

Geochemical characterization of a High Resolution DC Electrical Resistivity Tomography crossing the summit craters of Mt Etna

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Between June and July 2015 a very deep ERT profile (Pole-Dipole configuration, 40m spacing between electrodes and a remote electrode located at ~10km from the acquisition points) has been performed in the framework of the "MED-SUV" Project. Self-potential (SP), soil gas concentrations (CO₂, ²²²Rn, ²²⁰Rn, He, H₂ and CH₄) and soil temperature (T) measurements were coupled to the ERT profile with a spacing of 20m (except for Rn: 40m). The NE-SW profile crossed Etna's summit craters in the middle of the 5720m ERT total length. Five roll along protocols of ¼ of the dispositive (640m out of 2520m tot) have been carried out and, for the first time, a high resolution DC ERT profile reached the noticeable investigation depth of 900m bgl. The results clearly evidence the central shallow hydrothermal system of Mt Etna with large positive SP anomaly, high values of T, ²²²Rn, CO₂, He, H₂ and CH₄, in the areas where the conductive bodies reach the surface in correspondance of the summit craters and the 2014 eruptive vents (CO₂, ²²²Rn and T). Structural boundaries, such as the Elliptic Crater (EC), were highlighted by a sharp decrease of the SP inside the EC. The high activity of ²²⁰Rn (Thoron) outside the EC highlights shallow gas source. The resistive body identified just below the NE crater is probably due to the over-heated plume rising from the top of the shallow feeding system towards the surface.