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Podiform Chromitites and Mantle Peridotites of the Purang Ophiolite, Western Yarlung-Zangbo Suture Zone, Tibet: Implications for Partial Melting and Melt-Rock Interaction in Oceanic and Subduction-Related Settings

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The Purang ophiolite, which crops out over an area of about 650 km^2 in the western Yarlung-Zangbo suture zone, consists chiefly of mantle peridotite, pyroxenite and gabbro. The mantle peridotites are mostly harzburgite and minor lherzolite that locally host small pods of dunite. Some pyroxenite and gabbro veins of variable size occur in the peridotites, and most of them strike NW, parallel to the main structure of the ophiolite.

Typically, only one type occurs in a given peridotite massif, although some ophiolites contain several massifs which can have different chromite compositions. However, the Purang massif contains both high-Cr and high-Al chromites within a single mafic-ultramafic body. Seven small, lenticular bodies of chromitite ore have been found in the harzburgite, with ore textures ranging from massive to disseminated to sparsely disseminated; no nodular ore has been observed. In addition to magnesiochromite, all of the orebodies contain minor olivine, amphibole and serpentine. On the basis of magnesiochromite and olivine/clinopyroxene compositions, two stages of partial melting are identified in the Purang peridotites: an early, low-partial melting event (about 5-15%), and a later high-partial melting event (about 20-30%). Anorthites in the pl-harzburgite were formed when MORB basalt melt met and reacted with the harzburgite froming the mineral assemblage Cpx + Opx + Sp. The Purang peridotite are alpine-type and forearc peridotites, depleted in LREE, and the harzburgites and dunites have “U”- or “V”-shaped REE patterns, indicating variable enrichment by later melts/fluids. The mineralogy and geochemistry of the Purang peridotites suggest that they formed originally at a mid-ocean ridge（MOR) and were later modified by suprasubduction zone（SSZ） melts/fluids. Our results support a model involving both melt-rock interaction and differential partial melting to explain the high-Al chromitites as the products of early MORB magmas, whereas the high-Cr varieties are thought to have been generated by reactions with later SSZ melts.

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