

## ARCHAEO - GEOPHYSICAL INVESTIGATIONS IN THE TROESMIS SITE

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### Abstract

We carried out magnetometric and resistivity measurements in the Troesmis archaeological site in the Dobrogea region, Romania. We analyzed the results to see if we could find the orientation of the walls or any other ancient civilization structures in a limited area. We showed the estimated depth of the site and a possible orientation of an wall.

### Introduction

The history of the site (Figure 1 a, b) is marked by wars. The first historical information about this site mentioned that the ancient city was taken from the Gets and give to the Thracians by Pomponius Flaccus. Around the year 100 the war with the Dacians began and the control of the city was taken by the 5<sup>th</sup> Macedonian Legion. In the 2<sup>nd</sup> century it is confirmed the presence of two communities (Canabenses and Troesmienses) that merged later on. After the Romans leaved Dacia (approx. 274) the city began to decline because it lies at the crossing of roads that connected Northern Europe with Asia and Middle East. During Ottoman rule the walls and other less important ruins were demolished and in 1860 the frenchmen Desire More started exploiting the stone of the ruins.



Figure 1: a. Topographic map for the Troesmis area, Romania, showing the rests of the ancient city; b. Image showing the outcrops of the city. Source map: Google Earth

### Description of the analyzed field data

The magnetic data was acquired using a Geometrics G-856 (a Proton Precession Magnetometer) device with a gradient (Figure 2) array, the investigated area is 18 by 18 meters and it is located in the north-western part of the site (in the continuation of Figure 1b) having a grid density of 1 by 1 meter.

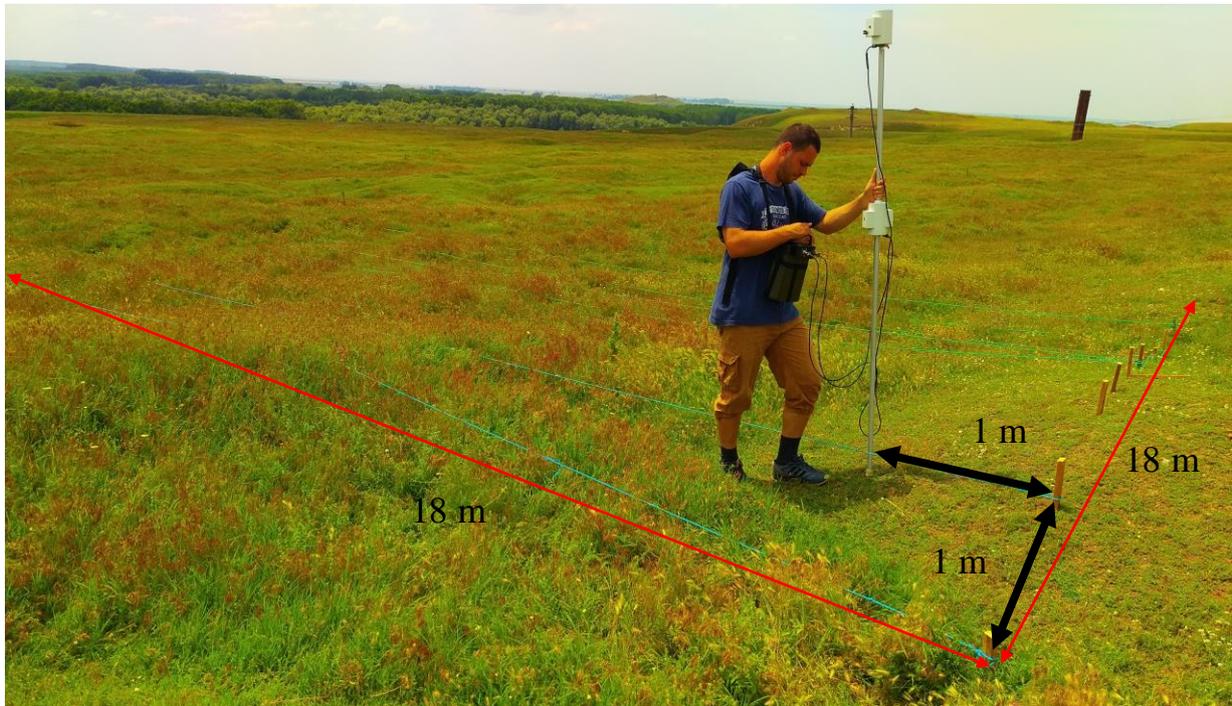


Figure 2: Image showing the device used for the data acquisition and the investigated area with the gridding spacing

