

Chalcophile element geochemistry of komatiites and basalts in the Archean greenstone belts of Russian Karelian

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Archean komatiite and komatiitic basalt from the Hautavaara, Koikary, Palaselga and Sovdozero areas in the Vedlozero-Segozero greenstone belt, and the Irinozero and Khizovaare areas in the Northern Karelian greenstone belt has PGE contents in the range of other S undersaturated komatiites and komatiitic basalts globally, at 5-20 ppb Pt and Pd each, and Pd/Ir ratios range from <10 (komatiites) to > 15 (komatiitic basalts and basalts). The Iridium-group platinum group elements (IPGE) (Ir, Ru, Os) generally show compatible signature, decreasing with falling MgO content, whereas Pt, Pd and Rh (PPGE) exhibit incompatible behaviour. The poor correlation between Ir and MgO suggests that olivine does not control the IPGE contents. Pd, Cu and Au have behaved variably mobile during alteration and metamorphism. Some samples from the Khizovaara belts have low Pt/Ti N ratios, low Ni, and high La/Sm, indicating localized sulfide saturation in response to crustal contamination. However, the potential of the Russian Karelian belts for Ni-sulfide mineralization is considered low, due to the absence of sulfide rich sedimentary rocks in the region, the lack of chalcophile element enrichment in any of the samples analysed, and the paucity of dynamic lava channel environment, indicated by a lack of high olivine adcumulates. Amongst the analysed belts, lavas in the Khizovaara area are considered to be the most prospective target for Ni sulfide mineralization due to their relatively enhanced crustal contamination and greater depletion of PGE.