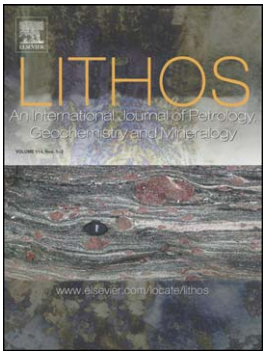

Across and along arc geochemical variations in altered volcanic rocks: Evidence from mineral chemistry of Jurassic lavas in northern Chile, and tectonic implications

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Across and along arc geochemical variations in altered volcanic rocks: Evidence from mineral chemistry of Jurassic lavas in northern Chile, and tectonic implications.

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Abstract

Post magmatic processes mask the original whole-rock chemistry of most Mesozoic igneous rocks from the Andean arc and back-arc units preserved in Chile. Mineral assemblages corresponding to subgreenschist metamorphic facies and/or propylitic hydrothermal alteration are ubiquitous in volcanic and plutonic rocks, suggesting element mobility at macroscopic and microscopic scale. However, fresh primary phenocrysts of clinopyroxene and plagioclase do occur in some of the altered rocks. We use major and trace element chemistry of such mineral phases to infer the geochemical variations of four Jurassic arc and four back-arc units from northern Chile.

Clinopyroxene belonging to rocks of the main arc and two units of the bark-arc are augites with low contents of HFSE and REE; they originated from melting of an asthenospheric mantle source. Clinopyroxenes from a third back-arc unit show typical OIB affinities, with high Ti and trace element contents and low Si. Trace elemental variations in clinopyroxenes from these arc and back-arc units suggest that olivine and clinopyroxene were the main fractionating phases during early stages of magma evolution. The last back-arc unit shows a broad spectrum of