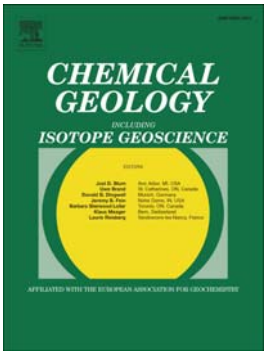

Trace element systematics of olivine from historical eruptions of Lanzarote, Canary Islands: Constraints on mantle source and melting mode

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Trace element systematics of olivine from historical eruptions of Lanzarote, Canary Islands: constraints on mantle source and melting mode

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Key words

Lanzarote; 1730-1736 eruption; 1824 eruption; Trace element; Olivine; Peridotite; Pyroxenite; Carbon dioxide

Abstract

Oceanic island basalts are thought to originate from partial melting of lithologically heterogeneous mantle. Sobolev and coworkers proposed the use of fractionation-corrected Ni concentration Ni x (FeO/MgO) and Fe/Mn measured in olivine as indicators of pyroxenite-derived component in mixtures of primary melts. Trace element concentrations were measured in olivine from two historical eruptions in Lanzarote (Canary Islands), which erupted mafic and mantle nodule bearing magmas, ranging in composition from highly silica-undersaturated basanites through alkali basalts to tholeiites. Tephra from each of the five eruption phases of the 1730-36 AD Timanfaya eruption contains olivine phenocrysts with cores with restricted Fo variation (~3 mol %), whereas trace element concentrations and ratios vary by a factor of approximately two. The largest variation is observed in early basanites with later eruption phases producing olivine macrocrysts containing trace elements within that range. Ni x (FeO/MgO) and Fe/Mn of olivine in the basanites span the whole range of olivine