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THE ENEOLITHIC RITUAL BARROW COMPLEX IN PRYDNISTRYANSKE, VINNYTSIA OBLAST: MAGNETOMETRIC SURVEYS

ABSTRACT

The article presents the results of magnetometric surveys carried out in the village of Pridnistryanske on two barrow sites. In the site 1, the principal objectives were to capture the course of barrow ditches – not covered by the excavations – and investigate the space between the mounds. On site 2 relying on photographs was a group of nearby barrows selected for geophysical investigations.

Key words: barrows, spatial analysis, magnetometric method

INTRODUCTION

The investigations of barrow cemeteries always run up against the problem of delineating the limits of the space used for ritual purposes. Usually, excavations centre first on the visible elements of funeral architecture and sometimes on their

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immediate surroundings. In practice, however, usually only a barrow mound is explored. The large dimensions of barrows located in the steppe and forest-steppe zones often make them isolated targets of investigations, while their surroundings are left unexplored. Moreover, as in present Central Europe, intensive agriculture has completely levelled off the mounds of many barrows and considerably changed the original relief. Particularly susceptible to such destruction, Eneolithic barrows are typically distinctly smaller than barrows built or heightened in the Early Bronze Age (associated with the Yamnaya culture). Now, only vestiges of such features are perceptible as is the case with barrows I-III, site 1, Prydnistryanske, Yampil Region, Vinnitsta *Oblast*, explored as part of the Polish-Ukrainian project to study the Yampil Barrow-Ritual Complex in 2014 [Klochko *et al.* 2015].

The future-oriented methods of non-invasive prospection can considerably expand our knowledge and help us in planning excavations. First, however, it is necessary to analyse aerial and satellite photographs to identify levelled-off barrows that are hardly perceptible from the ground. After a review of such photographs, areas to be surveyed using geophysical methods were selected. A decision was made to begin with the zone excavated earlier: a group of barrows on site 1, Pridnistryanske. The principal objectives were to capture the course of barrow ditches – not covered by the excavations – and investigate the space between the mounds. Only then, relying on photographs was a group of nearby barrows selected for geophysical investigations. These barrows were of a similar size and degree of destruction to those on site 1 and formed an analogous linear arrangement (site 2, Pridnistryanske). This was done for comparing the structures of unexplored barrows with the results of excavations on site 1. A secondary objective was to check the readability of results in the environment of Podolia *chernozem* soils that had not been investigated until then.

1. METHODOLOGY

To carry out the survey, a magnetic method was chosen, allowing large areas to be sampled relatively quickly. A magnetometer records the presence of anomalies of higher or lower values of the earth's magnetic field caused by diverse human activity. Recognisable anomalies (usually point or linear anomalies with higher magnetic field values) result in particular from the presence of dug-in features (pits, ditches, sunken buildings, etc.). Special anomalies, showing large amplitude of changes, are associated with the presence of furnaces, hearths and other features exposed to high temperatures in the past, for instance, the relics of burnt buildings. Dipolar anomalies, in turn, are caused by the presence of ferrous objects. Under favourable conditions, recognizable anomalies may be also caused by the relics of

F i g . 1 . Prydnistryanske, Yampil Region. Location of geophysically surveyed barrow clusters: sites 1 and 2

masonry, in particular bricks. Zone anomalies may also mark human activity sites. Inhumation graves, however, may pose a problem in this respect as their fills do not differ much, in terms of physicochemical properties, from their background and, thus, do not give any magnetic anomalies [David *et al.* 2008: 20-21; Misiewicz 2006: 78]. The magnetic method allows the position of archaeological sites to be recognized quickly and comprehensively. It has a shortcoming, though: a relatively small penetration depth only slightly exceeding 1.0 m [David *et al.* 2008: 16].

Magnetic measurements in Prydnistryanske were made with a fluxgate magnetometer [Misiewicz 2006: 74-98] 4.032 DLG manufactured by the Foerster Ferrex company, measuring the gradient of the vertical component of the magnetic field and fitted with one probe of a resolution of 0.2 nT. Sampling lines were 1.0 m apart. Ten measurements per 1.0 sq. m were made. The data were collected bi-directionally.

The survey resulted in the recording of very many anomalies of a various nature. They are shown on magnetic charts plotted using the Terra Surveyor 3.0.29.3 software.

