



An application of geophysical techniques to the study of man-made cavities of historical importance

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Geophysical techniques, based on different methodologies (Ground Penetrating Radar, electric tomography), are very useful to integrate the classical archaeological investigations, and may provide important results to be combined with other surveys. In this study, the geophysical prospections are applied aimed at gaining a better knowledge of a cultural heritage site in the inner part of Apulia region, in southern Italy. The study area is located near Altamura, in a rural area of the Murge plateau, and specifically in the immediate surroundings of Masseria Jesce (masseria is the typical countryside mansion in the region), which first settlement dates back to the end of 1500. There, five man-made cavities are present, two being located in front of the main facade of the mansion, whilst the remaining three are at its back. They are related to different activities carried out in the centuries at the site: from shelters for animals, to sites of production of milk and cheese, works for water collection and distribution, etc. All the man-made cavities are of high historical value but the most important is probably an hypogean crypt, site of christian worship, which walls are decorated with several frescoes dating back to the 14th century.

Within the framework of a project dedicated to reach a better knowledge of the area, and to partial restoration of the site as well, geophysical techniques have been used in combination with direct speleological surveys to detect the known artificial caves, and to help in the identification of the probable, further ones. Main goal of the survey was in fact to obtain detailed information on the development and features of the underground cavities, and to verify their likely continuation.

At Masseria Jesce the Ground Penetrating Radar (GPR) prospecting was carried out by means of a SIR20 GSSI system with GSSI 270 Mhz antenna, that provides a good compromise between resolution and depth of investigation. The data were subsequently processed using three-dimensional processing techniques by means of the RADAN software.

The multi-methodological approach, involving GPR, electrical tomography (ERT) and the direct survey of the cavities allowed to define with high precision the morphological and topographical features of the area, together with the size and extension of the man-made cavities. The latter information were, in particular, extremely useful for assessment of the risks related to the presence of underground voids. In conclusion, the known cave system has been compared with the geo-electrical and GPR anomalies surveyed. In general, a good agreement was observed with the known extension of the subterranean cavities. In some cases, however, the registered anomalies are probably to be related to further cavities, so far unexplored, that should be object of specific, direct surveys.