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Purang Utramafic Complex and Their Geological Origin, Southwest Tibet

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Purang ultramafic complex of western Tibet consists of spinel peridotites, olivine websterite, rodingite and later intruded gabbro-diabase veins. The spinel peridotites consist of lherzolite, harzburgite and dunite. All Purang peridotites are rich in MgO, but depleted in Al_2O_3, CaO and TiO_2 relative to primary mantle values, indicating depletion by several episodes of partial melting. The olivine websterite probably formed by melt/rock reaction between an evolved basaltic melt and harzburgite or dunite. The evolution of the Purang ultramafic rocks from lherzolite through harzburgite, and dunite to olivine websterite indicates multistage melting and melt/rock reaction processes. Decompression-related textures such as exsolution lamellae of clinopyroxene and spinel in orthopyroxene, and melting, melt/rock textures such as embayed, flame-like grains of spinel and partial chain spinel textures are widespread in the ultramafic rocks. Impregnation textures are reflected by the presence of late intergranular and interstitial clinopyroxene in the harzburgite, dunite and olivine websterite. Bulk rock chemistry and minerlaogical chemistries of the spinel, clinopyroxene and orthopyroxene all recorded both abyssal/back arc basin and supra-subduction zone affinity.

Rodingites were found in the Purang ultramafic complex as veins or blocks. The abundance of rodingites is much less than those in the other ophiolites along the Yarlung Zangbo Suture Zone (YZAZ), such as in the ophiolites around Ricaze district of central YZAZ. Rodingiteshave SiO_2~46.8-52.0, MgO~23.7-25.2, and their major elements diagrams of CaO, Al_2O_3, SiO_2 and TFe_2O_3 vs MgO show lineation relationship with spinel peridotites, suggesting a genetic affinity. REE and trace elements of rodingites are low in concentrations in compared with normal olivine gabbro, indicative of fore-arc geochemical characteristics based on the diagrams of V-Ti, La/Nb-Y and Zr/Y-Zr. The U-Pb ages of rodingites indicate the existence of ancient mantle domains (~10 Ga).

Gabbros/diabases are later intrusions of the ultramafic massif, having well-defined weighted mean $^{206}Pb/^{238}U$ age of 111.6±3.6 Ma. Chemical characteristics show a back-arc basin affinity for these rocks (The current study was supported by the Chinese Geological Survey Project, grants 1212011121263, 1212011221116, 1212011221117).

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