

Much more than just a Roman camp: diachronic interpretation of magnetic data from Danube Limes in Croatia

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Abstract

First large-scale magnetic gradiometer surveys with flexible sensor arrays started at the Danube Limes in 2020 and continue. The investigation of Danube Limes sites with extensions of several dozens of hectares revealed unknown Roman military structures as well as archaeological and historical features from Prehistory to modern era. The diachronic approach to magnetic data interpretation is most appropriate for the palimpsest-like historical landscape of the southern Pannonian Basin.

Keywords

Danube Limes; diachronic archaeology; interpretation; magnetic prospection; Roman military

Introduction

Roman Limes sites were systematically investigated using large-scale magnetic measurements along the right river-bank of Danube in Osijek-Baranja County (Croatia). The objective of surveys was to evaluate assumptions of the existence of complex Roman military installations that were drawn from field surveys, prior archaeological excavations and geophysical investigations, and aerial photographs. At the centre of interest is the magnetic data set obtained at the site of Dragojlov brijeg (Kneževi Vinogradi, Osijek-Baranja County, Croatia). Prior investigations revealed the existence of a 2nd century AD Roman auxiliary camp with a citadel on a surface of about 4 hectares (Vukmanić and Mušič 2012). In two campaigns the magnetic survey area was extended to almost 60 hectares.

Materials and methods

For the magnetic measurements the multi-probe fluxgate gradiometer array LEA MAX combined with a GNSS-RTK positioning system was used. Most of the area could be

measured by use of an ATV. Hand-driven systems were used at neighbouring sites, where surface and terrain conditions did not allow for motorized measurements. For the archaeological interpretation the data sets were overlaid with LiDAR data. Since the data sets revealed fragmented features of Prehistoric and modern origin, they were subjected to a diachronic interpretation with the aim to create comprehensive interpretation maps which take into account the complexity of the palimpsest-like historic landscape. The term palimpsest has long been used in archaeology. Here it stands as a metaphor for a static and seemingly chaotic reflection of technically and culturally different processes, during which soil layers and structures, and thus the magnetic properties of the soil, were changed by human activity over long periods (Bailey 2007).

Results

Based on the results of the geophysical measurements from 2012 (Vukmanić and Mušič 2012), the large-scale



Fig. 1: Magnetic data from the site of Dragojlov brijeg.

