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Uppermost mantle structure beneath Southern Italy from Pn tomography

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In this study, Pn traveltimes from regional earthquakes are used to tomographically reconstruct the lateral velocity variations in the uppermost mantle beneath Southern Italy. The dataset consists of a selection of crustal events (depth < 35 km, $M > 4.5$) occurred in and around the Mediterranean region since 2002, recorded at epicentral distances between 200 and 1000 km. During the observing period, the number of permanent stations belonging to the Italian national seismic network increased significantly, and various temporary arrays deployed in the area for passive experiments improved furtherly the coverage. The linear fit of Pn traveltimes versus epicentral distances gives an average compressional wave velocity of about 8.0 km/s, and a mean crustal delay of 6.8 s. The set of linear tomographic equations, built up of the time term equation for each source–receiver pair, is solved by using a singular value decomposition algorithm. The explicit computation of the generalized inverse of the tomographic equations makes it possible to compute both the resolution matrix and the model covariance matrix, allowing us to estimate the resolution and reliability of the solution. The velocity anomalies range from -0.30 to 0.35 km/s relative to the mean velocity of 8.0 km/s. The most robust feature is represented by a wide high velocity anomaly imaged beneath the Apulian platform and the Adriatic Sea. This high-V structure well correlates with the region of positive P-wave velocity perturbation reconstructed by a recent high-resolution teleseismic study at 40 km depth. Low velocity anomalies are found in the mantle lid of the Tyrrhenian basin.