

ELECTROMAGNETIC PROSPECTION AND THE SITE CHARACTERISATION IN THE GASO-CARBONIC HYDROTHERMAL PROVINCE OF NE PORTUGAL

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Any evaluation program for mineral and thermal water (M-Th W) resources in crystalline massifs ought to consider the exsurcences for their patterns of lithostratigraphic control, physico-chemical parameters, specific yields, geometry of the conductive zones, as these patterns tend to hold on within its hydrothermal province. This background supports the choice of the method of prospection and its laying out. For the province of the gaso carbonic, sodium bicarbonated, with high TDS and E.C.(0.9 to 5 mS/cm) waters of NE Portugal, it is found that the electromagnetic prospection, though limited to investigate shallow depths, gives fast and at low costs usefull information for: 1) drilling new boreholes, 2) dimensioning the conductive fault zones, 3) evaluating the vulnerability factors and shape the protection zones, 4) supporting long term and seasonal monitoring. On the six areas prospected for M-Th and plain waters, the apparent resistivities (ρ_a) were measured with the support of sixteen hundred EM sounding sites, using either the frequency of 18 KHz and 25 KHz or else 0.4 KHz. It is found that the ρ_a of the M-Th W conductive zones range from 5 to 70 ohm/m. Its discrimination from plain water conductive zones is difficult. As for their encasing rocks, the most frequent apparent resistivities are 500 to 1000 ohm/m, 400 to 500 ohm/m and 100 to 400 ohm/m, respectively for massive quartzites and granites, quartzphyllites and carbonaceous slates. These methods are adequate for M-Th W prospection.