



## **GPR Surveys for Archaeological Investigation in a Bronze Age site from NW Portugal**

L. Gonçalves (1,2,3), H.A. Sampaio (3), A.M.S. Bettencourt (2,3), M.I.C. Alves (1,2,3)

(1) CGUP - Geology Centre, University of Porto, Portugal, (2) Earth Sciences Centre, University of Minho, Braga, Portugal, (3) CITCEM - Transdisciplinary Research Centre Culture, Space and Memory, University of Minho, Braga, Portugal

This work describes the use of Ground-penetrating Radar (GPR) surveys in the identification and mapping of subtle cultural remains, from Pego Late Bronze Age settlement, located near the city of Braga, in NW Portugal. Bronze Age settlements from NW Portugal are characterized by the presence archaeological structures such as storage pits, postholes and trenches. These subtle structures have a very low dielectric contrast, making them quite difficult to detect in GPR surveys. In the case of Pego Site, previous investigations using conventional archaeological techniques, during a rescue excavation, partially revealed a residential area, a necropolis, and a stockade foundation trench that encircle the whole settlement. Different GPR prospection approaches were performed using GSSI Sir 3000 System, with 400 MHz antennae, with the objective of identify and define the borders between the different areas of human occupation inside the settlement. For the GPR survey, a grid-based approach with closely spaced parallels transects was defined, covering different areas inside the site. A first survey was conducted with a pseudo-3D methodology, with 50 cm profile separation, followed by a second survey with a dense data acquisition methodology, with 10 cm profile separation. Processed two-dimensional GPR profiles and constructed amplituded-slice maps were produced and analysed. Wave velocities were determined by reflected wave methods and by Hyperbola-Fitting method. The background analysis of the archaeological and geological features of the site, integrated with the preliminary interpretation of GPR data (profiles and amplitude slice-maps) suggest the presence of flat graves, in the west part of the site, and storage pits, post holes and some small trenches, in the centre and north area of the settlement. This interpretation indicates that the settlement is individualized in two different areas, a necropolis and a residential area, such as the first archaeological study suggested. Systematic excavations conducted in the residential area confirmed the clues inferred by the GPR survey about the presence of a trench and some postholes. By the use of a non-destructive geophysical technique it was possible to detect and map unstudied areas from the site. It was also possible to define GPR data acquisition and processing methodologies suited for the NW Portugal Bronze Age archaeological context.