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Applying the model of triclinic transpression with oblique extrusion to an active fault: The Alhama de Murcia Fault (Southeastern Spain). Preliminary results.

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Monoclinic transpression is kinematically defined as the combination of simple shear parallel to the shear zone and coaxial shortening orthogonal to the shear zone. On the other hand, triclinic transpression occurs when simple shearing direction is oblique to the shear zone direction and/or the extrusion produced by the coaxial component is oblique to the shear zone dip direction.

The model of triclinic transpression with oblique extrusion (Fernandez and Diaz-Azpiroz, 2009) includes direction of simple shear oblique to the shear zone azimuth together with oblique extrusion along the shear zone produced by the coaxial component. This model predicts orientations of strain and fabric features in natural cases, that depends on the vorticity of the flow, the finite strain and the value of φ, υ and ζ (being φ the angle between the simple shear component and the shear zone direction; υ the angle between the dip direction and the extrusion direction of the shear zone; and ζ the acute angle between the simple shear direction and the extrusion direction).

In this study we present the preliminary results of the application of this model to an active shear zone: Alhama de Murcia Fault (AMF, Bousquet y Montenat, 1974). This fault is an active left-lateral-reverse fault with its current kinematics acting since Tortonian. It is part of the Eastern Betics Shear Zone together with Carrascoy, Los Tollos, Carboneras and Palomares faults (De Larouzière et al., 1988). The AMF has exceptional features in order to apply this model due to the high quality outcrops, the amount of information of kinematic indicators and the possibility to compare the results with active kinematic indicators such as GPS data and earthquake focal mechanisms.

This fault deforms and offsets mainly Quaternary and Cenozoic rocks, but also rocks of Paleozoic and Permo-Triassic formations of the Alpujarride and Nevadofilábride Units. When the deformation affects to metamorphic units of the Alpujarride Units, in many cases, it is developed a fault gouge with an important amount of kinematic indicators that, together with gypsum fibers and slickenlines, allowed us to test the model.

The iterative approach varying the regional shortening direction, kinematic vorticity and extrusion angles, allowed us to estimate (as preliminary results) that, for this shear zone, the most probable vorticity values are between 0.62 and 0.89 (around the transition between the pure shear and simple shear-dominated flow). The extrusion direction deviated up to 30º towards SW from the dip direction. Local shortening was also constrained ranging between N190º-210ºE, rotated clockwise from the regional shortening direction of N150ºE.