



Mantle exhumation in the Tyrrhenian back-arc basin (Central Mediterranean): new constraints from geophysical and geological data

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The Western Mediterranean region is represented by a system of back-arc basins associated to slab rollback and retreat of subduction fronts. The onset of formation of these basins took place in the Oligocene with the opening of the Valencia Through, the Liguro-Provençal and the Algero-Balearic basins, and subsequently, by the formation of the Alboran and Tyrrhenian basins during the early Tortonian. The opening of these basins involved rifting that in some regions evolved until the continental break up, which is the case of the Liguro-Provençal, Algero-Balearic, and Tyrrhenian basins. Previous geophysical works in the first two basins revealed a rifted continental crust that transitions to oceanic crust along a region where the basement nature is not clearly defined. In contrast, in the Tyrrhenian Basin, recent analysis of new geophysical and geological data shows a rifted continental crust that transition along a magmatic-type crust to a region where the mantle is exhumed and locally intruded by basalts. Converted S-waves were used to derive the overall V_p/V_s and Poisson's ratio, as well as the S-wave velocity of the basement. The results show values in agreement with serpentinized peridotite, rather than gabbro/diabase, in agreement with our first observation that the mantle is exhumed beneath this particular area of the basin. We used P-wave velocity models to quantify the amount of hydration, which appears to present a depth distribution similar to Continent-Ocean Transition zones at magma-poor rifted margins. These results, together with basement sampling information of MOR-type and intraplate magmatism in the area, suggests that the late stage of mantle exhumation was accompanied or soon followed by the emplacement of MOR-type basalts forming low ridges that preceded intraplate volcanism responsible for the formation of large volcanos in the area.