The use of GPR in Archaeology: the structural detailing of buried Roman baths

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INTRODUCTION

This study evaluates the feasibility of GPR for the structural detailing of buried Roman baths. Up to now, studies on the analysis of data deriving from GPR prospections regarding thermal complexes have mainly focused on retrieving and completing the plan-views and studying the different phases of the structures. Scientific contributions concerning the identification of hidden bath among the other possible buried structures by means of GPR are still lacking.

OBJECTIVE

The aim of the study is to focus on the possibilities of GPR to detect buried archaeological remains and in particular architectural features and to interpret the function of buried structures. Moreover to identify the anomalies deriving from the specifically bath-related structural characteristics, such as the hypocaustum, with its double floor, and the activity of the praefurnium from which the hot air started its circulation through an arch and after that below the floor and between the walls of the caldarium.

RESULTS

The analysis of the data has shown some significant results concerning the structural and functional features that could be useful to identify specific elements for easily recognizing this kind of structures by geophysical surveys.

- It was possible to identify the main ancient buried structures and features (like hypocaustum and the arch) already detected during the last century’s excavations.

The tomography in which it is possible to recognize the rectangular right tank, part of the left and of the apex of the tank (a tree had damaged the middle part of the latter one).

- The tomographic analysis stressed out a wall pattern that seems to suggest the presence of further rooms in the top-right side of the area and highlighted the presence of two further tanks, suggesting the possibility of further rooms to be located close to the known ones.

METHODOLOGY

Ground Penetrating Radar (GPR) is well known as a viable equipment for locating buried archaeological remains. Its effectiveness is mostly due:
- to a wide range of available antenna frequency systems,
- to the enormous amount of information retrieved
- to the possibility to obtain a tomographic plan view of the area investigated.

The grid and the survey on the field.

The tomography with highlighted the wall pattern.

The tomography with highlighted the potential presence of further tanks.

The survey through Ground Penetrating Radar has been carried out in the Maxentius Complex, along the ancient Appian Way in Rome. Precisely an area of the site occupied by a thermal building (2nd century AD), partially brought to light during the 2nd half of the last century then buried and no more visible.

The remains of the baths complex are characterized by three rectangular thanks (15.50 m wide and 19 m long). On the southern side another tank with an apse shape is located and part of its roof is still visible at a height of 7.20 m.

An iconic example of space articulation and composition with different shapes, Romans considered baths spaces both for health and hygiene care and meeting places where anybody could go. Thermi were often provided with luxury furnishing and impressive architecture according to the possibilities of the client, who frequently coincided with the Emperor himself. According to the specific function of these structures, which required the warming of entire pools and rooms for bathing, they were realized through remarkable technical solutions, like the hypocaustum system: an underground space in which the hot air heated by ad hoc ovens (praefurnii) flew among a network of small pillars supporting the floor (suspensura). The tanks were located, and thanks to the well cavities made by tubi (ballow bricks).

Despite the evident evolution of this kind of buildings in the transition from the Republican period to the Imperial age, the planimetric scheme and the main spaces (caldarium, tepidarium, frigidarium and sudatorium) remained roughly unvaried.

The grid and the survey on the field.