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Non-invasive prospection of two Iron Age sites in Michałowice, southern Poland

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INTRODUCTION

Non-invasive prospection was carried out and subsequently verified by excavation on two related archaeological sites (Fig. 1) dated to the pre-Roman and the Roman Influence Period in Michałowice (Czarnocin commune, Świętokrzyskie voivodship, southern Poland). On the two sites (a burial ground and a nearby settlement), magnetic gradiometry was the main geophysical method that was applied (Aspinall *et al.* 2008). It was deemed to be the most effective, taking into account soil conditions and the character of targeted features, that is, ditch enclosures, pits, production areas, urn graves with metal goods.

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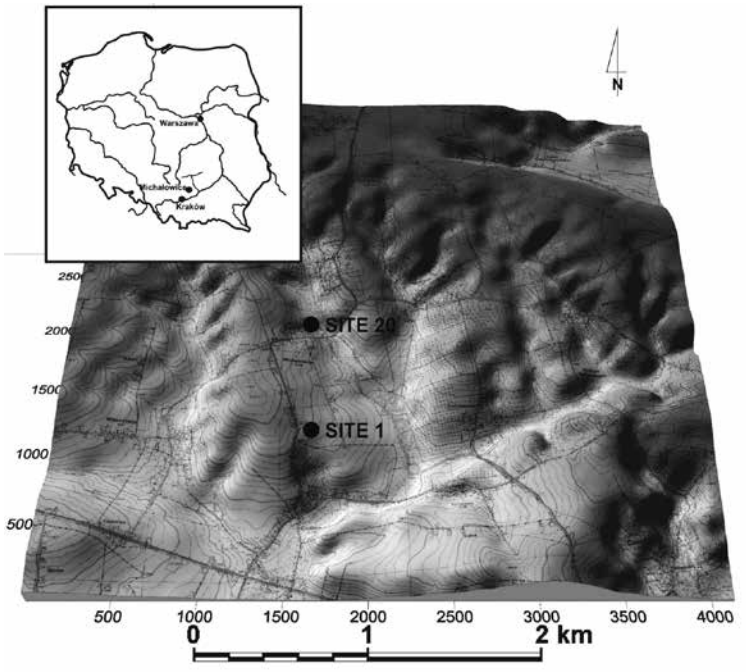

Fig. 1. Location of Michałowice site 1 (burial complex) and Michałowice site 20 (open settlement)

BURIAL COMPLEX (MICHAŁOWICE SITE 1)

The first of the studied sites, Michałowice site 1, is an interesting and rare burial complex with a unique set of small rectangular groove-type features (Pol. *obiekty rowkowe),* from 6 m to almost 14 m long. Urn or pit graves were often located inside the ditch enclosures (Zagórska-Telega *et al.* 2011: 195–225; 2012: 135–160; see also Gedl 1985: 159–190). On-site archaeological (invasive) investigations have been taking place regularly since the 1990s. In 2008, a small (30 m x 50 m) magnetic test survey (Fig. 2) was commissioned in an area believed to be a peripheral part of the burial site. Despite the small size of the survey, it yielded surprising results with the discovery of one of the largest groove-type features known at that point and a series of smaller features of the same kind (Wroniecki 2012: 161–170). In the following years, further magnetic prospection (over an area of approximately 4 ha) revealed more structures, both natural (loess gullies, sealed depressions) and anthropogenic, thus helping to understand the spatial arrangement of the site, as well as the surrounding, archaeological and natural landscape. This influenced excavation strategies. A series of trenches was opened on the spot of the anomalies in an effort to verify their anthropogenic character. It was proved that all of the rectangular positive magnetic anomalies were in fact groove-type features. Grave goods in urn burials were the source of many point dipolar anomalies. Well fired pottery vessels were also reflected on the magnetic map. A circular anomaly, 20 m in diameter, initially thought to be of anthropogenic origin, was excavated and identified as a sealed depression.

