

Archaeological data and geophysical survey at Masseria Grasso (BN, Italy): Ancient Appia Landscapes Project

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Abstract – Since 2011, the *Ancient Appia Landscapes* project has improved the knowledge of the territory east of Benevento by reconstructing settlement dynamics and ancient landscapes in a large chronological range. It also has studied cyclical elements and human activities influenced by landscape shapes and vocation. The project aims the use of a multidisciplinary approach. Different archeogeophysical methodologies was carried out in order to detect anomalies potentially correlated with buried archaeological evidences. This integrated approach has allowed to identify the site of Nuceriola, located at the fourth mile from Benevento along the Appia road.

I. INTRODUCTION

The *Ancient Appia Landscapes* project is working with a multidisciplinary approach by the University of Salerno, in partnership with “Soprintendenza Archeologia, Belle Arti e Paesaggio per le province di Caserta e Benevento”, the CNR-IMAA of Tito Scalo (PZ) and the GeoGisLab of the Dipartimento Bioscienze e Territorio (University of Molise). The main aims is to study the territory of Benevento from an historical point of view, in its anthropic assets and spatial forms (agricultural divisions, road axes, etc.) [1-2]. The research involves several steps of analysis and stages of study, with various methods and tools of investigation, from a territorial to an intrasite scale [3-4]. Following a macroscopic spatial study that led to the analysis of historical maps, paleobotanical documentation, aerial photography interpretation, geomorphological and archaeological surveys, an intrasite survey was conducted on a narrower area. In this context, an archeogeophysical surveys has been realized just before to define an archaeological digs in Masseria Grasso area-

II. ARCHAEOLOGICAL CONTEXT

The research covers a broad area east of the city of Benevento. Two hypothetical cadastres were identified by the team of Besançon, dated back to the Triumviral period (*Beneventum I*, 20x20 actus, N 42° E) and to the Augustan era (*Beneventum II*, 16x25 actus, N 2° W) [5]. Recent considerations about Beneventan cadastres did lean towards a new dating: the years of the colonial foundation (after 268 BC) for the *Beneventum II*, the Triumviral-Augustan age for the *Beneventum I* [6-7]. In this territory A. Meomartini supposed that a segment of the Appia was recognizable in Masseria Grasso Area [8]; here, recent archaeological investigations confirm the presence an important settlement identified as the *statio* of Nuceriola, located at the fourth mile from Benevento and dated from the middle of IV century BC to the VI-VII century AD.

III. APPROACH AND METHODS

In the described archaeological context, a large archeogeophysical survey was carried out in the area. The figure 1 shows part of the Geomagnetic survey carried out in 2014 before the archaeological excavations.



Fig. 1: Geomagnetic results

The used instrumentation was the cesium vapor magnetometer is the G 858 of Geometrics. The gradiometric method, defined as passive, is based on the measurement of the Earth's magnetic field. These technique, widely used in archaeological field, for low cost, rapid data capture/processing and not invasive features, permit to map shallow structures and give guidelines for the subsequent excavation and archaeological studies [9]

The geomagnetic map highlights several iso-orientated anomalies potentially related to buried structures. Structures with the same orientation would seem to occupy the entire northern portion of the investigated area, almost like an attestation of the presence of iso-oriented buildings belonging to a multi-stratified site. Dark anomalies with low gradiometric values may be related to the presence of significant traces of fire (such as the furnace investigated). Instead it is difficult to interpret the light colour trace along the eastern edge of the map and having a N 61° W development. This track would seem to break the continuity defined by the orientations previously mentioned. Therefore, two main area where defined for an archaeological excavation (red circles). In 2015 and 2016, excavations allowed to recognize the path of Appia road and several structures related to a production area (Fig. 2).



Fig. 2: Archaeological excavations (2015-2016)

In the south sector, two archaeological digs (namely Saggio 1 and Saggio 2) confirm the presence of an ancient path dating from the end of 4th century BC to the 5th-6th century AD. The road consists in the overlap of several levels of frequentation suggested by curbs and cobbles disarranged by ploughing. It is about 5.6m wide (19 “pedes romani”), compatible with the width of some ancient roads. Moreover, it has the orientation of N42°E, according with the Triumviral-Augustan centuriation (20x20 *actus*) and its hypothetical projection could correspond with a main centurial axis.

In the north sector, a further dig (Saggio 3) shows two little kilns and remains of several spaces linked to a perimeter wall. The presence of many sherds, including

the “pareti sottili” class along with a great number of kiln wastes suggests a production complex dating between the Augustan-Tiberian era and the half of 1st century AD. The evidences allow defining an archaeological framework that embraces a large and articulated historical period; the anomalies found in the geophysical survey can support the reconstruction of the entire complex, at the moment only partially excavated.

