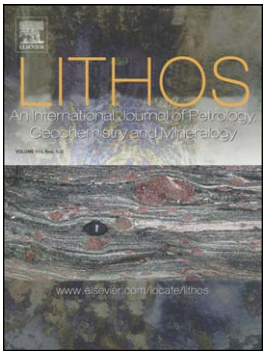

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Marina Veter, Stephen F. Foley, Regina Mertz-Kraus, Nora Groschopf

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Trace elements in olivine of ultramafic lamprophyres controlled by phlogopite-rich mineral assemblages in the mantle source

Marina Veter[1,2,*], Stephen F. Foley[1,2], Regina Mertz-Kraus[2], Nora Groschopf[2]

[1] Department of Earth and Planetary Sciences, Macquarie University, North Ryde, NSW 2109, Australia

[2] Institute for Geosciences, Johannes Gutenberg University of Mainz, 55099 Mainz, Germany

* Corresponding author: Marina Veter, marina.veter@hdr.mq.edu.au

Abstract

Carbonate-rich ultramafic lamprophyres (aillikites) and associated rocks characteristically occur during the early stages of thinning and rifting of cratonic mantle lithosphere, prior to the eruption of melilitites, nephelinites and alkali basalts. It is accepted that they require volatile-rich melting conditions, and the presence of phlogopite and carbonate in the source, but the exact source rock assemblages are debated. Melts similar to carbonate-rich ultramafic lamprophyres (aillikites) have been produced by melting of peridotites in the presence of CO_2 and H_2O, whereas isotopes and trace elements appear to favour distinct phlogopite-bearing rocks.

Olivine macrocrysts in aillikites are usually rounded and abraded, so that it is debated whether they are phenocrysts or mantle xenocrysts. We have analysed minor and trace element composition in olivines from the type aillikites from Aillik Bay in Labrador, Canada. We characterize five groups of