

Magnetic survey on Neolithic site Vinča

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An archaeological site of the Neolithic culture of Belo Brdo (White Hill) is situated on the right bank of the Danube River in the village of Vinča, 14 km downstream from Belgrade. It was first discovered in 1908 by the Serbian archaeologist Miloje Vasić (Vasić, 1932). Since then, with several interruptions, numerous archaeological excavations have been carried out.

The last campaign was finished a few years ago (1998–2009). Vinča-Belo Brdo was introduced into the treasury of world heritage as an object of prehistoric cultures. It is almost entirely made up of the remains of a human settlement and was occupied several times from the Early Neolithic (ca. 5000 BC) through to the medieval period (Nikolić & Vuković 2008; Srejović & Tasić 1990). Serbian Government warranted it the highest level of state protection and classifies it as an archaeological site of exceptional importance. Today, Vinča has the status of Archaeological Park. Unfortunately the site has received no appropriate treatment in practice.

Protected area is much smaller than real area where people from that time have lived and have leaved artifacts. Archaeological remains are covered with present village and infrastructures (roads, houses, cables, pipes etc., see Fig. 1.). Use of magnetometer survey was test in this unfriendly environment for magnetic survey.



Fig. 1.: Location of research area (maps.google.com)

Detecting a concentration of burned objects (fireplaces, kilns, fired clay) by magnetic measurements is one of the best known archaeogeophysical applications (Breiner, 1973).

The magnetic measurements were made using an Overhauser GSM-19W proton magnetometer with an absolute accuracy of ± 0.1 (nT), resolution of 0.01 (nT) and sampling interval of 0.5 (s). We use gradient walk mode, for collecting data, without GPS (Global Position System). We measured data on two fields. Spacing between profile lines was 0.5 m, where it was possible. Azimuth of profiles was 60 degrees. Sensors was at heights of 0.9 m and 1.74 m above ground. Geodesy provides us positions of the field edges. After data correction, vertical gradients were computed (Fig. 2.) to one field. Kriging interpolation method was used for vertical gradient map. In down right corner we had to remove bad data caused by an iron fence. Data were removed manually. Field can be separated to north and south field by difference in height field.

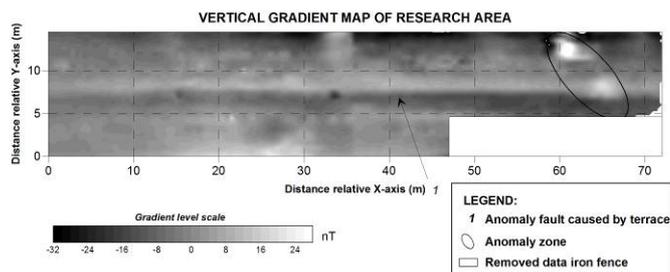


Fig. 2.: Vertical gradient map of magnetic survey

North part of the field is 0.1 to 0.3 m higher from south part. Magnetic survey shows, that it is like dipole line with maximum on north and minimum on south side of line. The magnitude of dipole does not affect the results of the research.

Aim of research was to detect possible remains of fireplaces and houses. Positive magnetic anomalies of gradient over 20 (nT) could be buried remains.

In the coming period, we will try to estimate the depths of the anomalies. Presented data shows that magnetic survey can be used in some cases inside populated areas with infrastructures, too.

Regarding archaeological tasks, results from our surveys benefited the archaeology team to better choose the locations for archaeological sounding.

After sounding we will have clear image of the site. We will be able to measure magnetic susceptibility. We will use it as an input parameter for depth calculation and prediction of the interesting anomaly fields.

All previous results give us better starting position for the next explorations of wider zone of archaeological site Vinča.

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