Microstructural analysis of plastic deformation of upper mantle and shear zones of the Neyriz ophiolite, southeast of Iran

The Neyriz ophiolite is part of the upper mantle and Tethyan oceanic crust which is stretched along the Zagros thrust zone. The present study using preferred orientation of olivine and orthopyroxene in harzburgite and in gabbroic mylonite reveals that the gradual evolution olivine and orthopyroxene optical axes preferred orientation in non-coaxial and incremental regime. The slip systems in olivine are determined to be (010)[001] or (0k1)[100] and in orthopyroxene is (001)[001]. This indicates deformation of olivine in low temperature (700-1000°C) in upper mantle. Olivine and orthopyroxene dextral slip which indicates ophiolite is generated from northeast flank of the ridge. This idea is confirmed by the harzburgite foliation measurements and trajectories foliations. These trajectories exhibit severe folding and thrusting toward southwest the same as other present structures in Zagros and are confirmation Pasadenaian orogenic phase effect and in parts express dextral slip movement of main Zagros fault and its effects on ophiolite deformation.

Reconstruction of paleo-ridge is also obtained by using harzburgite foliation and sheeted dykes chilled margins. The sheeted dykes are rotated counter-clockwise in order to reconstruct the original situation before emplacement of ophiolite. The studied shear zone in massive gabbros shows that its trend is 260 with a sinistral movement. Amphibole crystals of the mylonitic gabbros have undergone simple shear deformation with plastic deformation and exhibit inter-crystalline slip. These amphibole show slip system of (100)[100] which indicate high temperature deformation with ductile to superplastic deformation.

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