Fig. 2. Prydnistryanske, Yampil Region. Site 1. Magnetic map superimposed on satellite photograph

2. RESULTS

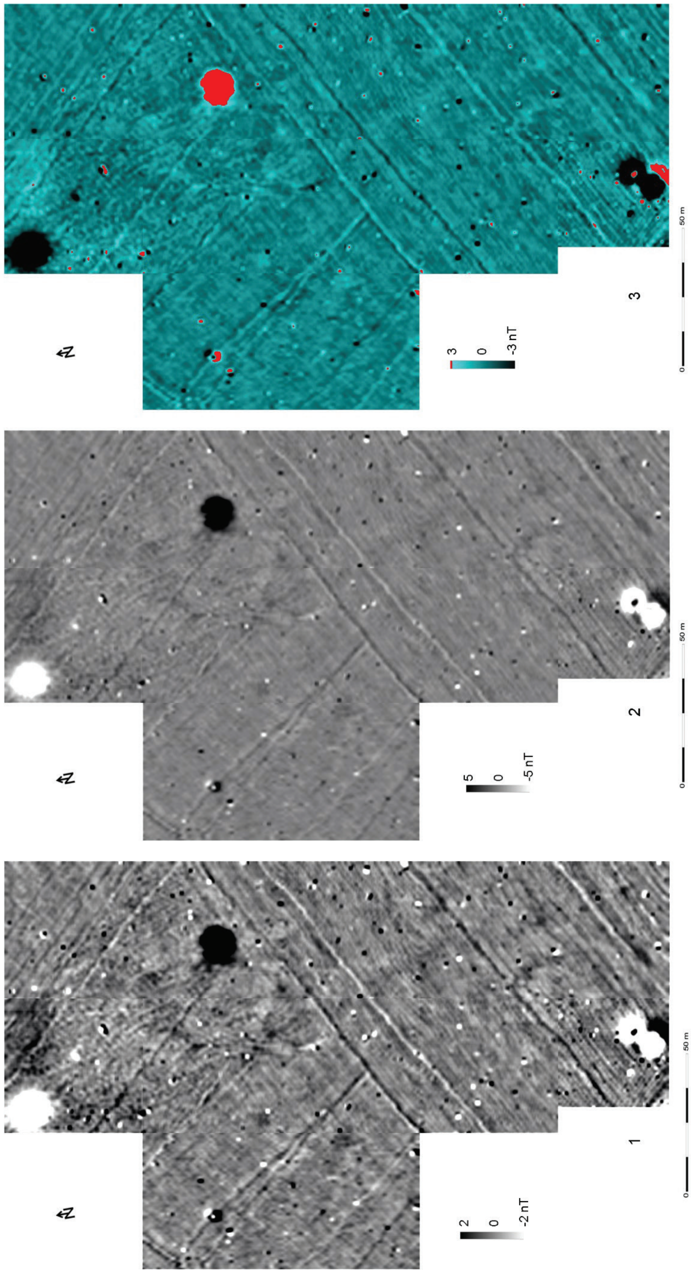
For the survey, Prydnistryanske, site 1 and 2, being barrow clusters, were selected (Fig. 1). On site 1, measurements covered 2.95 ha (Fig. 2), on site 2 – 0.75 ha (Fig. 3).

On site 1, satellite photographs helped identify four barrows: one large and three smaller ones arranged in a line. All were excavated in 2014 [Klochko *et al.* 2015]. The magnetic survey covered the large barrow and two of the three smaller ones (Figs. 2, 5). In the surveyed area, very many distinct linear anomalies related to land cultivation were identified and found to be related to baulks dividing fields in various times and traces of deep ploughing. Furthermore, numerous small dipolar anomalies were recorded related, no doubt, to ferruginous objects located in the humus layer. Relatively numerous positive and negative point anomalies seem to be related rather to natural, geological and zoogenic formations than potential archaeological features. Situated in the surveyed area, high-voltage electricity pylons were sources of strong dipolar anomalies (Fig. 5).

