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# A Cross-section of Crustal Domains and Tectonic Structure Across the Central Tyrrhenian Basin: From Back-arc Extension to Mantle Exhumation

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The Tyrrhenian Sea constitutes a young, well-preserved example of Mediterranean back-arc oceanic basin. It opened mainly between Tortonian and mid-Pliocene as a response to the E-SE migration of the Apennines-Calabrian subduction system. We present a new interpretation of the crustal affinity and tectonic structure of the central Tyrrhenian basin, which considerably differs from previous ones, from two coincident wide-angle and multi-channel seismic reflection profiles and gravity data acquired in the MEDOC-2010 survey. The basin displays three distinct basement domains with different petrological affinity based on their velocity and velocity-derived density structure. The first domain includes the continental crust of Sardinia and the conjugate Campania margin. In the Sardinia margin extension has thinned the crust from $\sim$20 km under the coastline to $\sim$13 km in $\sim$60 km. Similarly, the Campania margin is also affected by strong extensional deformation. The basement in the second domain, under the Cornaglia Terrace and its conjugate Campania Terrace, appears to be oceanic in nature. It shows differences with respect to the reference young Atlantic oceanic crust while it agrees with that described in back-arc oceanic settings. The high velocity and velocity gradient and the lack of crust-mantle reflections in seismic records of the third domain, which encompasses the Magnaghi and Vavilov basins, indicate that the basement is fundamentally made of exhumed mantle rocks, in accordance with previous observations from hole 651 at Ocean Drilling Program Leg 107. Several large seamounts of the third domain (e.g. Vavilov) are underlain by 10-20-km-wide, relatively low velocity anomalies interpreted as younger magmatic bodies locally intruding the exhumed mantle. We interpret that these domains correspond to different phases of back-arc spreading controlled by the variations on the relative location of the spreading axis and the active volcanic arc due to the migration of the subduction system.