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Strain and vorticity analysis using drag folds associated to the Sananadaj-Sirjan HP-LT metamorphic belt, southwest Iran

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The presence of asymmetric drag folds is characteristic of many ductile shear zones. The origin of these folds is variable, as their development may predate, be synchronous or postdate the shearing events. Folds and other meso- and micro- structures within shear zones are often asymmetric. However, their finite geometry, degree of asymmetry and their orientations with respect to shear zones are influenced by many variables besides shear sense. Consequently, the link between these type of folds and the kinematics of shear zones is often complex. The final geometry, of folds and their rheology and initial orientation of folded surfaces depends on the vorticity within the shear zone.

The Seh-Ghalatun area in southwestern Iran is part of the Sanandaj-Sirjan HP-LT metamorphic belt within the Zagros orogenic belt. This area gives an opportunity to study asymmetrical drag folds and estimate the amount and type of deformation that rocks experienced using them as tools. Drag folds are mainly found in folded quartzite and quartzo-feldspathic layers in this area. Following the method of Gomez-Rivas et al. (2007), outcrop-scale drag folds have been used to estimate initial fault angles ($\alpha 0$), as well as the minimum finite strain of the shear zone and the kinematics of deformation. Drag folds are associated to both antithetic and synthetic faults. As input parameters for the calculations we have used the following field data: fault orientations (α), drag fold angles (β) and the ratio of the thickness of deflected layers at faults (L) and further away from them (T). were also measured and than was compared with α, β and L/T. using these parameters, the Seh- Ghalatun area was subjected to a minimum mean kinematic vorticity number is Wk= 0.78 and mean finite strain of Rs = 2. The estimated kinematic vorticity number is Wk=0.78, which corresponds to subsimple shear deformation. This quantifications are consistent with the known local deformation at this area. which were obtained for population of antithetic and synthetic faults related to the drag folds. The estimated finite deformation (Wm) value indicate relative contribution of 38% pure shear and 62% simple shear components for the formation of drag folds.