

# GEOCHEMISTRY OF KOMATIITE ROCKS OF THE ARCHEAN WOODBURN LAKE GROUP, PIPEDream LAKE, NORTHWEST TERRITORIES (NUNAVUT)

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This study examines the geochemical characteristics of a series of ultramafic igneous rocks from the Pipedream Lake area of the Woodburn Lake Group in the Churchill Province, Northwest Territories, Canada. Samples include layered and texturally-differentiated komatiite flows, gabbros, and olivine-cumulate dunites. Re-Os isotope data, collected in the summer of 2000 at the Carnegie Institution of Washington, indicate that the rocks formed at 2656 ± 110 Ma, confirming the interpretation of S.B. Shirey (personal correspondence, 2000) that the rocks crystallized from their parent melts around 2.7 Ga. Some of these samples represent open systems with respect to Re and Os isotopes; those that were unaffected by this open-system behavior were the more equigranular and impervious cumulate rocks. Initial osmium isotopic ratios in the cumulates (0.110) indicate a slightly sub-chondritic mantle source whereas the spinifex rocks have enriched initial Os isotopic compositions (0.132).

Petrographic study and SEM/EDS chemical analyses at Smith College show that the rocks contain serpentine-chlorite-amphibole assemblages, the gabbros also hosting feldspar crystals. Minor crystal phases for the suite include hematite, ilmenite, apatite, calcite, dolomite, rutile, clinozoisite, sphene, chromite, and sulfide minerals. These mineral assemblages represent lower amphibolite facies metamorphism across the suite. Bulk chemical major and trace element analyses collected by G.A. Jenner show that olivine was fractionating in these rocks and that the mantle source for the melts was characterized by chondritic elemental ratios and depleted LREE compositions. Elements including Ca, Mg, Si, Na, Ti, Zr, Eu, and LREE were mobilized in some of the rocks due to localized hydrothermal fluid flow associated with the alteration events (see Fig. 1).

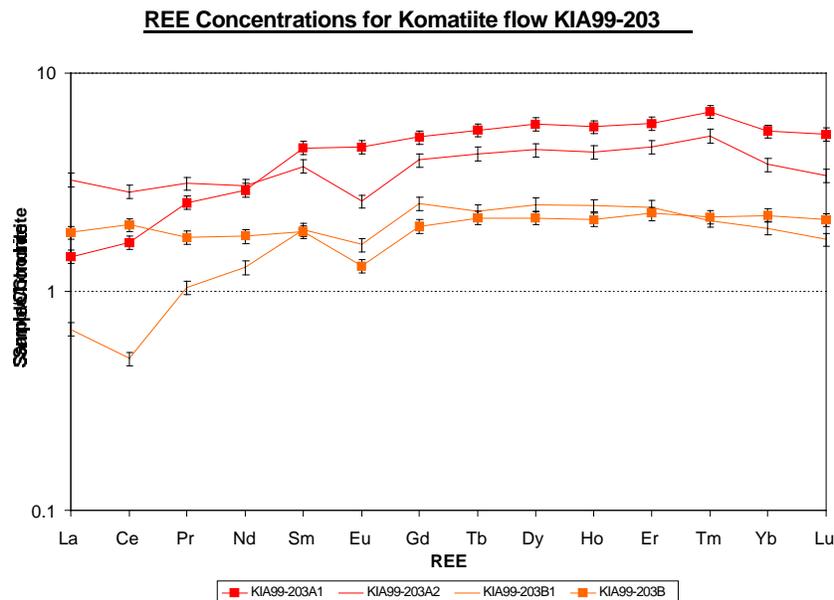


Fig. 1. The above spiderdiagram shows chondrite-normalized rare earth element abundances for four of the samples examined by this study. The flat HREE and sloping LREE trends are evidence for a mantle source region characterized by chondritic elemental ratios and depleted LREE. Variation in LREE patterns and Ce and Eu anomalies reflect element mobility in the samples.