Structure of the upper mantle beneath the Alps and Apennines as seen by Receiver Functions

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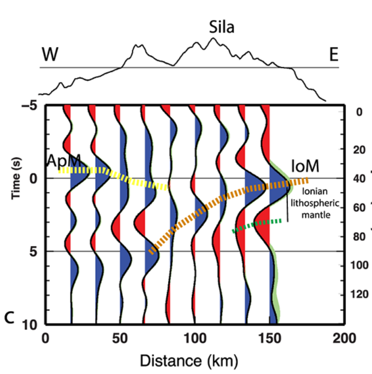
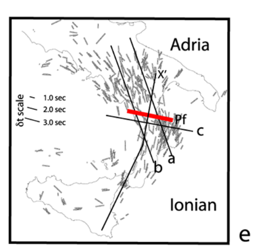
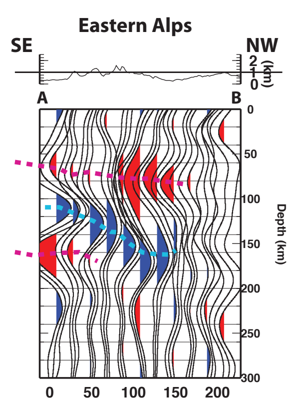
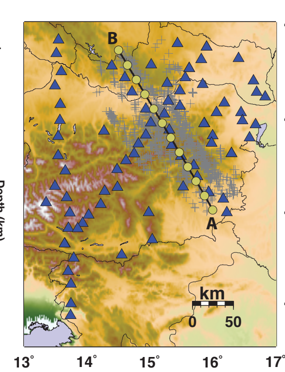
The boundary between the African and Eurasian plates in the Mediterranean area consists of a broad zone of deformation, due to the convergence between the two plates (DeMets et al., 1990 and DeMets et al., 1994). Since late Cretaceous the Adriatic microplate, acting as a promontory of Africa, has deeply indented Europe, resulting in yielding the Alpine orogeny (Platt et al., 1989). Within the convergence of the large (Europe and Africa) plates, the Adriatic microplate moves independently, and rotates counterclockwise with respect to stable Europe, controlling the strain pattern along its boundaries (Nocquet and Calais, 2004). The Apennines nucleated along the retro-belt of the Alps, from the Marittime Alps in western Liguria moving southward, where oceanic or thinned continental lithosphere was present (Carminati et al., 2010 and references therein).
The Alps show a double-vergent growth, with the involvement of large volumes of basement and the exhumation of metamorphic rocks belonging to the European, oceanic and African realms.
The Apennines describe an arc from northwestern Italy, down throughout the Italian peninsula, continuing to the southwest into Sicily and merging into the Maghrebides of northwestern Africa.
Alps and Apennines developed along opposite subductions, in an area characterized by strong variability of tectonic signatures. This variability, coupled to the incompleteness of geological and geophysical observables and to their non-unique interpretation, resulted in the proposal of several, often contrasting, geodynamic scenarios of evolution (Carminati et al., 2010).
In order to shed light on these complex tectonic structures, we aim unraveling both the isotropic and anisotropic properties of the Alpine and Apennines mantle; teleseismic observations recorded at permanent and temporary seismic stations have been employed to produce images of the lithospheric discontinuities with tens of kilometers lateral resolution. We illustrate the feasibility of the lithosphere-asthenosphere boundary detection on a regional scale through P- and S-receiver functions, and detect the occurrence of deeper seismic discontinuities due both to positive and negative seismic velocity jumps.









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