

## **Micro-meso structural deformation and tectonic imprints of the Hazara-Kashmir Syntaxis on Lesser Swat area, North Pakistan**

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Integrated micro and meso structural investigation were carried out in the multiple deformed rocks of swat region of Northern Pakistan (North-West Himalayas). The studied samples represent the Indian plate cover sequence, deformed, and metamorphosed to medium- and high-grade during the Himalayan orogeny. Two well-developed mesoscopic deformation folds D2 and D3 are recognized in the region. The NNW-SSE trending D2 folds developed during the NNE-SSW horizontal bulk shortening followed by NNE-SSW trending D3 folds, which are developed during NNW-SSE shortening. NNE-SSE trending S2 crenulation cleavages are folded by D3 deformations both microscopically and mesoscopically, which can be clearly observed in boudinage structures and mineral stretching lineation. The recognition of NNW-SSE folds in Marghazar Gorge termed D2 and D3 both microscopically and mesoscopically postdate F1, F2, F3 and F4 structures in the Lesser Swat North Pakistan.

The petrographic studies of the samples suggests that the inclusion of muscovite and biotite in garnet porphyroblast indicate regional metamorphic conditions in swat region. Garnet, Staurolite and Calcite porphyroblasts grew before D2 deformation because the sophisticated S2 cleavage related with D2 in the matrix wraps around these porphyroblasts. The inclusion trail in garnet and staurolite are truncated by S2 cleavage in the matrix. Microscopically the main matrix foliation is well defined by, muscovite, biotite calcite, and quartz.

**Keywords:** Boudinage structures, porphyroblasts, foliation