IV. NEW RESULTS

Following the archaeological excavation, new geophysical prospecting have provided by means of GPR. The instrumentation used is SIR 3000 of GSSI with 400 MHz antenna of centre-band. This technique, defined as active, is based on the introduction of electromagnetic waves into the ground and subsequent recording of the reflections. During the archaeological excavation, several GPR surveys were carried out close these areas, in order to give more information to the archaeologist. The figure 3 shows one of the investigated GPR area close the Saggio 3 archaeological excavation.



Fig. 3: GPR investigation area close the Saggio 3 archaeological excavations (2015-2016)

The investigated area has a dimension 10x10 meter and it was analyzed by 10 parallel profiles at constant distance (1 m) to allow 3D visualizations. The investigated area has furnished interesting electromagnetic reflections. The figure 4 and 5 highlight two time slices coming from the results of the 3D GPR survey.

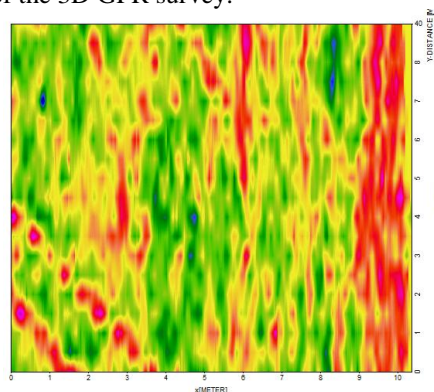


Fig.4: GPR time slice at 15 cm with a $V=0.14m/ns$

From the slices obtained through the processing of the recorded radargrams, it is possible to observe a series of linear anomalies that partially intersect each other and seem to correspond with great part of the anomalies already described in the previous paragraph. Furthermore, it is important to highlight in figure 4 the pair of parallel traces present in the southeast corner of the acquired area (road path?) and the continuous red anomaly that runs along the northern edge.

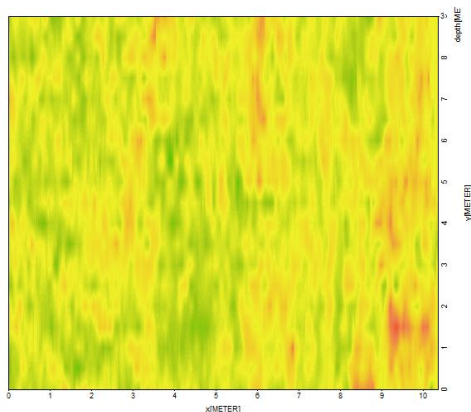


Fig.5: GPR results: time slice at 75 cm with a $V=0.14m/ns$

The deep time slicers show some more linear anomalies and some reflections coming from a planar surface. The linear anomalies could be associated to walls or some linear structures, otherwise the planar surface could be a pavement or ancient path.

The figure 6 highlight the 3D GPR image coming from the area between Saggio 1 and Saggio 2. The indirect results show two different kind of structures: 1) linear anomalies that could be associated to walls; 2) large planar anomaly on the west part of the investigation area that could be associated to the shadow of the ancient path.

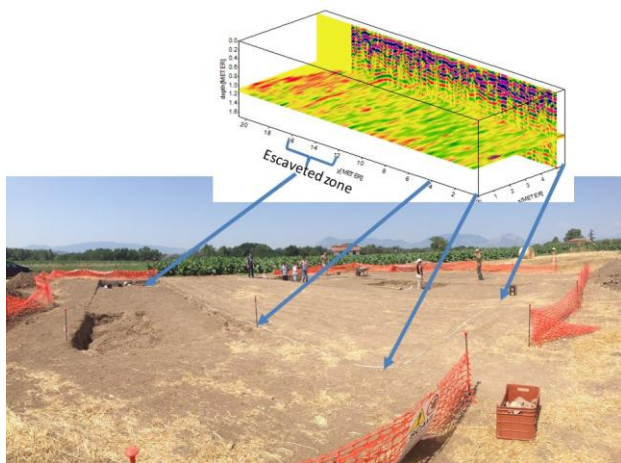


Fig.6: 3D GPR results with a time slice at 100 cm with

The final objective of these results were to define the possible development of archaeological structures already highlighted, in order to delimit and describe in detail the new areas to dig.

V. CONCLUSIONS

This contribution aims to offer new geophysical data to the archaeological community, highlighting that close and synergistic collaboration between disciplines nowadays can be a good starting point not only for planning excavation but also for a real knowledge of the subsoil. In a time of strong economic and institutional instability, just a multidisciplinary cooperation can contribute to a real safeguard of the cultural heritage. The integrated application of tools, methods and techniques currently leads to a knowledge and safeguard of what it could be preserved and protected after a destructive excavation intervention

VI. REFERENCES

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