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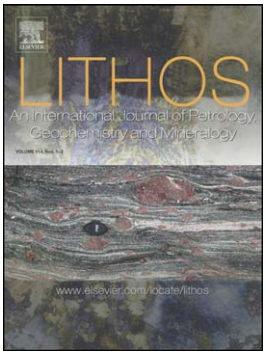

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Geochemistry, Sr-Nd-Pb isotopes and geochronology of amphibole- and mica-bearing lamprophyres in northwestern Iran: implications for mantle wedge heterogeneity in a paleo-subduction zone

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Abstract

Lamprophyres of different age showing distinctive mineralogy, geochemistry and isotopic ratios are exposed in northwestern Iran. They can be divided into Late Cretaceous sannaite, Late Oligocene-Early Miocene camptonite (amphibole-bearing) and Late Miocene minette (mica-bearing) and spessartite (amphibole-bearing) lamprophyres.

Sannaites have high-Ti amphibole along with high-Ti and Al clinopyroxene, and they are characterised by homogeneous enrichment in incompatible trace elements with troughs at Pb. Spessartites have hornblende and low-Al and Ti clinopyroxene, and they are characterised by enriched incompatible trace element pattern with depletions of Nb, Ta, Pb, and Ti with respect to large ion lithophile elements. Minettes have high-Ti and Al brown mica and low-Al and Ti clinopyroxene, and similarly to spessartite, are characterised by fractionation of high field strength elements with respect to large ion lithophile elements, with troughs at Nb, Ta, and Ti and a peak at Pb. Minettes show high initial $^{87}Sr/^{86}Sr$ values up to 0.70760 and low initial $^{143}Nd/^{144}Nd$ down to 0.512463 with a negative correlation, consistent with the trace element distribution related with an enriched mantle source modified after sediment recycling during subduction and continental collision.