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## **New integrated GPR surveys, using different frequencies, with direct archaeological excavations to locate chamber tombs in Monte Abatone necropolis, Cerveteri (Italy).**

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The Monte Abatone Project, jointly developed between the Campania University “Luigi Vanvitelli” (Caserta) Prof. F. Gilotta, the Tuscia University (Viterbo) Prof. M. Micozzi and A. Coen, the Bonn University, Prof. M. Bentz and ISPC (CNR) is based on the development of an integrated research employing different methodologies to reconstruct the limits of the necropolis and the location of all different tombs. This necropolis is one of the main important necropolis of Cerveteri, located 60 km north of Rome (Latium, Italy). In the period 1950-1960, several tombs have been discovered and excavated, though still many remain hidden underneath the subsurface. In the period between 2018 - 2021, geophysical surveys have been carried out to investigate the unexplored portions of the ancient Etruscan Necropolis, to provide a complete mapping of the position of the tombs. Ground Penetrating Radar and the Magnetometric methods have been systematically employed to investigate about twelve hectares of the necropolis. GPR system SIR 3000 (GSSI), equipped with a 400 MHz antenna with constant offset, SIR4000 (GSSI) equipped with a dual frequency antenna with 300/800 MHz and the 3D Radar Geoscope multichannel stepped frequency system were employed to survey the selected areas where the presence of tombs was hypothesized from previous archaeological studies.

All the GPR profiles were processed with GPR-SLICE v7.0 Ground Penetrating Radar Imaging Software (Goodman 2020). The basic radargram signal processing steps included: post processing pulse regaining; DC drift removal; data resampling; band pass filtering; background filter and migration. With the aim of obtaining a planimetric vision of all possible anomalous bodies, the time-slice representation was calculated using all processed profiles showing anomalous sources up to a depth of about 2.5 m. The obtained results clearly show the presence of a network of strong circular or rectangular features, linked with the buried structural elements of the searched chamber or pit tombs. Together with archaeologists, these anomalies have been interpreted to have a good matching with the expected searched tombs. The obtained results have enhanced the knowledge of the necropolis layout and mapping. After the geophysical surveys, direct excavations have been conducted, which brought to light few of the investigated structures. The obtained results, after the excavation, have been compared and integrated with the geophysical maps to define the keys for the interpretation.

### **References**

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