A three dimensional crust and uppermost mantle model for Italy and nearby regions

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Being part of the Alps Orogeny, Italy and nearby areas, are located on the boundary between the northeast-moving African plate and relatively-stable Eurasian tectonic plate, and are seismically active. The associated complex and active tectonic processes have generated diverse geological features with a wide range of rock types, ages, and structures, making it an ideal location for studying the continental dynamics in convergent plate boundaries with potentially high social impacts. Additionally, the interpretation of the geoneutrino signals recorded in central Italy also requires knowledge of the regional geological properties to correct the near-site bias. As a result, it is in our interests to build a high-quality crust and uppermost mantle model by taking advantage of the dense seismic array deployment made in the past decade. In this presentation, we report an effort that uses over 1,000 seismic stations to build maps of high-resolution Rayleigh wave phase velocity and H/V ratios. These data are then combined with receiver functions to build a 3-D shear velocity model of Italy with sensitivity ranging from the near-surface into the uppermost mantle. The preliminary result shows significant differences in velocity above the middle crust between the northeast and southwest sides of the Apennines. Additionally, the Po Plain and the Southern Alps are characterized by low shear wave velocity anomalies in the shallow crust, which is likely due to soft alluvial deposits and thick terrigenous sediments.

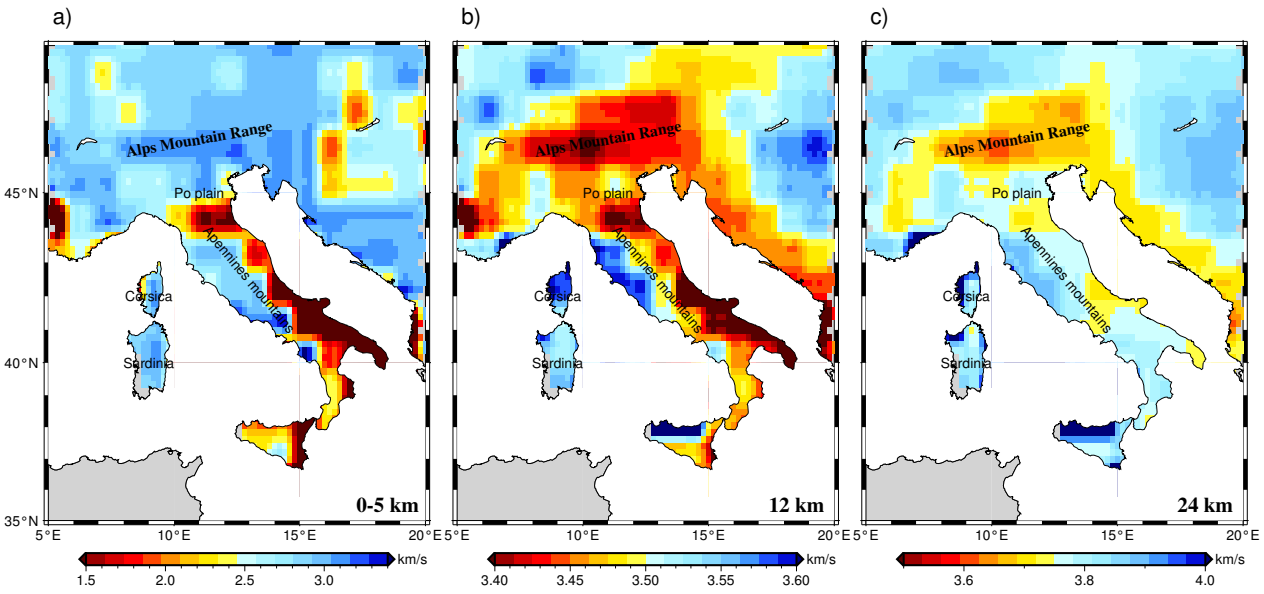

Figure 1: Map views of Vs at different depths. (a) averaged Vs over the top 5 km, (b) Vs at 12 km depth, (c) Vs at 24 km depth.