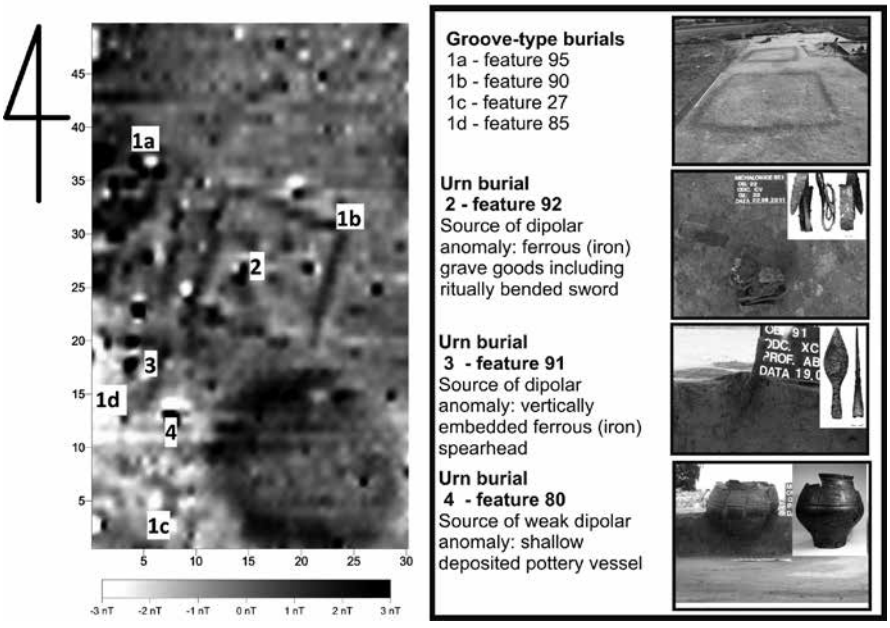

Fig. 2. Visualisation of the results of the 2010 magnetic survey and verification trenches excavated at Michałowice site 1

OPEN SETTLEMENT (MICHAŁOWICE SITE 20)

The second investigated site, an open settlement referred to as Michałowice site 20, was discovered during a field-walking survey in 2011. Archaeological surface finds linked the site to two cultural groups inhabiting this area in the Iron Age: the La Tène culture with still largely unidentified general settlement characteristics (Dulęba 2009: 11–34; 2014: 189–200) and the Przeworsk culture, which in this region is dated to the end of the 2nd century BC. Settlement lasted through the end of the 1st century AD as attested by the youngest archaeological material discovered so far. The site is most likely only a fraction of a settlement that underlies the buildings of the modern Michałowice village. Non-invasive prospection could be carried out on the valley floor used to this day as a field and meadow. A magnetic survey, funded by the Jagiellonian University, was carried out in 2012. Positive point anomalies registered during the prospection were interpreted as traces of past settlement activity. In the course of the following three years, excavations conducted to verify these anomalies uncovered production installations, such as lime kilns, as well as pit houses, refuse pits and part of a probable longhouse (Fig. 3).

DISCUSSION

The presentation focuses on micro-regional studies of the Iron Age landscape in the Michałowice area, which is in the southeastern part of Garb Wodziesławski separating the basins of the two major

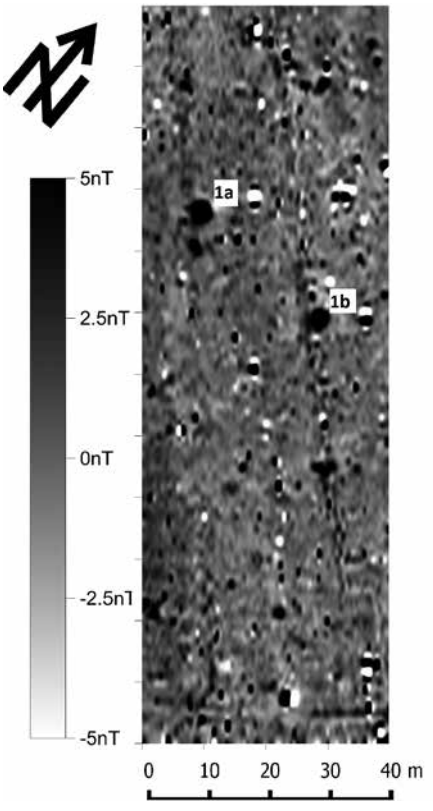

Fig. 3. Visualisation of the results of the 2012 magnetic survey (±5nT, light to dark) and verification trenches excavated at Michałowice site 20

tributaries of the Wisła river, Nida and Nidzica. The geological substrate is made up of solid rocks from the Cretaceous period. Above them lie deposits from the Pleistocene and Holocene periods, most prominently loess soils. River valleys are characterised by accumulated colluvial sediments, often of considerable thickness. Strong diluvial processes that continually change the landscape are also observed in the broader geographical zone. Strong erosion causes reduction of the topsoil cover in the upper parts of the hills, subsequently stimulating the accumulation of fertile soils in their lower parts (Kołodziejczyk 2003; Żyła 2007). This fact is of significance for non-invasive prospection in general and for magnetic prospection in particular.

The burial area in Michałowice is located near the hilltop, where the thickness of the topsoil ranges from 10 cm to 30 cm and loess soils underlie the ploughed horizon. Such conditions are favourable for magnetic prospection, mainly because of the geological background and the relatively high magnetic susceptibility of the fill. In this geological situation, it was possible to detect ditched features as well as other, often miniscule, anthropogenic and geological features. On the settlement site in Michałowice, however, the geological situation is different with the fertile subsoil (chernozem) reaching 110 cm in thickness. Few of the excavated features lay deeper, being dug into the underlying loess soils. This situation significantly reduced magnetic detection rates, the only features marked by anomalies being structures with evidence of thermal treatment.

This short case study is at once empirical proof of the possibilities of the magnetic method and its limitations in the context of the geomorphology of the Małopolska Upland. Further investigations at both the burial site and the open settlement in Michałowice should contribute to the development of non-invasive methodologies and interpretations in the region.

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