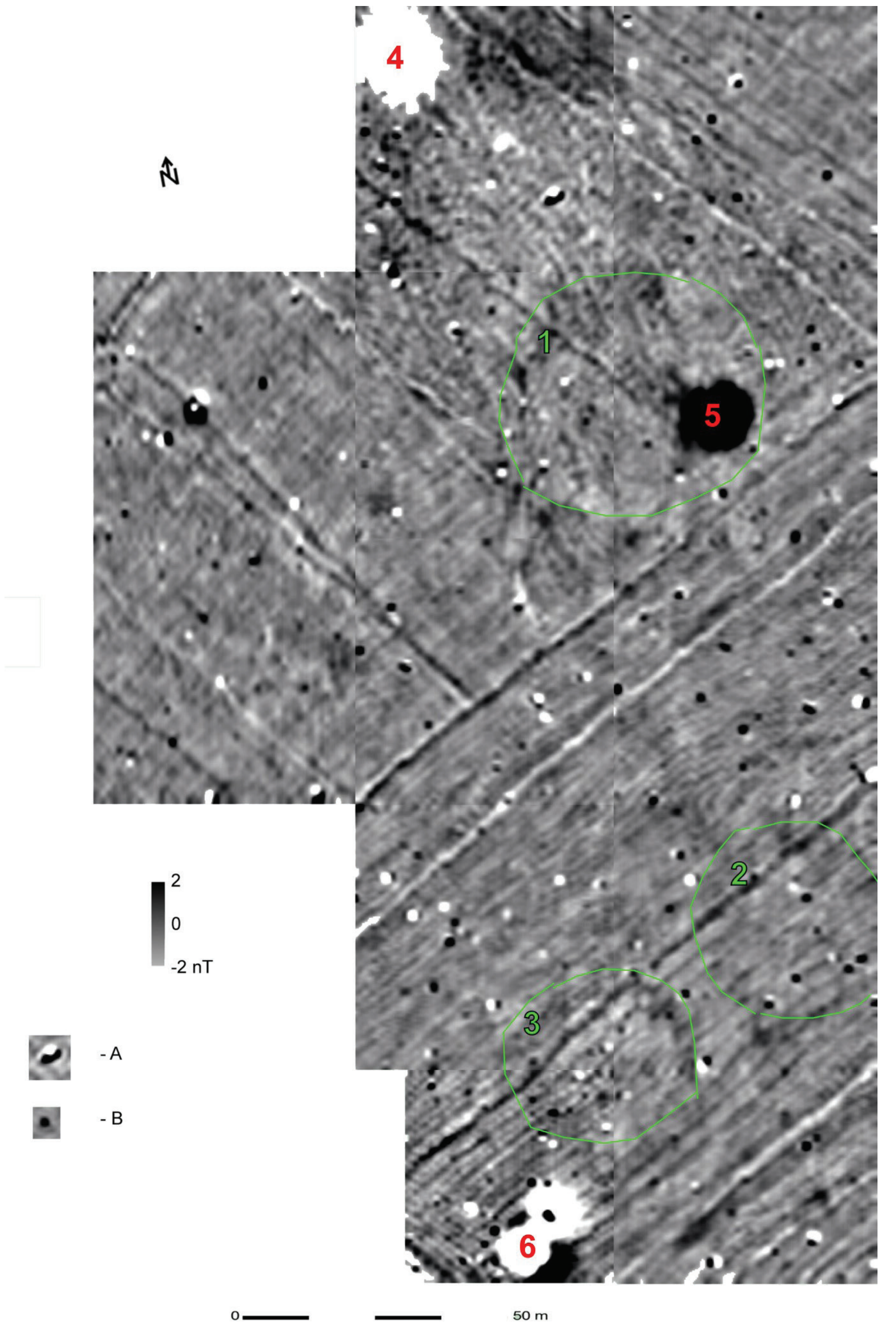
F i g . 3 . Prydnistryanske, Yampil Region. Site 2. Magnetic map superimposed on satellite photograph

The Eneolithic barrows may be associated only with positive anomalies caused by ditches or rather borrow pits surrounding the barrows (Fig. 5: 1, 2, 3). In the case of the large barrow, the recorded anomaly was a zone one and was irregularly shaped (Fig. 5: 1). It was best recognizable in the northern part of the barrow perimeter. Similar anomalies, connected to other smaller barrows, may be called linear. They formed ring-like patterns, marking barrow edges (Fig. 5: 2, 3). Their values varied and their recognisability was limited. No anomalies were recorded that could be unequivocally connected with other barrow elements, as for instance grave pits.