The resistivity measurements were done with an Intel 91 Resistivitmeter (Figure 2). It was projected to acquire three survey lines but due to the bad weather conditions only two were done. The profile have a length of 18 meters and a depth of 16 m, they were realized using the vertical electrical sounding (VES) method with a Schlumberger array. The VES points are located 6 m apart, the MN distance was 2 meters and the AB distance started at 4 meters and during the measurements it grow with a 4 meters step until it reached 32 meters.



Figure 3: Resistivity device used for the data acquisition and the investigated survey line

## Analysis of 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 displayed in the color legend bare are in nT. We can observe the first positive anomaly that it is located in the northern part of the area; the anomaly correlates well with the existing city remains because it is in the continuation of Figure 1b indicating a prolongation of the wall. Modeling using PotentQ (Figure 5) has shown also a body that can be approximated to the remains of a wall.

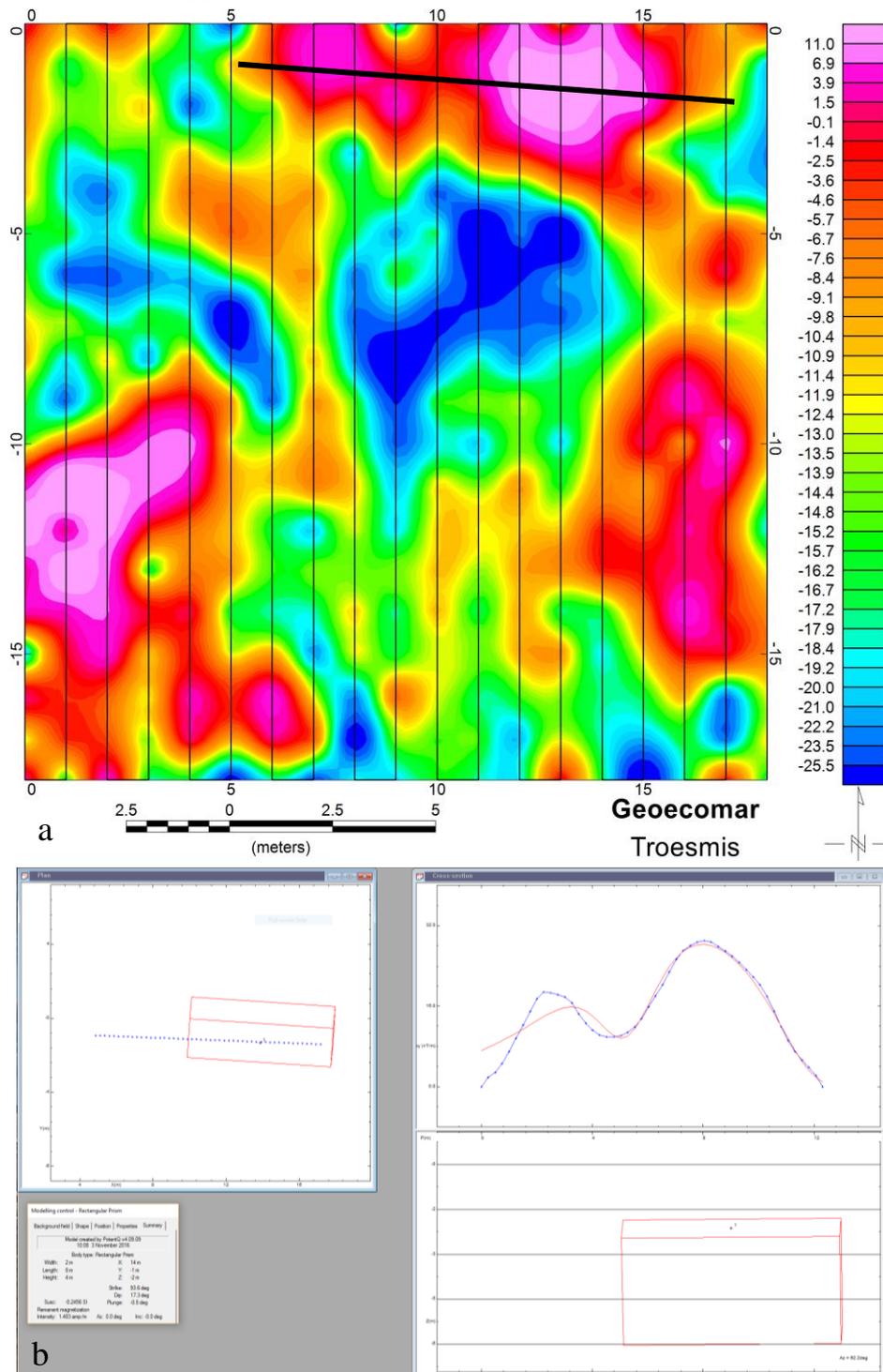


Figure 4: a: Magnetic gradient anomaly map; black line is showing the area where the modeling using PotentQ was done; b: the modeling of magnetic anomaly and the resulted body

