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Archaeological surveys in areas with a high density of artefacts: Analysis and interpretation proposals

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ABSTRACT

This paper has a twin methodological and interpretative focus. It presents the use of geospatial technologies applied to archaeological surveying. We use the high-resolution spatial and temporal data obtained from the study of the ancient Protohistoric and Roman landscape in the eastern area of the Iberian Peninsula (present-day Alicante province, Spain) to illustrate the methodological proposals. The observed spatial patterns allow us to infer certain aspects relating to the ancient use of the land, transformations in settlement patterns and the intensification of landscape use.

1. Rural landscape and surface record

Studies of the ancient rural landscape face major challenges in identifying and explaining the archaeological vestiges. Most of the difficulties encountered during this type of research have been described in works devoted to that subject and it is beyond the possibilities of this paper to comment on and explain them (Alcock and Cherry, 2004; Mayoral and Sevillano, 2013). Nevertheless, along those initial lines we would like to refer to certain factors that, from our point of view, affect the question of the surface record.

The first variables we find are natural and include soil conditions and topographic, climatic and edaphic particularities, as well as the vegetation, all of which condition the way in which the surface is seen. The impacts on surveys range from the soil visibility conditions caused by vegetation to the effect on slope topography of landslips that lead to greater surface dispersion.

Another set of factors that conditions surveys is human secular establishment in rural environments and on farmland. Repeated occupation of the same niches blurs or erases earlier traces, making them difficult to identify and analyse. This particularly affects Mediterranean highland areas where terraces and banks have been built to parcel out farmland, mainly during the mediaeval and modern periods.

Finally, we refer to ancient establishment methods, the intensity of land use and the properties of the surface archaeological record formed over the centuries. These formation conditions affect such aspects as the survival of building remains, movable find density and the way in which wider or narrower dispersions were formed.

These factors sometimes lead to areas with a high density of surface archaeological record. These are places with high levels of dispersed remains consisting of thousands of fragments that often form virtual carpets of pottery remains covering hundreds of hectares. Sometimes they result from the superposition of pottery remains from different periods as a result of a dense historical stratification of rural sites. On occasions those extensive zones of finds are dated to a single period, which presents us with post-depositional processes and farming practices that have led to the formation of such complex spatial distributions of remains. These circumstances make it necessary to use archaeological surface investigation methodologies with multiple techniques with the aim of increasing the spatial and chronological resolution of the data obtained. Only by refining the procedures will we be able to progress in our understanding of the ancient rural landscape.

In the following article we present the methodological proposals for surveying, analysing and interpreting these zones with a high density of surface remains. Based on specific cases from the Protohistoric and Roman periods in our study area we illustrate the methods and proposals for the archaeological interpretation of the evidence. The study area is the River Serpis valley, a mountainous region in the north of the present-day province of Alicante (Spain).

In antiquity it was a territory presided over by fortified centres of a certain size from which a dense dispersed rural occupation was organised. These rural communities — basically farms and small villages — are fundamental to our understanding of the ways in

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which the ancient territory was organised, both during the Iberian Iron Age (6th–1st c. BC) and the subsequent Roman Imperial period (1st–6th c. AD). Although in the Iberian period there were some sixty settlements (Grau Mira, 2002), in the subsequent Roman period we attest approximately fifty settlements that covered the majority of the area's cultivable land (Grau and Garrigòs, 2007). Despite the importance of this dense rural occupation, it has not been studied to the same extent as the most important settlements, the Iberian *oppida* or the Roman villas, for which we have abundant references and analyses (Grau Mira, 2002; Grau and Segura, 2013). In order to obtain analytical documentation, in recent years we have developed a programme for surveying and analysing the rural landscape that allows us to recognise ancient types of settlement and land use in the area. It is with this data that we illustrate this article.

2. Surveys assisted by geospatial techniques

In the following lines we discuss the different investigation strategies we have developed in recent years for carrying out archaeological surveys (Fig. 1).

2.1. Topographic analysis: LiDAR

The topographical study of the land being surveyed is particularly important for understanding artefact dispersion. The topographic base of cultivated fields in the zones to be surveyed is generally far from flat and regular. In fact, it normally consists of plots of varied morphology ranging from rolling hills to steep slopes that have been terraced for cultivation.

These circumstances make it necessary to analyse the base terrain in order to understand the sectors that may have been affected by natural or anthropic post-depositional processes. With regard to the former, it is worth mentioning hillside landslips, in which the movement of sediments has led to the displacement of surface artefacts. Among the latter, we can highlight farming terraces and banks. The mechanical movement of earth to build up agricultural terraces tends to bring deep remains to the surface, whereas those in the area near the terrace wall are buried. We therefore need to be aware of the topographical factors that may have affected the configuration of the surface record.

