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Crustal and Upper Mantle three-dimensional stratification and Anisotropy from Receiver Functions (Northern Apennines-Italy)

P. Roselli, N. Piana Agostinetti, T. Braun

Istituto Nazionale di Geofisica e Vulcanologia (INGV)-Arezzo, Italy (roselli@ingv.it / Fax: +390575-403148 / Phone: +390575-403171)

The Northern Apennines (NA) were predominantly formed by a Meso-Cenozoic sedimentary sequence thrust northeast and stacked over the Adriatic foreland during Late Miocene-Pleistocene. Extension on the Tyrrhenian margin is synchronous with thrust emplacements along the external Apenninic chain and is associated by crustal thinning, normal faulting, ductile deformation, volcanic activity and high heat flow. Both, the extensional and the compressional fronts migrated towards the Adriatic foreland during the Plio-Pleistocene. Crustal extension everywere disrupted structural architectures formed during the preceding compressional phase leading to the development of thinned, uplifted and extended crust in the Tuscany mainland. Several models have been proposed to explain the evolution of the NA that are acknowledged to be tectonically complex.

We present results from a Receiver Functions (RFs) analysis of teleseismic events recorded at Arezzo seismic station (Tuscany). A broad-band station (ARZ) is installed on the north-east margin of the “Val di Chiana” extensional syntectonic basin. We selected and grouped in “bins” high signal/noise teleseismic events of four years of recording to compute a data-set of RFs. We applied a classical inversion scheme (a Neighbourhood Algorithm) and we carried out a three-dimensional modelling. As a criterion to identify and to distinguish the effects of azimuthal anisotropy from those of lateral heterogeneity, we included the harmonic angular analysis performed by stacking Radial (R) and Transverse (T) components with weights depending on the back-azimuth. The results of these analysis provide a detailed three-dimensional image of the S-velocity lithosphere structure.