Detecting and Mapping Hilltop Sites between the Cesano, Misa, and Nevola River-Valleys

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Introduction

Marche is a region in central Italy, situated in the external sector of the Adriatic side of the Umbria-Marche Apennines, a trust-and-fold chain rising up since Miocene. It is characterised by short rivers with several orders of terraces, deep gullies and narrow alluvial plains. The Cesano and Misa rivers, including the Nevola torrent, are situated in the northern part of the region and flow orthogonally to the coastline. The landscape of the Marche region is subjected to continuous changes, which can be monitored by studying old and modern remote sensing data. The terraces originated during the uppermost Pleistocene-Holocene, due to the dissection of the alluvial fill (Dall'Aglio, *et al.*, 2012). During the 3rd century BC, the Romans operated a division of the *agri Picenus et Gallicus* (*lex Flaminia*, 232 BC), which resulted in a massive and growing network of drainage that caused a deep transformation of the landscape (e.g., the meandering configuration of the rivers). The landscape started to change again in the 5th and 6th centuries AD, when the Cesano and Misa valleys went through a process of depopulation (Dall'Aglio, *et al.*, 2012). Caused by both natural (e.g., a climate cooling) and human factors (e.g., the Gothic Wars in AD 535-553), it led to waterlogging, wasteland, and hydraulic disruption (Dall'Aglio, *et al.*, 2012). As a consequence, the cultivated area was replaced by woods and swamps. Eventually, the braided configuration of the rivers in the Cesano and Misa valleys was restored. In the recent years, the changing rhythm is accelerating due to more invasive ploughing techniques and a shift in cultivation, from olives and wine to cereals (Boschi, 2020).

In the central-southern area of Marche, many pre-Roman necropolises and settlements were mapped in the hilltops of the Potenza and Esino valleys, around Ancona and the Conero promontory. The Cesano, Misa, and Nevola river-valleys, instead, seemed to be less populated. In the Cesano valley, while traces of settlements have been found on top of plains or river ridges (e.g., Montedoro, Miralbello), the data about the necropolises is lacking. On the other hand, in the Misa and Nevola valleys, data about necropolises is abundant, whereas the settlements are still to be mapped (Boschi, 2022). However, scholars believe this could be related to a lack of systematic studies (Boschi, 2020).

This project aims at mapping and detecting hilltop Picenian settlements in the river-valleys of the Cesano, Misa, and Nevola. They will be then connected with known necropolises in the area. To do

so, a holistic approach will be applied, involving the study of cartography, geomorphology, LiDAR, satellite imagery, and aerial photos. Moreover, this project will focus on identifying markers for the detection of Picenian settlements, as has been done for the necropolises by Professor Federica Boschi. To do so, a comparison with geomorphologically similar valleys will be made (e.g., the Potenza valley). Eventually, field-walking surveys will be conducted to verify promising sites.