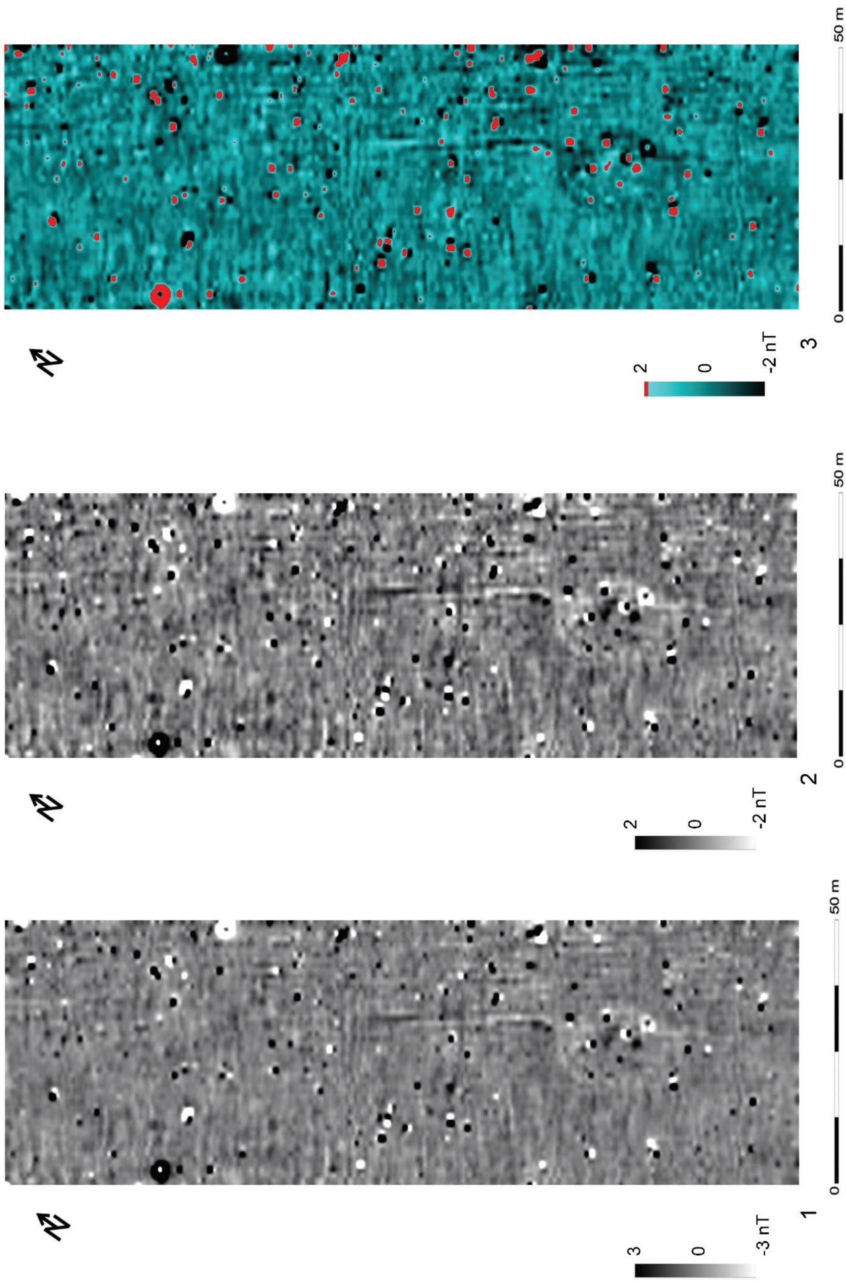
In the case of Prydnistryanske, site 2, the survey covered all the three hypothetical barrows (Figs. 3-6). In this case, too, numerous linear anomalies were observed, related to land cultivation (ploughing), and exceptionally numerous minor dipolar anomalies, attesting to the area being littered with ferromagnetic objects. Out of three discernable supposed barrows (soil indicators visible on satellite photographs), only the south-easternmost barrow was the source of recognisable anomalies. One of them was a zone positive anomaly (Fig. 7: 1), forming a ring around the supposed barrow. The anomaly is no doubt related to the place from which earth was taken to build the barrow. The very mound of the barrow is seen as an oval area of lowered magnetic susceptibility (Fig. 7: 2). The nature of the anomaly (lowered value of magnetic field) may be related to the barrow structure, namely, the removal of the layer of a high value of the magnetic field from its site.



