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Geochemistry and Sr-Nd isotope compositions of peridotite mantle xenoliths: Evidence from three intra-plate type alkaline volcanic localities in northwestern Mexico

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In Mexico, there are several localities where intra-plate type alkaline volcanism carried out mantle xenoliths to the surface. These spinel lherzolite xenoliths can provide evidence of the geochemical and isotopic compositions of the upper mantle. In this study, we present whole-rock geochemistry and Sr-Nd isotopes of lherzolite xenoliths (n = 10) and volcanic host rocks (n = 6) from the San Quintín (Baja California), Cacaxtla (Sinaloa), and Isabel Island (Nayarit) localities. By integrating our findings with existing literature, we delve into spatial variations in the nature of the upper mantle beneath northwestern Mexico. The San Quintin, Isabel Island, and Sinaloa volcanic rocks show alkaline basalt compositions with trace element concentrations similar to those of oceanic island basalts. One lherzolite xenolith from the San Quintin region has a depleted REE pattern and an Mg# value of 90, similar to the average depleted mantle (Mg# = 91)[1]. Still, the Nd isotope composition (εNd = +7) is lower than that of the average depleted mantle (εNd = +9). Another lherzolite xenolith from the San Quintin region has a slightly fractionated pattern with lower REE abundances, with a εNd value of +5, within the range of the volcanic rocks (εNd from +6.4 to +5.5). Two lherzolite xenoliths from Sinaloa show a depleted REE pattern, Nd isotope values (εNd = +9 to +7), and Mg# values (89) similar to the depleted mantle (εNd = +9 and Mg# = 91). In comparison, three lherzolite xenoliths from Isabel Island show a similar fractionated concave REE pattern and Mg# values from 88 to 91, but different εNd values of +6, +4.8, and -2. Some εNd values are the lowest from the analyzed set and might be related to contamination with a lower crustal component.

1. Workman & Hart (2005). *Earth Planet. Sci. Lett.* **231**, 53–72.