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Mechanism of rotation & deformation of fault rocks in Boushad transpressional shear zone, east of Iran

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Abstract

Boushad shear zone (BSZ) is located in south of Birjand, east of Iran. This shear zone has $\sim$40 km length, 1-3 km width with E-W trend. The mechanism of this shear zone is sinisteral that measured horizontal displacement is 4.5km. Rotated rigid objects in BSZ, give us valuable information on different aspects of the bulk deformation. Thus, for example, patterns of distorted foliation around rotated rigid objects have often been used to determine the sense of shear in ductile shear zones. An analysis of the stable positions of elongate rigid objects of different aspect ratios, also give us some information about the nature of bulk deformation. For a rhomboidal or cylindrical object, such analyses of the rotational history of rigid objects commonly involve the assumption that the cylinder axis or one of the principal axes of the rhomboidal object remains parallel to the vorticity vector. The rotation history of rigid objects in transpressional shear zones is quite different when fault rocks are brittle and ductile behavior. There is no significant difference in our conclusions if a somewhat smaller or larger value of R (the ratio of clasts) is taken. It should be noted that if θ <10, the equations for rates of rotation and of finite rotation of elongate inclusions, for the type of deformation considered here, are obtained by replacing the parameter γ in the equations of by the entity.

Sheath folds and segments of isoclinal folds often occur parallel to the stretching lineation in ductile shear zones. Many of these contemporary folds initiated broadly orthogonal to the shear direction and to the stretching lineation, and were rotated

towards the stretching direction during ductile shearing. Rotation of contemporary folds through a large angle is also indicated by occurrence of U-shaped lineation patterns over hinges of transport-parallel folds in BSZ. Depending upon the initial orientation, the hinge lines may rotate in both clockwise and counterclockwise sense (viewed from above in the XY plane); consequently, folds with a single sense of asymmetry, when they were more or less orthogonal to the lineation, may show S or Z asymmetry after they are rotated parallel to the lineation . Such a rotation history of folds implies that the stretching lineation is orthogonal, or at a large angle to the vorticity vector.

Key words: Boushad shear zone, fault rocks, deformation, clasts, orientation