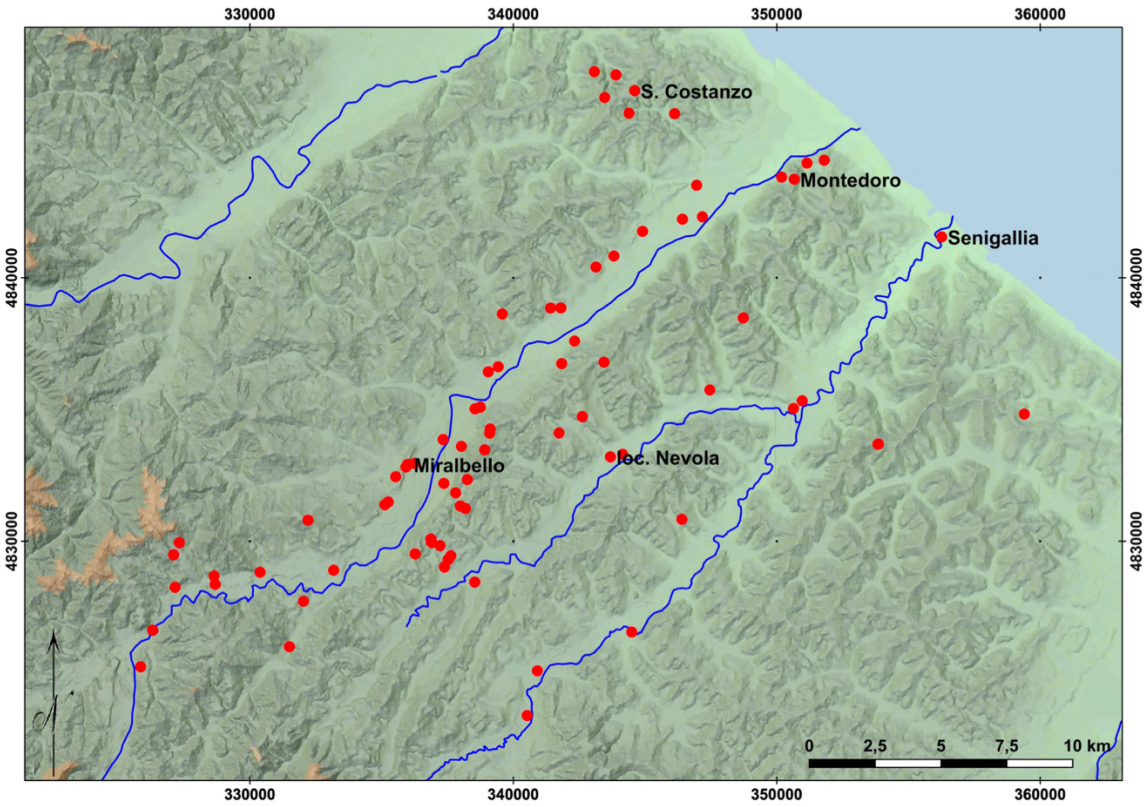

Figure 1. The sites mapped by the University of Bologna in the Cesano, Misa, and Nevola river-valleys (after Boschi, 2020, p. 53).

Methods and Analyses: A Comparison with Previous Research

The effectiveness of a holistic approach has been demonstrated by many scholars (e.g., the Potenza Valley Survey team of Ghent, the ArcheoNevola project). The University of Bologna is working in the Cesano, Misa, and Nevola river-valleys since the early 2000s. Aimed at evaluating the buried archaeological record and contextualising the necropolises, the project consisted of an integration of old and new data. The techniques used included toponymy, documentary, and literal sources, trial digs, field-walking surveys, aerial photography, and geophysical surveys. Among the geophysics appliances used, geomagnetic prospections and resistivity resulted to be the most performing in the area. GPR was almost unsuccessful because of the clayey soil (e.g., in Suasa), as has been also proved

by the Potenza Valley Survey team (De Neef, 2020). The Potenza Valley Survey (PVS) is an ongoing project of Ghent University focused on the population of the Potenza valley. Even though its primary aim was better understanding the settlement record during the Roman period, was then extended to pre-Roman population. The research was carried out through non-invasive prospections, with a particular focus on geo-archaeological studies (De Neef, 2020).

Following the example of both teams, the first step of this research will be an integration of data from ancient and modern aerial pictures, satellite imagery, and LiDAR.

A GIS to compare the results of the analyses and to monitor the changes in the landscape will be created. Particular attention will be given to the orography of the selected valleys, to detect the hilltops more favourable for Picenian settlements.

The research will also focus on identifying a settlement pattern in order to implement the investigations conducted by the ArcheoNevola project and the recently launched project *SEnsing ARCHaeology. Non-invasive mapping and tracking technologies for evaluating and protecting buried archaeology* (coordinated by F. Boschi). According to the investigations undertaken so far, the annular ditches, identified as Picenian funerary contexts, are characterised by a sharp circular shape of twenty to thirty m diameter (Boschi, 2022). These sites share some peculiarities: the geographic position, extension, and shape. They were set in a crucial point for road and fluvial systems: near road axes, the confluence of two rivers, and fords. Another marker is related to the extension of the site, which usually covers the totality of the plain. Their measure is standard, varying from 15 to 30 meters. The cluster disposition is the most common one. Monuments have been found in the funerary sites. They were usually delimited by circular ditches, covered with mounds or deposits of soil and stones, both made with excavated soil. Due to their position, necropolises have been hypothesized as pivotal places that could have had several connotations, among which certainly a value as territorial markers (Boschi, 2022). Together with the topographical position of the necropolises, another analogy is the continuity of occupation of the sites, or, possibly, a long-standing occupation and use of the site. The necropolises were also used by the Romans (from the 2nd to the 4th centuries AD). The same peculiarities are shared also by other areas of Marche. For example, Monte Franco, a site investigated by the PVS, is situated in a strategic position: the Potenza River crosses through the ridge at Passo di Treia, providing an east-west and north-south crossroads connecting the Appenine inlands, river valley, inland hill ranges, and coastal zone (De Neef, 2020).

As the presence of markers has been demonstrated for the Picenian necropolises, it is expected to find similarities for settlements too. The most important sites in the Cesano valley are Montedoro

and Miralbello. The latter is sited on a plateau at about 174 m above the sea and provided traces of occupation from the Bronze and Iron Ages to the Middle Ages (Gaucci, 2020; Giorgi, 2020a). Two concentric ditches of 200x100 m, containing regular features interpreted as structural elements, were mapped using geophysics. The site was also subjected to a field-walking survey, that shed light on impasto pottery attributed to the Picenian tradition (Giorgi, 2020b; Boschi, 2020).

