Geoarchaeological core prospection investigation to improve the archaeological interpretation of geophysical data: case study of a Roman settlement at Auritz (Navarre)

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KEY-WORDS: magnetic prospection, core prospection, geoarchaeology, stratigraphy, Roman town, interpretation

INTRODUCTION

The Aranzadi Society of Science has been engaged in a project to trace Roman roads in northern Navarre since 2011. This research has been focused on the route through the Pyrenees at Orreaga/Roncesvalles and has produced new evidence that suggests some variation from the route known so far. Field investigation detected a roadside settlement and archaeological trenches revealed substantial Roman masonry building foundations (Agirre-Mauleon *et al.* 2012). In order to delimit and characterize the site, a geophysical prospection was undertaken over an area of 18 ha using a magnetic fluxgate gradiometer. Results show a densely occupied area of approximately 5 ha, but also areas either without significant anomalies or with good magnetic contrast but showing poorly defined anomalies (Garcia-Garcia *et al.* 2013). The survey allowed the main characteristics of the settlement to be described and identified new areas of interest.

At this point, Aranzadi approached MOLA (Museum of London Archaeology) in order to develop a cooperative approach to the investigation and further research. It was agreed that the MOLA/Aranzadi team would implement an archaeological coring survey designed to complement and refine the existing geophysical survey. The principle was to conduct a non-invasive field study to further understand the stratigraphic make-up of the site (Agirre-Mauleon and Hill 2013).

OBJECTIVES

The geophysical survey provides a rich template for understanding the buried archaeological resource. Consequently, the objectives of the geoarchaeological investigation were driven by the results of this survey. The main goals of the investigation were to describe and define the underlying geology,

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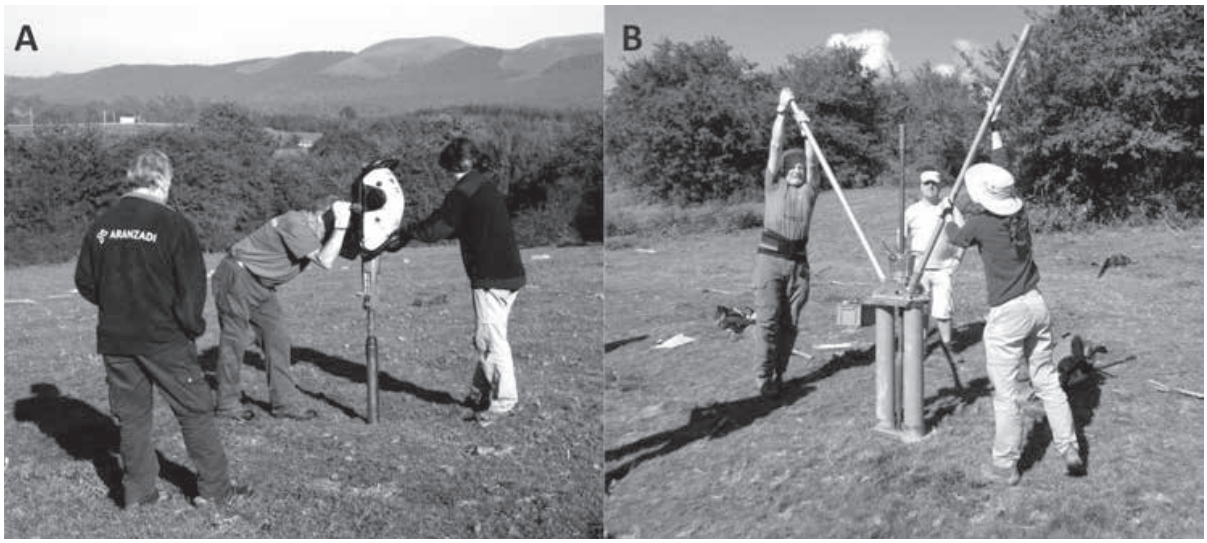

Fig. 1. A – power auger (Cobra TT engine) used for drilling; B – MOLA/Aranzadi team removing the gouge manually

to define the presence or absence of archaeological strata and to characterise the thickness and type of archaeological deposits. This information will help to design future excavation campaigns. In parallel, the core information will be used to correlate the distribution and characteristics of the archaeological deposits with the geophysical survey in order to improve archaeological interpretation. Therefore, some of the cores were undertaken with the specific goal of qualifying geophysical interpretations.

