Geophysical Research Abstracts
Vol. 13, EGU2011-13072, 2011
EGU General Assembly 2011

The Lithosphere-Asthenosphere Boundary beneath Italy from S receiver function analysis

Nicola Piana Agostinetti (1) and Meghan Miller (2)

(1) Centro Nazionale Terremoti, Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy (nicola.piana@ingv.it), (2) Department of Earth Sciences, University of Southern California, Los Angeles, California, USA.

The evolution of a subduction zone is mainly driven by both the physical properties and the structure of the incoming plate (e.g. the buoyancy of the subducted plate and the width of the subduction zone). In addition, the lithospheric structure of the overriding plate is strongly affected by processes, such as fluids released from the subducted slab and convergence rate. Therefore delineating the lithospheric structure of the two plates can provide important constrains on the behaviour of the "subduction factory". The convergence of the Eurasia and Africa continental plates in the Central Mediterranean caused the progressive closure of the Tethys ocean and subduction of the continental margins of the two plates. Mediterranean tectonics has been characterized by a irregular, complex temporal evolution with episodic rollback and retreat of the subducted plate followed by period of slow trench-migration. To provide insight into the geodynamics of this region, we study the characteristics of the two plates beneath Italy. We investigate the lithosphere-asthenosphere boundary (LAB), the primary negative seismic velocity discontinuity, in the 50-200 km depth range within the upper mantle. Its geometry and the lithospheric structure are explored using teleseismic S-to-P converted phase, a novel seismic tool, applied in this region for the first time. Preliminary results show: (1) a 80-100-km thick lithosphere in both the Iblean and Apulian Forelands, which represent the undeformed Africa continental margins before entering the subduction zone; (2) a thinned (60-km thick) lithosphere along the Northern Tyrrhenian sea, where the Eurasia plate is stretched by the retreat of the subduction zone; and (3) a 130-km thick lithosphere beneath Sardinia, which is a remnant continental block drifted off during the evolution of the subduction zone. Beneath the central part of the Italian peninsula, where the "subduction factory" is still active, we find evidence for a complex lithospheric structure, where two different negative S-velocity jumps are present at approximately 90 and 160 km- depth. In contrast, the lithospheric structure seems to be less complex beneath the southern part of the peninsula, with an almost flat LAB morphology of (averaging 110 km depth). This feature can be related to a slab window, suggested by previous teleseismic tomography results. Along the southernmost tip of the peninsula (i.e. the Calabrian Arc), where the oceanic plate may still be actively subducting, the stations alongTyrrhenian and Ionian coasts, display very different results, suggesting the flexure of the plate beneath arc.