The second two anomalies are located in the eastern and western parts of the area between the meters -10 and -15. In the central part of the map we can observe a low magnetic anomaly; if we relate this low anomaly with the high anomalies presented before we could say that this is a room, but until future proof this will remain only an hypothesis .

The apparent resistivity measurements are displayed in Figure 5: first profile (P1) is shown in figure a and in b it is displayed the second profile (P2), the red arrows are indicating the position of the VES stations and the values of the color legend bar are in  $\Omega/m$ . We can observe that the foundations of the ancient city extends until a depth of approximately 5-6 meters, also the highest anomaly values can be observed around the third VES measuring point on both profiles.

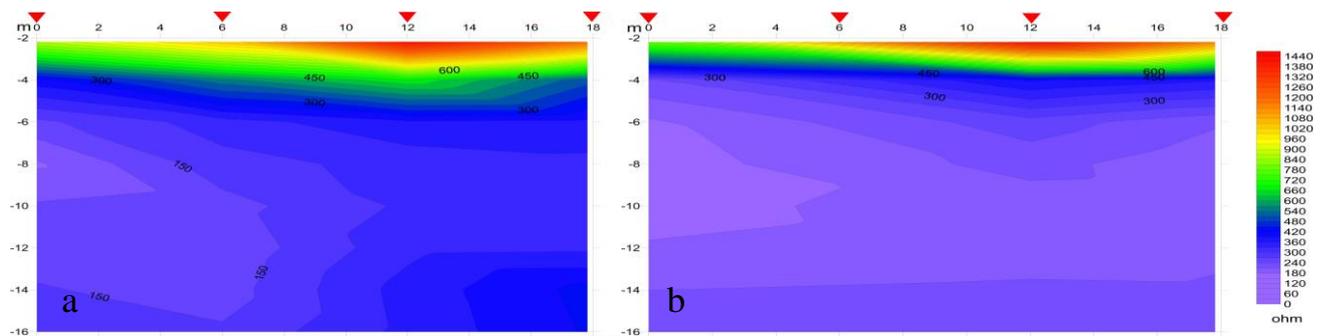


Figure 5: Apparent resistivity sections for P1 (a) and P2 (b)

## Conclusions

Magnetic and resistivity measurements were carried out in the Troesmis archaeological site. After the data analysis we have established the most probable orientation of the wall and offered an hypothesis that requires more future investigation.

We also established the extension depth of the site and the fact that the VES investigations need to be repeated with a shallower depth as target.

## References

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