



Magnetic and ground penetrating radar surveys for the research of Medieval settlements in the inland of the Marche Region (Italy)

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This work was carried out in the framework of the R.I.M.E.M. project (Research on Medieval settlements in the inland of the Marche Region, Italy.) leaded by the Universities of Macerata and Udine and having the aim to produce a significant contribution for the comprehension of the settlement process in the Central and Southern Italy during the Late Roman Period and Early Middle Ages.

Then, an extensive gradiometric survey were carried out, by using a vapour caesium magnetometer, in the area included amongst the municipal districts of Calderola, Cessapalombo and San Ginesio, sited in the area closed to Macerata between the valleys of Chienti and Fiastra rivers. Moreover, in the most interesting areas, a 400 MHz 3D ground penetrating radar (GPR) survey was carried out in order to get the precise overlapping with the magnetic method.

The Magnetic method is now a standard practice in the archaeological research taken into great consideration for its non-destructivity and quickness and its capability of mapping wide areas in quite a short lapse of time (Bavusi et al., 2008). Moreover the method provides an information well correlative with remote sensing data (Gallo et al, 2008).

The GPR method is extremely useful for archaeologists thanks to its non-destructivity and capability of giving real-time and high-resolution data (Basile et al., 2000). Today the effectiveness of this method was improved by powerful 3D visualisation methods as well as 3D space, time or depth slices and iso-amplitude surfaces, too (Nuzzo et al., 2002).

The integrations of several geophysical methods are usual (Sambuelli et al.1999, De Domenico et al., 2001; Chianese et al., 2004) particularly when a simple comparison in cross section along the same profiles can be performed.

In this work the overlapping between two kinds of data was complicated by different outputs coming from two methods: maps for the magnetic method and cross sections for the GPR one.

The 3D survey design for the GPR survey and a complex processing routine was carried out in order to get both data volumes and time slices, more easily comparable with magnetic maps. Magnetic data processing included spike removal and destripe.

Finally, the results revealed the presence of several target of archaeological interest and, where two methods were carried out, the results are consistent.

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