Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10083, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10083
EGU General Assembly 2008

Geophysical study of the hydrothermal reservoir in the Panza area (Ischia, Italy)

A. Aiuppa (1) , P. Cosentino (1), A. D'Alessandro (1), R. Di Maio (2), D. Luzio (1), R. Martorana (1), N. **Messina** (1)

(1) Dept. C.F.T.A., University of Palermo, (2) Dept. of Earth Science, University "Federico II" of Napoli

The aim of the present work is the reconstruction of the main geometric pattern and the characterisation with geophysical parameters of geological structures lying at small and medium depths in an area of the Ischia island (Italy), where a sensible hydrothermal activity is present.

The investigations were concentrated in the Panza territory. In particular, a 2D high-resolution resistivity tomography was carried out between Sorgeto and Panza, as well as 14 superficially distributed TDEM surveys (Time-Domain Electromagnetic) and a SPAC (SPatial AutoCorrelation) vertical survey.

The Finite Element Method was chosen for the forward problem solution. The horizontal grid size was half the lowest electrode spacing (10m), while the vertical thickness of each model layer increases with his depth, starting from half the lowest electrode spacing.

The inversion algorithm used is the *robust inversion* (Claerbout and Muir 1973). This minimises the l1norm of the (calculated apparent resistivity – measured apparent resistivity) vector.

Inverse models derived from the different data sets show the following similar features: a high resistivity shallow layer ($\approx$ 500 $\Omega\cdot$m) less then 10 m thick in the left side of the profile. For abscissas greater of 350 m the thickness increases up to 30-40 m. In the left side the surface layer covers a less resistive, discontinue and heterogeneous

layer, having resistivity values in the range 20-200 Ω·m, and thickness of about 50 m. At a depth of about 80-90 m the top of a strongly conductive zone, probably related to the hydrothermal reservoir, is apparent as far as an abscissa of about 480 m. In the joint inversion, however, it can be observed that the bottom conductive layer extends also to abscissas over 480 m, even though at larger depths. The main lateral variations could be attributed to faults or sub-vertical geological contacts.

The TDEM measures were carried out with square and rectangular *coincident loop* configuration

This loop configuration for media with mean resistivity by some tens to some hundreds of ohm per meter, typical values for the surveyed area, agrees whit an investigation depth of about 250 m.

In 14 TEM, 42 decay curves were acquired using a single transmitting and a double receiving loop to increase the signal-noise ratio. Three different current frequencies were used to optimize the resolving power of the decay curves within different time intervals and to carry out a statistical assessment of the experimental data.

The 1D models derived from all TEM data inversion show many shared characteristics. In all the models, down to a depth changing between 50 and 100 m, an alternation of conductive and resistive layers (10÷100 Ω·m) about 20÷60 m thick is present. At greater depth a very conductive layer (resistivity less than 3 Ω·m) with a thickness of about 120 m is present. This is probably related to the hydrothermal reservoir. The deepest part of all the interpretative models is characterized by high resistivity values (averagely more than 100 Ω·m). The top of this layer is deep from 150 to 200 m in the investigated area.

Finally, by the inversion of the experimental dispersion curve of the first Rayleigh wave mode obtained by SPAC method, the velocity of S waves-deepness function was obtained. This shows geometrical features compatible with those of the resistivity model, in the zone near to the SPAC sounding.