

Tectonic and volcanic structures in eastern Sicily as imaged by tomographic results of the TOMO-ETNA seismic active experiment

Graziella Barberi, Domenico Patanè, and Luciano Scarfi

Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Catania - Osservatorio Etneo, Catania, Italy

In the central Mediterranean region, collision, subduction and different types of volcanism in a very short distance (i.e. that of Etna and of the Aeolian volcanoes) characterise the complicated geodynamic framework of the eastern Sicily and southern Calabria. The geological processes that take place here have a great influence on the tectonic evolution of the region; accordingly, their understanding are major topics in the geological research. Despite the large number of studies, the major tectonic structures of the area and their complex interaction with the magmatism are still elements inadequately constrained and matter of discussion. In this work, we present high resolution tomographic images obtained using both seismic passive data acquired during the TOMO-ETNA experiment and a selected dataset of about 5,900 earthquakes recorded by the local INGV network. Our tomography, performed with a dense grid of measure nodes, allows us to investigate in careful detail the crustal structure of Mt. Etna, the Peloritani, the southern Calabria region and of the Aeolian Archipelago. In particular, results depict major discontinuities which characterise the Aeolian area, as part of the Southern Tyrrhenian Fault System, and which extend up to the Ionian Sea. In addition, some high velocity anomalies have been found in the southern sector of Mt. Etna. Results indicate that these last features could be related to a fissural activity of an ancient volcanic edifice which was located offshore the existing volcano and which has been disrupted and modified by erosive and tectonic processes during the time, since its formation more than 220 ka ago.