



Accretion of arc-oceanic lithospheric mantle in the Mediterranean: evidence from lamproites and mantle xenoliths

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Accretion of oceanic mantle blocks to older lithospheric domains during collision or subduction is relatively rarely reported. It is widely accepted that subducting slab descends and either penetrates the 670 km discontinuity or tends to flatten at the base of the upper mantle, but does not contribute to the continental lithospheric mantle. Here, we report evidence for oceanic accretion to continental mantle in the Mediterranean, based on evidence from lamproites, and from mantle xenoliths brought to the surface by alkali basalts.

Tertiary Si-rich lamproites (55-56 wt. % SiO₂) occur in all Mediterranean orogenic belts (Dinarides, Apennines, Alps, Betic Cordilleras, Turkey). They are olivine-phyric, with extremely Fo-rich olivine (up to 0.96) and high-Cr spinels (up to 0.95). The olivine-spinel pairs plot in the most refractory part of the olivine-spinel mantle array, together with mineral pairs from other arc-related high-Mg, high SiO₂ magmas. Their compositions correspond to around 40% of previous depletion of the mantle source.

Palaeogene basanites in eastern Serbia contain a suite of highly depleted peridotite xenoliths consisting of harzburgites, clinopyroxene-poor lherzolites and rare dunites. They contain mostly <5 vol% of modal clinopyroxene and are characterized by high Mg# in silicates (>0.91), high Cr# in spinel (up to 0.7), and by distinctively low Al₂O₃ contents in orthopyroxene (as low as 1 wt%). They are significantly more depleted than most non-cratonic sub-continental mantle xenolith suites, as well as orogenic and abyssal peridotites, but are compositionally very similar to peridotites of modern oceanic sub-arc settings. The sub-arc affinity is also inferred from the presence of rare

orthopyroxene-rich xenoliths which are interpreted to have originated as precipitates from high-Mg, SiO₂-saturated arc-related magmas.

We present and evaluate a model in which the most appropriate mantle source responsible for the depleted component in the lamproites is similar to xenoliths sampled by the Palaeogene basanites, namely harzburgitic suprasubduction-type peridotites.