

GROUNDWATER PROSPECTING WITH GEOPHYSICAL METHODS IN CRYSTALLINE AND SEDIMENTARY ROCKS OF ESPIRITO SANTO STATE - SOUTHEAST BRAZIL

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Four geophysical techniques were used in several parts of Espírito Santo State, Southeast Brazil, mainly in the districts of Aracruz (Retiro, Douradinha and Córrego D'Água Farms), Rio Bananal (Boa Sorte and Jurema Farms) and Itaguaçu. The main goal of the surveys was groundwater prospecting in complex sedimentary and crystalline geological media. The used geophysical methods were: DC-Resistivity (DCRE), Time Domain Electromagnetics (TEM), Frequency Domain Horizontal/Vertical Loop Electromagnetics (HLEM and VLEM) and Well Logging (WL - natural gamma ray, normal/lateral resistivity, spontaneous potential, temperature and caliper). Field works were performed, through several soundings (TEM and DCRE), surface (DCRE and HLEM/VLEM) and hole profiles (WL), by Petroleum and Exploration Engineering Laboratory of the North Fluminense State University (LENEP/UENF), National Observatory of the National Brazilian Research Council (ON/CNPq) and Geohidro Serviços Geofísicos (GSC). The results derived from the preliminary one-dimensional interpretation of surface data showed us that, with this wide range of techniques, it was possible not only to map depth and length of sedimentary layers and fault/fracture planes, but also the exact position of these structural features. On the other hand, WL was able to clearly separate the shally and sandy geological formations, which was very important in the definition of aquifer and aquitard environments of the different sedimentary areas. Next stages of this research will concentrate on the interpretation of surface data using more complex models (two and three-dimensional) and to obtain petrophysical parameters (resistivity, porosity, permeability, etc.) of the different rocks from WL profiles.