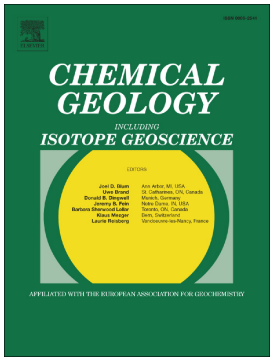

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The Distribution of Fluid Mobile and Other Incompatible Trace Elements in Orthopyroxene from Mantle Wedge Peridotites

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ABSTRACT

Orthopyroxene is especially suited to decode and testify to the behavior of highly immobile elements during hydrous mantle melting. Laser ablation ICP-MS analyses from orthopyroxene hosted within peridotite from the Coast Range ophiolite (CRO) demonstrates that Group A peridotites (lherzolites) have similar compositions to mid-ocean-ridge abyssal peridotite, whereas other peridotites (Groups B and C; harzburgites) retain depleted signatures, but display 'spoon-shaped' enrichments for the light-REE. These patterns are consistent with variable degrees of partial melting of MORB-source asthenosphere initiated within the garnet stability field (<10%) and continuing into the spinel stability field (<15%). A few samples may have been subjected to subsequent melt/rock interaction. The supra-subduction zone (SSZ) environment represented by the CRO is illustrated by enriched fluid mobile elements (Li, Be, B, Pb) in all samples - up to 200x depleted-MORB mantle (DMM). New applications of trace-element addition calculations [Shervais J. and Jean M.M. (2012) Inside the subduction factory: Modeling fluid mobile element enrichment in the mantle wedge above a subduction zone. GCA 95, 270-285] modified for orthopyroxene reveals that tens to hundreds of ppm were added to the DMM-source region. Our purpose is to demonstrate that orthopyroxene, in the absence of clinopyroxene, can be a constructive (*and perhaps better*) indicator of tectonic environment and magmatic processes that occurred within the North American Cordillera mantle wedge. Through this investigation we have captured all three stages of Coast Range ophiolite petrogenesis: starting with intial SSZ-coupled forearc spreading dominated by decompression melting, to a mature subduction zone