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Crustal structure and lithosphere delamination in shallow subduction zone beneath Italy

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We present a 3D P-wave velocity model of the lithosphere beneath Italy, in the framework of the subduction-collision system between the African and the European plates. Our images reveal important features of the hidden structure from the Alps to the Calabrian Arc, in a volume unresolved in previous studies. The deflected Adriatic continental crust is imaged below the Western and Eastern Alps and the Apennines while extensive low V_p bodies at 38 km depth and below, in the back-ac region are interpreted as shallow asthenospheric volumes extending from beneath the Tyrrhenian sea toward the high V_p Adriatic-Ionian-Maghrebian lithosphere.
The shallow crust-mantle boundary idientified beneath the Tyrrhenian domain and the differences in the velocity structure of the lithosphere beneath the Tyrrhenian domain (West) and the Adriatic domain (East) are key information to understand the processes that originated the Apennines and its present magmatic and tectonic set up.
We use the velocity structure of the lithosphere, the Moho topography, and other relevant geophysical and geological information to verify the hypothesis of an ongoing delamination process. This process is characterized by substantial asthenosphere intrusion, involving the Adriatic continental margin during the roll-back of the Adriatic slab, leading to the transformation of the overriding plate (on the Tyrrhenian Sea side) that strongly differs in terms of crust and mantle lithosphere from the Adriatic plate.