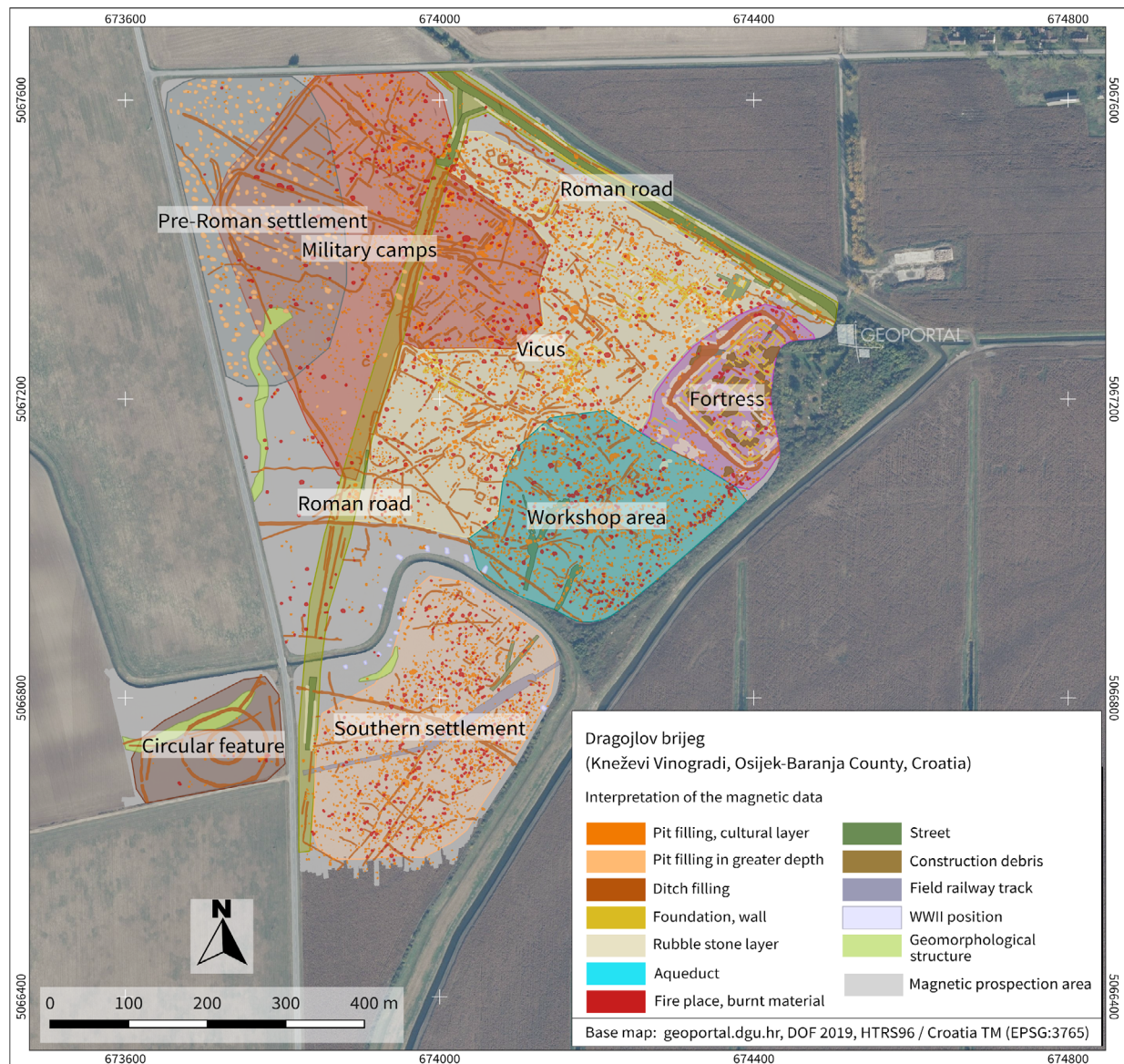


Fig. 2: Summary of the diachronic interpretation at Dragojlov brijeg.

surveys of 2020 and 2021 revealed a complex pattern of Roman features on almost the entire surveyed area of 60 hectares (Fig. 1 and 2). Besides the actual fortress, several larger units could be identified: To the west of the fortress, groups of stone buildings were detected, most likely associated with a Roman civilian settlement (vicus). Secondly, an assumed production area was found to the south of the fortress. The Roman military installations such as camps and minor fortresses, defined by ditch complexes, were found in the terrain 500 m towards the northwest of the main fortress. On the northeastern edge of the field, the course of a road can be traced. Two bifurcations, probably

related to accesses to the vicus and to the military camps, respectively, are recognizable. A north-south running feature most probably reflects the course of the main Limes road connecting the site with the colonia Aelia Mursa (Osijek) in the south and the sites of Ad Novas and Ad Militare in the north. The 2021 data reveal the existence of another settlement core, located to the east of the main Roman road. Eventually, a nearly concentric circular ditch system with a total diameter of more than 100 m, was identified to the west of the southern settlement. Its origin remains unclear. Traces of a pre-Roman settlement can be assumed in the north-western part of the field: A nearly

regular arrangement of pits, characterized by low magnetic intensity and thus pointing to low thickness or greater depth, indicate the presence of pit house remains. This settlement zone overlaps partly with the zone of the military camps and most likely continues towards the north and the west. Besides the Prehistoric and Roman structures further magnetic anomalies were connected to installations related to the exploitation of the fertile land by large-scale agricultural farms operated by Habsburg nobles since the 18th century. Further features were associated to military positions used during the Battle of Batina in November 1944, a decisive battle of Second World War between units of the Red Army and the Yugoslav Partisans against the Wehrmacht and their allies. WWII military positions could also be identified at other Roman Limes sites, which underlines the strategically favourable positions of them.

Discussion

The result of the interpretation using the diachronic approach, i. e. the deciphering all information possible in the palimpsest-like magnetograms, raises the question how far a veritable interpretation of archaeogeophysical data sets can go without additional data from direct archaeological interventions. Despite all uncertainties, it is proposed to squeeze the data as much as possible using additional sources such as historical maps and other archives, in order to set up plausible hypotheses which can be evaluated when needed and when time and resources allow.

Conclusion

Flexible magnetic prospection, i.e. large-scale surveys with motorized array and small-scale investigation with hand-driven systems, is a powerful tool for systematic archaeological investigation of archaeological landscapes. In case of the Danube Limes sites, an impressive amount of information could be obtained, not only related to the history of the Roman Limes along the Danube. The diachronic approach to magnetic data interpretation revealed the existence of a complex archaeological record. Prehistoric to modern structures could be detected which complete the picture of the development of human societies at the Middle Danube and thus allow a more comprehensive narrative of the history of this Central European region.

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