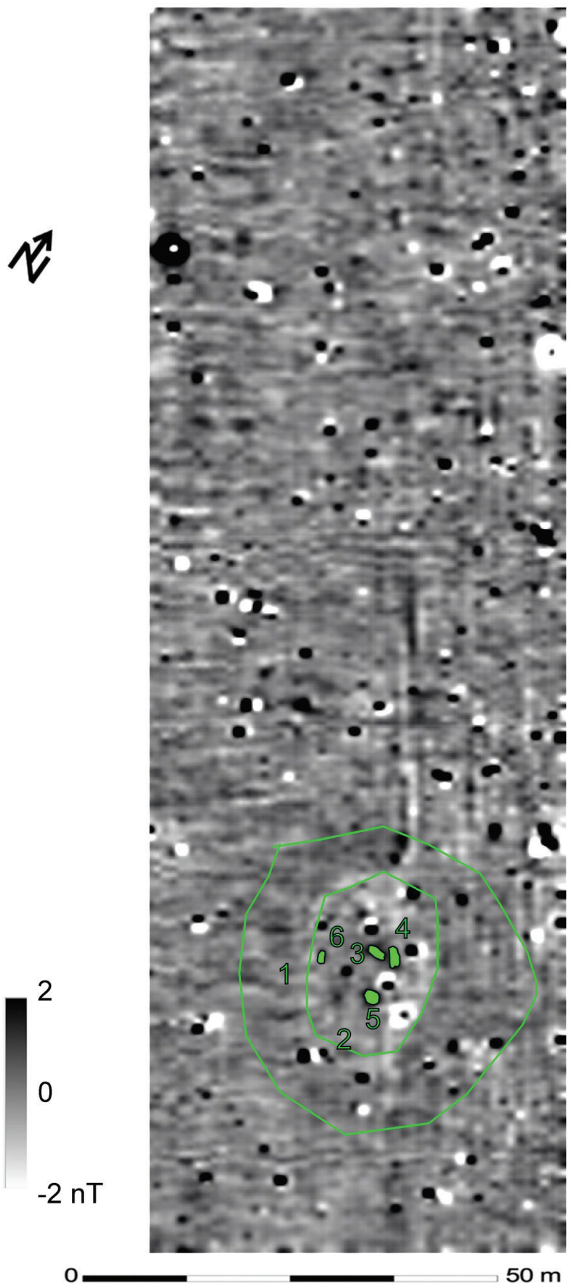
F i g . 4 . Prydnistryanske, Yampil Region. Magnetic maps of site 1. 1 – greyscale magnetic map in the range -2/2 nT; 2 – greyscale magnetic map in the range -5/5 nT; 3 – colour-scale magnetic map in the range -2/2 nT with the highest values highlighted



F i g . 5 . Prydnistryanske, Yampil Region. Magnetic map of site 1 with selected anomalies marked. 1-3: positive anomalies related to barrow structure; 4-6: anomalies related to high-voltage electricity pylons. A – example of dipolar anomaly; B – example of spot positive anomaly



F i g . 6 . Prydnistryanske, Yampil Region. Magnetic maps of site 2. 1 – greyscale magnetic map in the range -3/3 nT; 2 – greyscale magnetic map in the range -2/2 nT; 3 – colour-scale magnetic map in the range -2/2 nT with the highest values highlighted



F i g . 7. Prydnistryanske, Yampil Region. Magnetic map of site 2 with selected anomalies marked. 1-2: positive anomalies related to barrow structure; 3-6: spot positive anomalies suggesting possible archaeological features

This may be a sign that the site was dehumified prior to the building of the barrow or that material of low magnetic field values, as pure loess, accumulated within the barrow mound perimeter. In addition, within the barrow mound perimeter, a few positive point anomalies can be identified (Fig. 7: 3-6). Not especially high values, the elongated shape and dimensions, especially of anomalies 3, 4 and 6, may permit to associate them with archaeological features, possibly grave pits.

The poor recognisability of anomalies connected with the ditches surrounding the Eneolithic barrows is no doubt a result of a layer of humus over 1.0 m thick extending over the site. It muffles the anomalies of not especially high values related to archaeological features. On the other hand, the poor recognisability of anomalies is a consequence of the nature of features being their sources. These are relatively shallow, irregular ditches of a basin-like cross-section. Their fills have a magnetic susceptibility value close to that of humus. Relatively small barrow mound dimensions show that the barrows were built above all of the material of surface *chernozem* layers without reaching as far as the bedrock.

3. CONCLUSIONS

Despite visualization shortcomings, magnetic surveys have proven to be an effective non-invasive method of prospection for barrow sites in the area of Podolia *chernozem* soils. Their information has improved site plans by adding elements located outside the excavated areas (such as borrow pits). Furthermore, magnetic surveys have helped distinguish a complex of barrow cemeteries in the Dniester Area dated to the Late Eneolithic (second half of the 4th millennium BC). The object of the surveys was a cluster of three small barrow features, the structure of which turned out to be analogous to that of the barrows investigated on site 1 in Prydnistryanske. Presumably, in the vicinity of Prydnistryanske, a large ritual-funerary complex used to function in connection with Late Tripolye/Pre-Yamnaya population groups. So as to advance our knowledge in this field it is beholden to investigate it further, taking advantage of aerial photography and geophysical surveys.

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