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High resolution space and ground-based remote sensing and implications for landscape archaeology: the case from Portus, Italy

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ABSTRACT

Ground-based archaeological survey methods, together with aerial photography and satellite remote sensing data, provide archaeologists with techniques for analysing archaeological sites and landscapes. These techniques allow different properties to be detected dependent on the nature of archaeological deposits, although clear restrictions exist, either with their physical limitations, or in the extent and nuances of their application. With recent developments in landscape archaeology technologies, it is increasingly necessary to adopt an integrated strategy of prospection, incorporating both ground-based non-destructive methods and remotely sensed data, to understand fully the character and development of archaeological landscapes. This paper outlines the results of a pilot project to test this approach on the archaeological landscape of Portus, the port of Imperial Rome. Its results confirm the potential that exists in enhancing the mapping of this major port complex and its hinterland by means of an integration of satellite remote-sensing data, geophysical survey and aerial photography. They have made it possible for new questions to be raised about Portus and its environs and, by implication, suggest that integrated fieldwork strategies of this kind have much more to tell us about major Classical sites and other large and complex sites across the globe than by addressing them by means of single methods alone.

1. Introduction

Archaeological survey and aerial photography have played an integral role in the analysis and recording of sites in Classical archaeology. Archaeologists have used field-walking methods to provide broader data on the presence, absence and dating of settlements in the landscape since the 1950s (Potter, 1979). Aerial photography has allowed the mapping of the nature and extent of visible and buried archaeological remains (Guaitoli, 2003; Jones, 1999), stemming from the systematic coverage produced by the RAF, Luftwaffe and USAF in the Mediterranean region during WW2 (Mazzanti, 2006). Targeted geophysical survey has provided a useful companion to non-destructive methodologies on landscape surveys in the Mediterranean (Barker, 1997). Only more recently has technological development facilitated the integration of ground-based and remotely sensed survey methods.

Application of topographic and geophysical survey, with more widespread use of remote sensing technologies, has changed the perspective and approaches of Classical archaeologists (Pasquinucci and Trément, 1999), and especially the approach to ancient urban mapping, in the last decade (such as Buteux et al., 2000; Neubauer et al., 2002; Alcock and Cherry, 2004; Hay et al., 2006; Vermuelen et al., 2012; Johnson and Millett, 2013). This has had a dramatic impact upon our understanding of the Classical world, even though many interpretational issues remain, relating to the form and nature of anomalies represented in datasets, the dating and phasing of complex data where little or no tangible evidence is available for use in conjunction with survey results, and in comparing results from different surveys (Alcock and Cherry, 2004). The large scale of the work conducted at sites in Europe, including Wroxeter in the UK (Gaffney et al., 2000), Falerii Novi and Portus in Italy (Keay et al., 2000, 2005) has enabled a more detailed understanding of urban centre plans. Integration of these methods has allowed the mapping of archaeological features, including streets, roads, buildings, industrial features, cemeteries, and tombs, across a large area of landscape. The application of remote sensing and geophysical survey has provided a relatively cost-effective and efficient approach to surveying classical sites. The methods allow high resolution data collection, reducing the need to excavate large areas. Limitations do exist with the use of non-destructive methodologies. The nature of

