Crustal structure across the lateral edge of the Southern Tyrrhenian slab

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In the southeastern corner of the Tyrrhenian basin, in the central Mediterranean Sea, a tight alignment of earthquakes along a well-defined Benioff zone reveals the presence of one of the narrowest active trenches worldwide, where one of the last fragments of the former Tethys ocean is consumed. Seismic tomography furnishes snapshot images of the present-day position and shape of this slab. Through receiver function analysis we investigate the layered structures overlying the slab. We compute receiver functions from the P-coda of teleseismic events at 13 temporary station deployed during the "Messina 1908–2008" research project (Margheriti, 2008), and operating for an average period of 15 months each. The crustal and uppermost mantle structure has been investigated using a trans-dimensional McMC algorithm developed by Piana Agostinetti and Malinverno (2010), obtaining a 1D S-wave velocity profile for each station. At three of the stations, operating for a longer period of time, the number and the azimuthal distribution of teleseisms allowed us to stack the RF data-set with back azimuth and to compute the harmonic expansion. The analysis of the back-azimuthal harmonics gave us insight on the presence of dipping interfaces and anisotropic layers at depth. The strike and the dip of interfaces and the anisotropic parameters have been quantified using the Neighbourhood Algorithm (Sambridge, 1999).
Preliminary results highlight: (1) a neat differentiation of the isotropic S-wave velocity structure passing through the slab edge, from the tip of the Calabrian arc to the Peloritani Range, and (2) the presence of crustal complexities, such as dipping interfaces and anisotropic layers, both in the upper and lower crust.

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