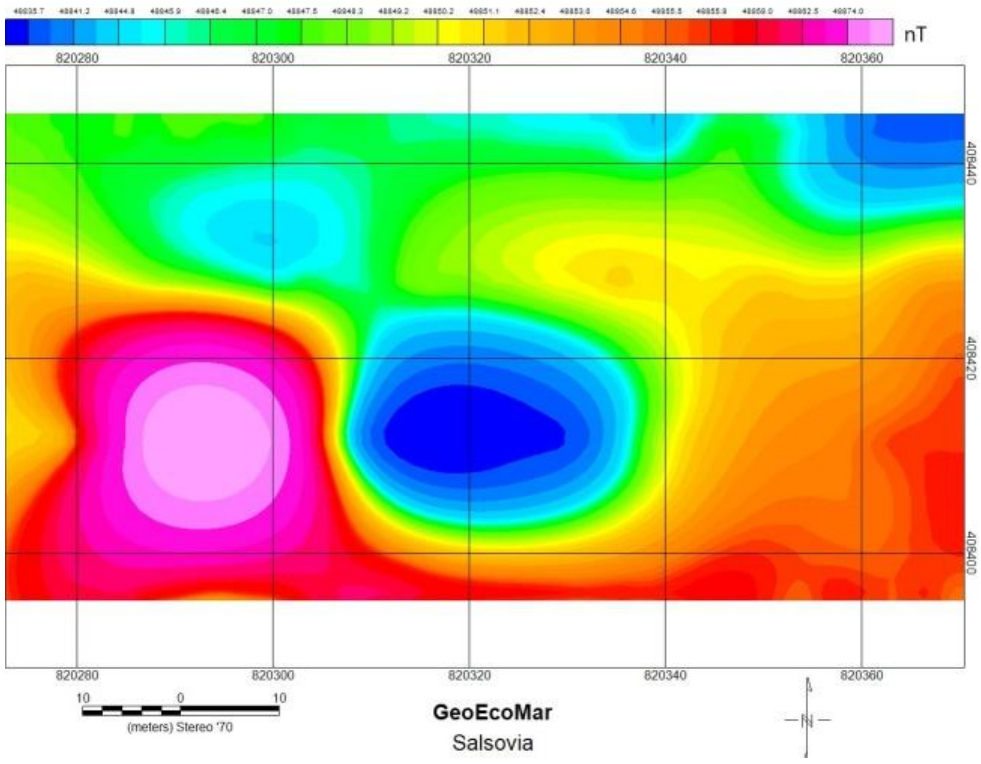

Figure 4. Magnetic gradient anomaly map;

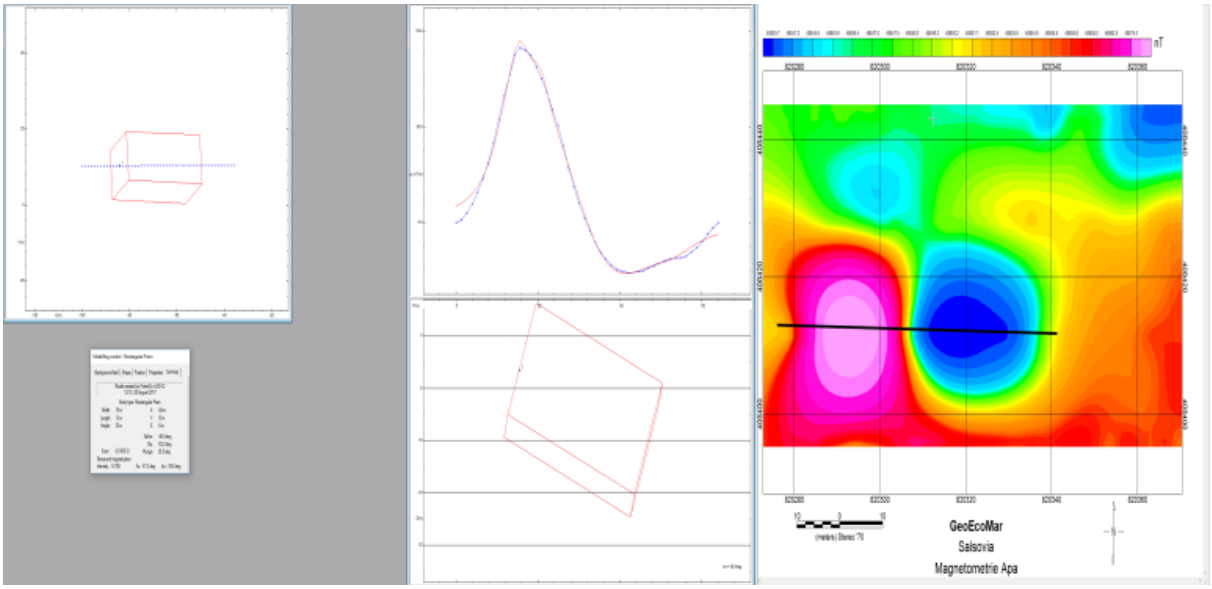

Figure 5. The model magnetic anomaly and the resultant buried wall

Conclusions

Magnetic measurements were carried out within a submerged area of the Salsovia archaeological site. After the data analysis, we have established the most probable orientation of a buried wall and created an hypothesis that requires more investigation to explore its validity. We also established the depth of the site and the fact that the VSP investigations need to be redone with a shallower depth as target (Project nr.16450502/2017).

References

Buselli, G., Barber, C., Davis, G.B., and Salama, R.B., 1990. Detection of groundwater contamination near waste disposal sites with transient electromagnetic and electrical methods. *Geotechnical and Environmental Geophysics* 2: 27-40.

Georgescu, P., and Gavrilă, I., 1989. Influence of electrical prospecting arrangement on apparent resistivity anomalies. *Revue Roumaine de Géologie, Géophysique, et de Géographie, série de Géophysique* 33, 1.

Rădulescu, V., Rădulescu, F., and Stan, I., 2006. Geoelectrical measurements applied to the assessment of groundwater quality. *Geo-Eco-Marina* 12: 107-110.