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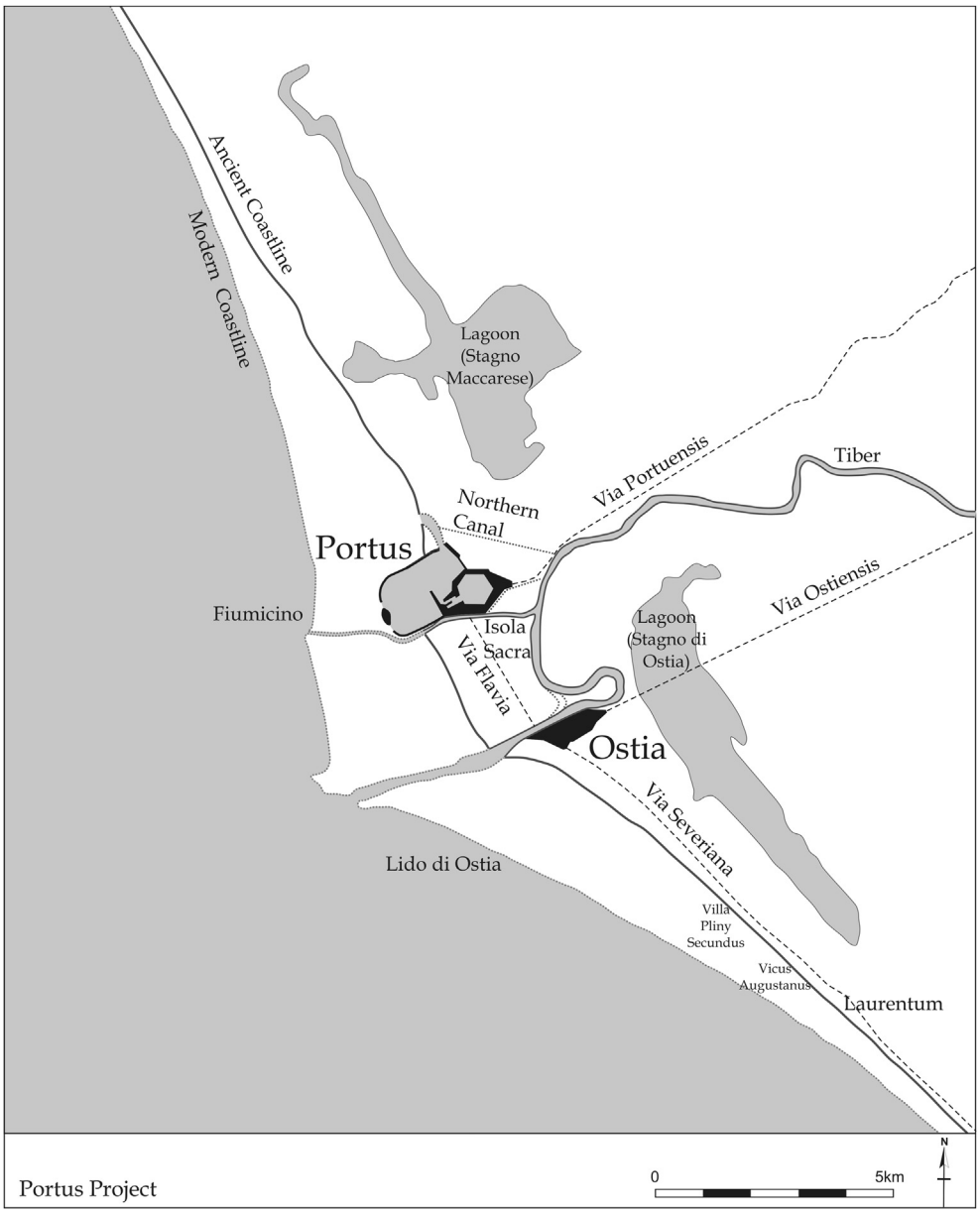

Fig. 1. Location of Portus, showing the main sites mentioned in the text.

buried archaeological materials will affect the ability of different techniques to detect features, and results can be open to over-interpretation, fitting the anomalies present in the datasets into prescribed hypotheses or notions of a particular site or landscape. This paper presents the results of a pilot project[1] that attempts to explore the potential of using additional non-destructive methods on major Classical sites. We integrate high-resolution satellite data with results from previous geophysical surveys, and calibrate the results via further targeted fieldwork.

The landscape of Portus demonstrates the need for a multi-faceted approach to the study of the archaeological site and its surrounding landscape. From the beginning of the geophysical survey at the site in 1998, and the Portus Project in 2007, the team has applied different methods of ground-based survey to assess the nature of archaeological remains (Keay et al., 2008a, 2008b, 2009, 2011, 2012a, forthcoming; Goiran et al., 2009; Ogden et al., 2010; Strutt and Keay, 2008). With such a background of a complex palimpsest of sub-surface and extant archaeological deposits, the authors of this paper applied multi-scalar, multi-temporal, and multi-spatial survey approaches in order to enhance our understanding of the site and its region, and to explore new ways of framing research questions and hypotheses relating to the site. It is hoped that the results will serve as a model for other major archaeological projects which use survey on complex sites of significant historical importance.

2. Archaeological context and discussion

Portus, constructed in the Tiber delta on the ancient Roman coastline is located some 35 km to the south-west of Rome, to the

[1] The work was undertaken at the behest of, and funded by, the BBC/Discovery in collaboration with the Portus Project and the UAB as part of the television programme “The Roman Empire: What Lies Beneath”.