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Upper mantle seismic tomography of southern Italy using data from recent passive experiments

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In the last few years, dense passive seismic experiments have been conducted in southern Italy with the goal of better understanding its deep structure and seismotectonic. Such deployments, along with the ongoing improvement of the Italian national network, increased significantly the coverage of recording sites, making available large datasets of local, regional, and teleseismic events for high-resolution lithospheric studies. In this study the upper mantle velocity structure to a depth of 550 km is investigated by integrating the teleseismic waveforms recorded by the permanent network in the last two decades with those collected from the continuous records of the temporary arrays (2001 $\div$ 2008). The dataset consists of 7355 P wave relative arrival time residuals picked from a selection of 239, Mw $\geq$ 5.5 events recorded at epicentral distances between 25° and 95°. A recently developed iterative non-linear tomographic procedure based on a subspace inversion scheme and incorporating a robust wavefront tracking method, is used to obtain the solution model. The resultant tomographic images show a pattern of P-wavespeed anomalies that better defines the geometry of the subduction system along the southern Apenninic arc from central Italy to Sicily. Beneath the Southern Apennines the main features of the model is represented by a SW-ward dipping high-velocity anomaly which extends from below 100 km to about 300 km depth. Below the Calabrian Arc the subducting Ionian slab is imaged clearly in the upper mantle down to at least 350 km depth. Pronounced low-velocity anomalies are visible around the southwestern boundary of the downgoing lithosphere, depicting a possible asthenospheric flow from the African mantle to the Southern Tyrrhenian back arc basin.