Hydrogeological Research with Geophysical Methods in Granitic Terrains (Gouveia-Seia, Portugal)

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Water resources are, on the whole, steadily decreasing in our planet. In Central Portugal there are large areas covered by granitic rocks, particularly in the area at the northwestern foot of the Serra da Estrela mountain. In this area, even though the mean annual rainfall is about 1000 mm/year, the asymmetry of the rainfall all along the year, together with the low porosity of the reservoir and the increasing demand for water supplies, can lead to situations of lack of water during dry years. In this context, the work developed aimed to clarify the geologic relationships of water occurrence within granitic massifs in an area of small thickness weathering materials using geophysical methods. Since several methods were used, it was possible to integrate data of different sources, as well as to compare their results.

The geophysical methods applied in this area include: (1) electrical methods &endash; vertical electrical soundings, electrical profiles, the square array, multidirectional soundings and pseudo-sections; (2) electromagnetic methods - VLF and VLF-R; and (3) gravimetry.

The field model used as a basis for geophysical interpretation emphasizes verticality as the major structural feature in a granitic environment of the type studied.

The results obtained allowed the determination of preferential water circulation zones within the granitic massif, and data analysis was strongly directed towards their positioning on the field. Conclusions are drawn on the potentialities of the different geophysical methods used, along with the ones of several data treatment and analysis procedures.