

ABUNDANCE AND DISTRIBUTION OF PGE AND AU IN ISLAND-ARC MANTLE: IMPLICATIONS FOR SUB-ARC METASOMATISM

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Mantle wedge xenoliths from Kamchatka and the Philippines represent solid residues after multiple, water-saturated melting in a sub-arc environment metasomatized by slab-derived fluids and melts. These xenoliths are composed of high-Fo olivine, Mg-rich orthopyroxene, and Cr-rich spinel along with metasomatic clinopyroxene, amphibole, and phlogopite. Platinum-group element (PGE) distribution in these xenoliths is consistent with their highly depleted and restitic nature and is indicative of multi-stage enrichment histories. These metasomatized sub-arc harzburgites exhibit elevated concentrations of Au, Pt, and Pd which are positively correlated with modal abundance of metasomatic phases (cpx, amph, and phl). This is consistent with the introduction of Pd-group PGEs and gold into a sub-arc wedge by slab-derived, hydrous fluids and melts. PGE distribution and Os isotope systematics of sub-arc mantle xenoliths indicate several episodes of depletion and re-fertilization in a sub-arc environment by hydrous fluids and siliceous slab melts (adakites). The resulting veined and multiply metasomatized sub-arc mantle is capable of generating various types of arc magmas.