To carry out this topographic analysis we used digital models of the terrain with resolutions of between 5 and 0.5 m, with the higher resolution being used for the larger scales of approximately 10–30 km. In the areas with the largest numbers of remains — evidence of a possible settlement — and their surrounding areas, we used high resolution data, with a DEM of 0.5 m cell size. The technique used was high resolution LiDAR spatial data digital modelling. Airborne Light Detection and Ranging (LiDAR) is an active system based on a laser sensor fitted to a plane or helicopter. This technology provides accuracy greater than 15 cm in height and a high density of spot heights.

Specifically we worked with the 2009 LiDAR Valencian Region flight, part of the Spanish National Plan for Territory Observation (PNOA). These data were obtained between August and October 2009 with an ALS50 scanner flown at an average altitude of 1300 m. The scanning frequency was 32.3 Hz, obtaining accuracy with a mean error of 0.03 m. The average point density is 1 pt/m^2.

To create the DEM we interpolated the points of the last pulse, removing the points for vegetation and other objects that do not belong to the terrain base. We used diverse interpolation methods that are explained in the corresponding section.

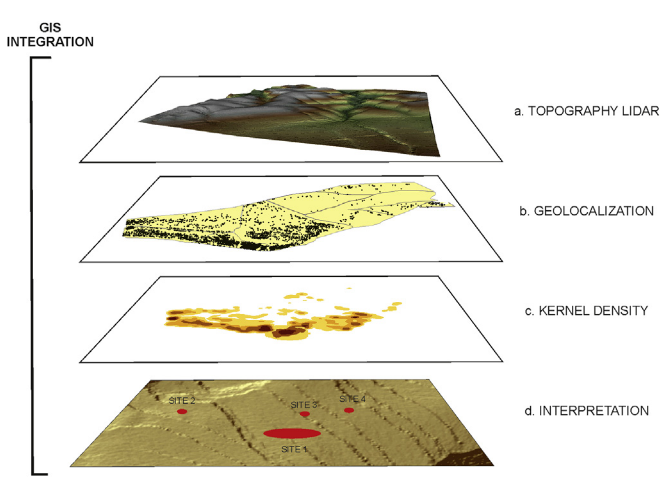

Fig. 1. Scheme of the proposed survey analysis and interpretation.

2.2. Geolocalisation of the surface record

In general we can speak of two basic types of survey: those whose objective focuses on the identification of “archaeological sites” — understood as specific locations in the archaeological record — and those that understand the surface of the terrain as a continuous space of land use, with different types of evidence that vary in their nature and structure (Mayoral and Sevillano, 2013, 39–42).

In our case we chose the second option to identify and analyse the spatial structure of the surface record. This means the element of record is the archaeological object, normally in the form of a pottery sherd. In a second step the remains dispersions are analysed to ascertain the greatest concentrations — which can be identified as settlements — and to offer other interpretations for zones with appreciably lower densities.

For our purposes we have developed a strategy of total surface cover. The task begins by dividing the space into sectors according to the current plot division of the terrain, which allows us to demarcate transects based on the limits visible in the field. The members of the survey team position themselves inside each of the plot units in parallel and approximately 3–4 m apart. The surveyors are equipped with high performance GPS receivers from within the non-professional or leisure use range. The use of these devices allows us to mark the trajectory tracks and accurately georeference the selected remains. The spatial information for the localisation of pottery can processed differently to identify the different sherds whose shape and fabric permit a typological, chronological and functional attribution.

In our fieldwork, building materials were not georeferenced, given their scarcity and the very specific location in relation to areas with high density of pottery. Such evidence not has been integrated into our study, as in other studies in which building material has been instrumental in the characterization of rural sites (García and Cisneros, 2014).

One problem with the geolocalisation process using the previously mentioned GPS devices is that it is not possible to correct the signal reception error. However, the introduction of the EGNOS system has reduced the margin of error to less than 3 m, a perfectly acceptable distance for the working scale and mapping produced for find dispersion. This system of georeferencing finds was inspired by Mayoral et al. (2009), whose proposals we have adapted to the conditions and objectives of our study cases. As we will see, in some cases the forms were selected and in others all the elements were found.

The fieldwork required a team of 12–15 persons with experience (postgraduated students) in surveys and detailed knowledge