



The volcanic system of Ischia Island: insights from magnetotelluric and borehole data

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We performed an integrated study of island Ischia volcanic system, by using data obtained from magnetotelluric survey and drillings (temperature and stratigraphy), which allows us to improve the knowledge of volcano-tectonic processes affecting the island. The Ischia Island (located in the Bay of Naples, Italy) represents a peculiar case of a well-exposed caldera that has experienced a large (>800 m) and rapid resurgence, accompanied by volcanic activity. The mechanism driving caldera resurgence is a crucial issue to investigate, because it is associated with potential eruptions and high risk to people living within and around such large active volcanic systems. To this aim, a magnetotelluric (MT) survey of the island was carried out along two main profiles through the central-western sector, providing an electrical resistivity map to a depth of 3 km. These resistivity cross sections allowed us to identify the presence of a very shallow magmatic intrusion, possibly a laccolith, at a depth of about 1 km, which was responsible for both the resurgence and the volcanic activity. The resistivity data is also compared with geothermal gradients and stratigraphy of deep boreholes (down to 1 km of depth) located in the western sector of the island. The tectonic structures bordering the resurgent area and the occurrence of a large thermal anomaly in the western sector of the caldera provided a signature in the resistivity cross sections, with the magma intrusion producing advection of hot fluids with high geothermal gradients (>150 °C/km) in the southern and western sectors. Furthermore, the boreholes temperature data allow us to assess the possible rheological state of the magmatic source and its viscosity. This is fundamental to account for the transition from magma eruption to accumulation.