



V_p, V_s and density model of the Euro-Mediterranean area by Integrated Inversion of seismological and GRACE gravity data

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Tomographic inversion of P body waves, fundamental mode Love and Rayleigh wave group speed measurements, and gravity data, allow us to reconstruct V_p, V_s and upper mantle density structure below the Euro-Mediterranean area, down to 250 km depth.

PM0.5 P-wave tomography of the Alpine-Mediterranean area (Piromallo and Morelli, 2003), and the new transversely isotropic shear wave velocity model of the upper mantle in the European and Mediterranean region (Schivardi and Morelli, 2007), are inverted with the Bouguer anomalies derived from the satellite GGM02C (Tapley et al., 2005) high resolution global gravity model.

For our analysis we use the tomographic inversion method of sequential integrated inversion (Tondi and de Franco, 2006). The approach uses a probability density function, where the information given by the seismic model and the information on the physical correlation among the density and the velocity parameters limit the model space within that the inversion of gravity data can operate. The density model parametrization which uses polyhedral bodies whose density is linearly dependent on the three coordinates (Pohánka, 1998) leads to a perfect match between the density and the velocity models and takes into account the presence of structures characterized by a gradual increase in density with depth. Taking in account the data resolution, we define the cell model with a horizontal regular spacing of 1° x 1°. The model horizontal dimensions are approximately of 6600 km in E-W direction, 3900 km in N-S direction. The vertical spacing is 50 km. The reliability of the reconstructed models, which explain equally well both travel times and gravity data, is quantified through a

checkerboard test and the estimation of travel times and gravity residuals.