GEOARCHAEOLOGICAL CORING METHODOLOGY

Cores were drilled with a mechanical petrol-driven 2-stroke power auger (Cobra TT engine). This is a hand-held coring machine, which drives 1 m long, open-sided steel gouges into the ground (Fig. 1: A). The sediment-filled gouge is then recovered from the ground using the two-person jacking apparatus (Fig. 1: B). The recovered window sample is then cleaned by trowel, photographed, recorded in a log, sub-sampled as necessary and finally discarded, so that the gouge can be used again. Sediments were photographed and described according to standard sedimentary criteria (Jones *et al.* 1999; Tucker 1982). Preliminary interpretations were made of the depositional conditions represented by the soils and sediments within each core and the deposits or contexts grouped into broad stratigraphic units.

Based on the geophysical survey, the area of investigation was divided into four zones, but the principal focus was on Zaldua, which contains the main area of the settlement, and Otegi, where geophysics have shown some anomalies that could not be interpreted. The survey at Zaldua comprised 80 cores configured as nine approximately parallel, east–west transects, positioned to create a grid of points. A number of specific points was also included, these being points with potential to resolve anomalies apparent in the geophysical survey. The Otegi area is known to have a necropolis in its southern part and could have been settled in its northern part. The core locations are shown in relation to aerial photography in Fig. 2.

