



3D resistivity model of the Solfatara crater by AudioMT data

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In the framework of the MED-SUV project an electromagnetic survey is scheduled to define a high-resolution 3D resistivity structure both at shallow and intermediate depths on a target area covering the Solfatara-Pisciarelli-Agnano fumaroles. The aims were i) the investigation of structural link between the distinct fumarolic areas, ii) the recognition of the water table and iii) the structure of the hydrothermal field. In particular, the Solfatara crater is located almost in the centre of the Phleorean Fields caldera and several studies demonstrated a clear link between the change of its hydrothermal system and the ground movements of the whole Phleorean Fields known as bradyseismic phenomena.

An areal AudioMagnetoTelluric (AMT) survey was performed until now restricted in the Solfatara crater: it consists of 21 soundings in the frequency range 10 Hz – 100 kHz. This investigation permitted us to obtain:

- a preliminary 3D resistivity model of the Solfatara and
- a key-point recommendation for the ongoing survey of the whole area that will be ended in February.

The main features of the 3D resistivity model that fit the data are:

- an high shallow very conductive area, overlying a resistive zone, associated to the fumarole outcrop due to clay and relatively higher temperature;
- the presence at about 100 m below ground surface of a very conductive zone in the south-eastern part of the crater;
- the presence of a sub-vertical conductive alignment that resembles a NW-SE fault bordering the crater at West.

During the modelling and inversion of the collected data we evidenced that the adopted frequency range, typical of AMT band, is unable to give a good resolution at intermediate depths everywhere due to the very low resistivity (about 1 Ohm.m) characterizing the shallow fumarole's areas. This forced us to plan a wider frequency range for impedance estimation that will be extended to frequency as low as 0.1 Hz during a new ongoing survey in the whole target area. Furthermore, the present 21 soundings were collected during late spring-summer that corresponds mainly to a dry condition; the new ones, in the same sites, but acquired in late winter time, will permit an estimation of the seasonal resistivity changes that characterizes the crater area.