

Magmatic and tectonic controls on kimberlite genesis and evolution beneath Slave Craton locations.

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Olivine macrocrysts from the Jericho kimberlite were analysed for major and trace elements. Most macrocryst compositions overlap those of olivines from mantle-derived peridotites and pyroxenites, but olivines of distinct composition also occur. These are inferred to represent protokimberlitic magmatic products and highly metasomatized peridotite xenocrysts. A new approach to single-grain olivine thermobarometry suggests Jericho xenocrysts tend to be sourced dominantly in the shallow lithospheric mantle (< 140 km), and Lac de Gras xenocrysts from the deep lithospheric mantle (> 140 km). Jericho magmatic rims and phenocrysts have Mg # of ~ 90.3. Previously published Lac de Gras magmatic olivine analyses show higher Mg #s (90.4 to 92) correlated with kimberlite eruption ages (fig.). A subset of Lac de Gras groundmass olivines resemble harzburgite refertilized by a magma similar to the Jericho kimberlite, implying widespread kimberlite infiltration in the Slave craton at 173 Ma. Lac de Gras kimberlite eruptions may be triggered by regional events such as 72 Ma and 55 Ma Rocky Mountain compression or associated melt flux.