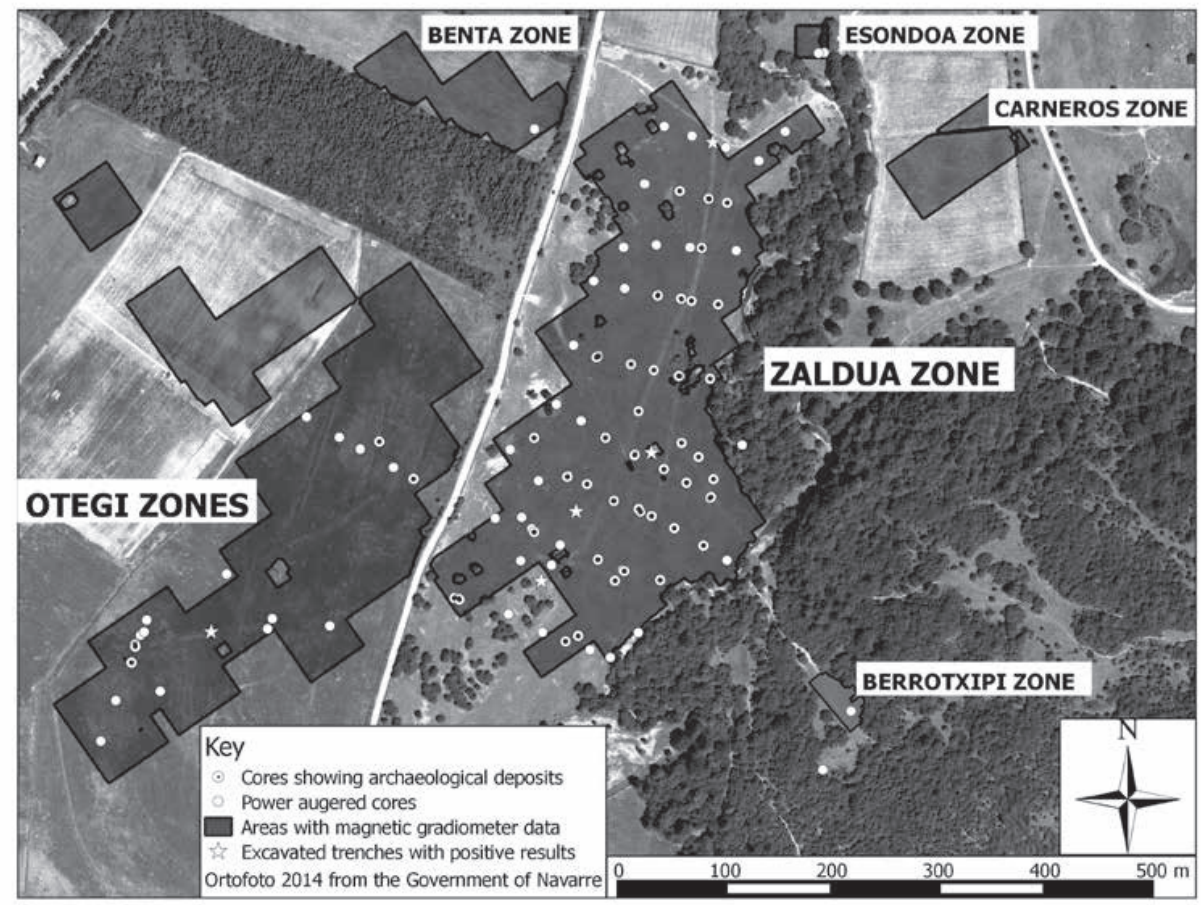

Fig. 2. Plan of the cores, areas with geophysical prospection and trenches excavated in 2012 overlaid on a aerial image (obtained from the Government of Navarre)

RESULTS AND DISCUSSION

In total, 104 cores were drilled and most of the cores reached undisturbed alluvial terrace deposits (silts or gravels) at between 1 m and 2 m depth (MOLA/Aranzadi 2014). One obvious conclusion is that the volume of archaeology across the site is lower than estimated based on trench excavation, due to trenches being located in areas where stratigraphy was deep.

In general, the survey across Zaldua mirrored the presence and absence of archaeological matter in the geophysical survey. Cores that showed natural sequences with no archaeology are mainly those at the edge of the geophysical survey, outside the main focus of settlement. Specifically, the northern transect confirmed an absence of archaeological matter and strengthened the interpretation of this area as the northern edge of the main settlement. The survey also demonstrated the absence of archaeological deposits in the woodland around the settlement, where geophysical data was hard to retrieve.

In areas where strong geophysical anomalies were targeted, the cores generally confirmed the interpretation from the geophysical survey. Furthermore, the extracted sequences allowed

these interpretations to be refined and permitted not only a better understanding of the origin of the anomalies, but also provided dating evidence. Some discordance was found, however, and new areas of interest were identified for further investigation.

The core survey across Otegi zone was less intensive. Archaeological deposits were recorded in only five of the 19 holes drilled, but nevertheless, most of the questions posed could be answered. The boundaries of the known necropolis area could not be determined and will require further detailed sampling. Some of the cores confirmed archaeological interpretations based on geophysical results, although in one particular case, the expected archaeological feature was not found, and the core revealed the anomaly to be geological.

CONCLUSIONS

The MOLA/Aranzadi fieldwork undertaken in 2014 has produced an archaeostratigraphic model that can inform future archaeological works at this site. It provides a map of the buried topography and the distribution of deposits across the site, enabling identification of sediment type, character and thickness prior to any further groundwork.

Archaeological deposits are concentrated in the Zaldua zone. Multiple floor surface and levelling deposits have been identified in several locations and distinct deposit sequences discerned in different rooms within buildings. The findings may substantiate the idea that the incoherent geophysical signal in these zones results from multiple phases of deposition.

The predominant conclusion is that, in general, the core survey confirms the results of the geophysical survey in the Zaldua zone. In contrast, at Otegi and Esondoa, the core results differed from the archaeological interpretations made based on geophysics. Further work is needed in the Otegi zone before definitive conclusions can be made about the presence or absence of archaeological remains.

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