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# Geophysical investigations of the structural setting of the Ischia Island Caldera (Italy)

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Geophysical investigations are a tool for 3-D imaging of the subsurface. Geophysical images beneath volcanoes are based on different kind of data, and their integration usually increases the resolution of the resulting structural models. At active calderas, geophysical imaging can be very helpful because it plays a major role in the delineation of the structural context constraining the dynamics and because it is critical for hazard assessment.
Hazard assessment of active, densely populated volcanoes is primarily based on the knowledge of their past behaviour and present state. As a contribution to the definition of the present structural setting of Ischia island volcano, we constructed a new model of the shallow crust beneath the island through seismic tomography and gravity data inversion.
Ischia, located at the northwestern end of the Gulf of Naples (Italy), is one of the active volcanoes of the Neapolitan volcanic area, whose Pleistocene volcanoes have erupted in historical times. Ischia Island represents the emergent part of a more extended volcanic area developed westward of the island, with underwater volcanoes aligned along regional fault patterns. The activity of Ischia is evidenced by the historical eruptions, the intense and diffuse hydrothermal phenomena, and the seismic activity. The volcanic risk at Ischia is high due to the presence of 50,000 permanent inhabitants, the number of which increases during summertime because of tourists.
The Bouguer gravity anomaly data along with seismic tomography inversions allowed us to investigate the structural setting of Ischia down to 2 km depth b.s.l. Gravity data provided a well resolved image of the structure inside the island itself, while travel time data allowed us to accurately image the deeper part of the crust below the island.
Our new model contributes to the quantitative analysis of the caldera collapse related to the volcanic activity occurred between 77 and 150 ka BP. The main results provided by the 3-D seismic and gravity images are the definition of the caldera rim along the perimeter of the island, as hypothesized by many authors, and the presence of a high velocity and density volume inside the caldera consistent with the presence of the resurgent block that characterizes the recent deformation. Previously, the existence of these structures was proposed based on geological, petrological and local fluid geochemistry investigations at the surface. The main contribution of our results is to improve the definition of these structural features. Moreover, the measurements of physical parameters (density and P-wave velocity) can be useful to develop quantitative dynamical models of the island.