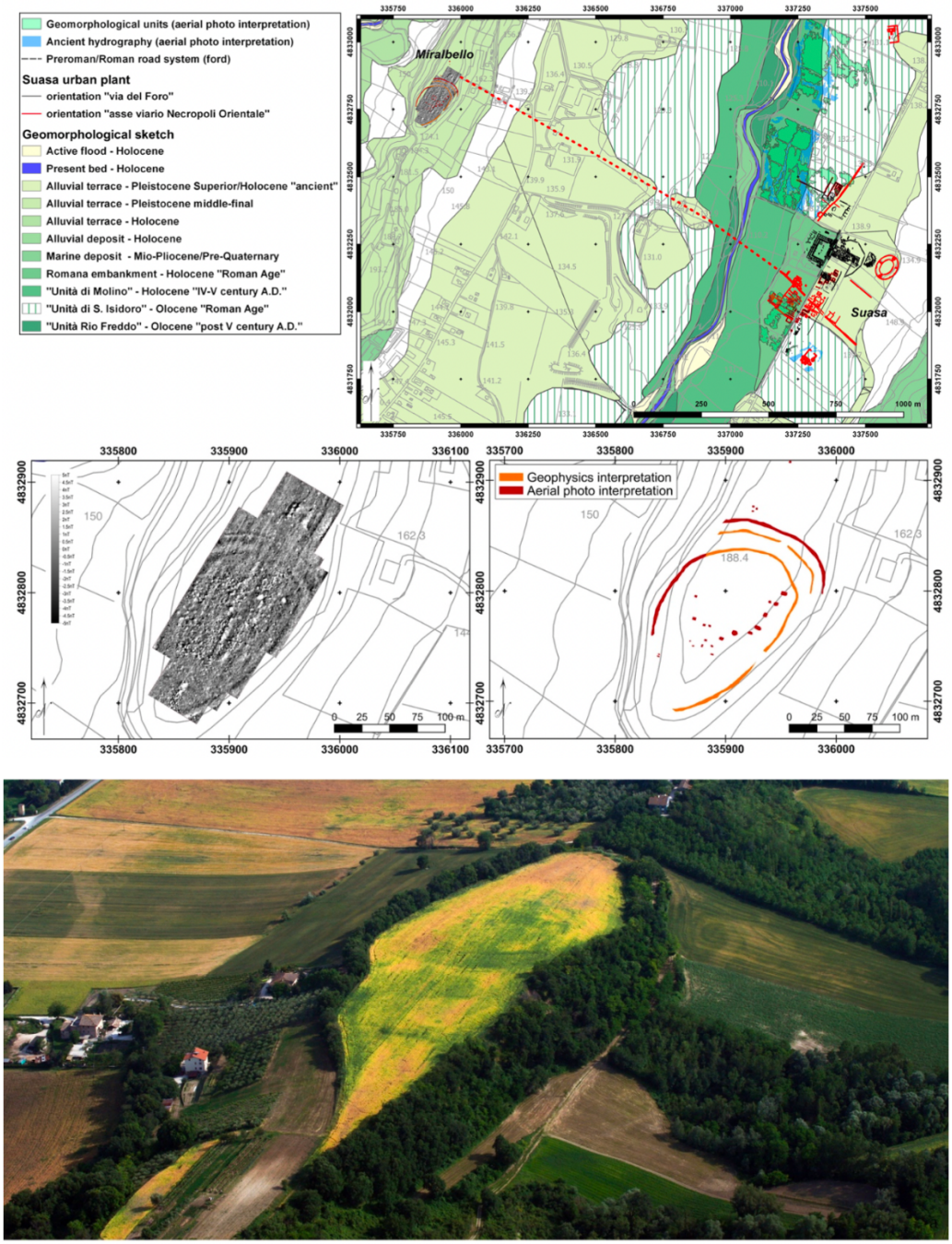

Figure 2. The site of Miralbello (after Boschi, 2020b, p. 58).

Montedoro is located on a hilltop too, about 100 m.a.s.l. It dominated the mouth of the Cesano river and was highlighted as an active settlement from the early Iron Age up to the 5th century BC.

However, its river port is believed to have survived even longer. In the 4th century BC, the site was substantially abandoned (Gaucci, 2020).

Moving to the Potenza valley, the site of Montarice is sited on a flat elliptical hilltop plateau of seven hectares. The site was occupied since the Middle Bronze Age (as confirmed by impasto pottery) until the Republican times. The plateau was surrounded by defence structures, such as walls or ditches. Traces of the "village" have been found in the nearby valley floor, near the river beach. This could suggest a commercial use, to facilitate contacts with the area of the Monte Conero and the valley corridor (De Neef, 2020).

Conclusions

Most of the information relative to the Picenian population comes from the necropolises. Settlements and economy, on the other hand, remain largely unknown (De Neef, 2020). As demonstrated by previous research in Marche region, a holistic approach is the most effective technique to map hilltop sites and gain a better understanding of the area. After the analysis of aerial pictures, LiDAR, and satellite imagery to identify promising sites, markers of Picenian settlement trends will be investigated. To do so, a comparison between with geomorphologically similar valleys (e.g., the Potenza valley) will be made. By comparing three different sites, Montedoro and Miralbello (in the Cesano valley), and Monterice (in the Potenza valley), a first hypothesis can be made. All the analysed settlements were sited on hilltops or plateaux. Moreover, they were set in strategic positions (e.g., at crossroads or fords), probably because of the possibility of commercial contacts with the surrounding areas. Another marker could be the presence of defence structures (probably walls and ditches) surrounding the site. An integrated approach and systematic surveys would lead to a stronger knowledge of the area, including spatial organisation, and changes in the landscape (as highlighted in De Neef, 2020). Moreover, it would guarantee future well-targeted excavations.

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