

Petrology of the mantle rocks from the Muslim Bagh Ophiolite, Balochistan, Pakistan

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The Muslim Bagh ophiolite shows a nearly complete ophiolitic sequence ranging from residual peridotite at the base to the Mantle–Crust Transition Zone in the middle which grades into the crustal rocks at the top. The mantle section comprises the foliated peridotite that grade into the transition zone dunite. The foliated peridotite is mainly harzburgite with minor dunite and lherzolite. The dunite present is either interlayered with harzburgite or occurs as envelopes around harzburgite containing mostly podiform chromite deposits. The harzburgite and dunite of the lower mantle section have often been referred to as depleted peridotite resulting from large degrees of partial melting from a lherzolite parent and also that they are partly formed by the processes such as magma–mantle interaction. The transition zone comprises residual dunite with impregnations of wherlites/pyroxenite and is interpreted to be formed by a combination of mantle and crustal processes; reflecting predominantly mantle processes at its base and preserves evidence of crustal fractionation at the top. The chromite occurs in the mantle dunites and is mostly podiform and vein-like and may have been formed by melt-rock reaction. The petrology of mantle rocks displays a porphyroclastic texture with harzburgite poor in modal clinopyroxene and dunite poor in pyroxene, indicating that the peridotite is melt residue. This residual nature is confirmed by the higher Cr # in spinel and Mg # in orthopyroxene and olivine from the foliated peridotite suggesting their derivation by higher degree of partial melting from a depleted mantle source. These petrological and mineral chemical characteristics may have been inherited from processes within a supra-subduction zone tectonic setting.