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Geochemical composition of subcontinental lithospheric mantle in the westernmost Mediterranean: constrains from peridotite xenoliths in Plio-Pleistocene alkali basalts (eastern Betic Cordillera, SE Spain)

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Peridotite xenoliths in Plio-Pleistocene alkali basalts from the eastern Betic Cordillera (Murcia, SE Spain) provide key information on Alpine tectono-magmatic processes that affected the subcontinental lithospheric mantle beneath the westernmost Mediterranean. Here we present a detailed geochemical study comprising whole-rock and mineral major- and trace-element, as well as Sr-Nd-Pb isotopic compositional data of spinel $\pm$ plagioclase lherzolite, spinel $\pm$ plagioclase harzburgite and spinel wehrlite xenoliths from Tallante and Los Perez volcanic centers. The whole-rock major element compositions and mineral chemistry of the studied xenoliths reflect increasing fertility from clinopyroxene-poor peridotites (Group I; Mg# up to 91.5), to common lherzolites (Group II; Mg# up to 90.6), fertile lherzolites (Group III; Mg# = 86.8-88.9) and wehrlites (Mg# = 86.7-87.4). The mineral major element chemistry records the geochemical imprint of maximum 10-12 % partial melting in the most depleted Group I peridotites. However, trace element and isotopic data attest for various degrees of metasomatic enrichment that overprinted the previously depleted lithospheric mantle. Interaction with melts produced enrichment of LREE in Group II and Group III peridotites, as well as in wehrlites. In contrast to major and trace elements, Sr-Nd-Pb radiogenic isotope systematic is unrelated to compositional groups and shows isotopic variations between DMM and EM2 end-members and contribution of an Atlantic sediment-like component. Different whole-rock trace element compositions coupled to similar isotopic signatures indicate that metasomatism was caused by external melt(s) issued from a common source not before the Tertiary. These geochemical evidences attest for the percolation of slab-derived, SiO_2-undersaturated melts (and hydrous fluids) with carbonate sediment affinity in the pre-Miocene supra-subduction continental lithospheric mantle beneath the Alboran Basin.