



Advantages and disadvantages of Georadar used for hydrogeological investigations: case of study of shallow aquifer in the Brindisi Plain (Southern Italy).

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Among the most recent techniques for the underground stratigraphy reconstruction, the Georadar (or Ground Penetrating Radar) no-dig technology is now becoming very important.

This technique was used testing a new prototype of antenna in some sites near S.Vito dei Normanni and Tutturano, in the Brindisi district (Southern Italy), where geological and hydrogeological features are well known from previous researches. It is a zone characterized by the outcrop of Cretaceous bedrock of Apulian carbonate platform, on which transgressive calcarenites are found (Upper Pliocene – Lower Pleistocene); upwards more recent clay sands and calcareous sands are found (Middle – Upper Pleistocene) and they are characterised by vertical and lateral high variability of facies. Two hydrogeological environments there are in studied area: the first is represented by deep groundwater, housed by carbonatic aquifer; the second is represented by surface groundwaters system housed by Pleistocene sands.

The Georadar used here is based on the emission of low frequency electro-magnetic waves underground, and the waves reflected from high dielectric discontinuities are sent back to the device. The specific use of a new prototype of a 40 MHz antenna allow, in ideal conditions, to reach maximum depths of 40 m with a vertical resolution of about 50 cm. After that some preliminary calibration tests were effected, three investigation sites with different hydrogeological features have been selected. Georadar sections have been performed along traces parallel to country roads, for a total amount of about 11 km of measurements, trying to effect sections both longitudinal

and trasversal, where it was possible in consequence of logistical conditions. The antenna is an unshielded type, so it is possible that the radar signal could be disturbed by element which are out of the underground; so, with the aim to define a quick survey method, the radar signal acquired near those elements was analysed and a detailed topographic survey with a GPS was performed.

The data elaboration allowed to reconstruct bi-dimensional sections, similar to the common geological cross sections, which were compared with the data acquired with traditional methods. That kind of verification gave good results, highlighting that the used technique was good and allowing to add new informations about the geometry of the main stratigraphic boundaries and facies variations in the sandy deposits. Another important aspect is represented by possibility of recognising surface groundwater bodies inside the Middle-Upper Pleistocene deposits. In fact, it is significant the partial reconstruction of geometry of arenaceous lens marked with sharp boundaries (reflected georadar signal it is very strong) and including shallow groundwater that causes a gradual decreasing of radar signal since to its total disappearance.