



Attenuation tomography of the main volcanic regions of the Campanian Plain.

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Passive, high resolution attenuation tomography is used to image the geological structure in the first upper 4 km of shallow crust beneath the Campanian Plain. Images were produced by two separate attenuation tomography studies of the main volcanic regions of the Campanian Plain, Southern Italy, Mt. Vesuvius volcano and Campi Flegrei caldera.

The three-dimensional S wave attenuation tomography of Mt. Vesuvius has been obtained with multiple measurements of coda-normalized S-wave spectra of local small magnitude earthquakes. P-wave attenuation tomography was performed using classical spectral methods. The images were obtained inverting the spectral data with a multiple resolution approach expressly designed for attenuation tomography. This allowed to obtain a robust attenuation image of the volumes under the central cone at a maximum resolution of 300 m.

The same approach was applied to a data set recorded in the Campi Flegrei area during the 1982-1984 seismic crisis. Inversion ensures a minimum cell size resolution of 500 meters in the zones with sufficient ray coverage, and 1000 meters outside these zones. The study of the resolution matrix as well as the synthetic tests guarantee an optimal reproduction of the input anomalies in the center of the caldera, between 0 and 3.5 km in depth.

Results allowed an unprecedented view of several features of the medium, like the residual part of solidified magma from the last eruption, under the central cone of Mt. Vesuvius, and the feeding systems and top of the carbonate basement, 3 km depth below both volcanic areas. Vertical Q contrast image important fault zones, such as the La Starza fault, as well as high attenuation structures that correspond to gas or fluid reservoirs, and reveal the upper part of gas bearing conduits connecting these high attenuation volumes with the magma sill revealed at about 7 km in depth by passive travel-time tomography under the whole Campanian Plain.