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Kinematics of long lived faults in intraplate settings: case study of the Río Grío Fault (Iberian Range).

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This study is based on the comparison of structural analysis and AMS data of Río Grío Fault, associated with the Datos Fault System, in the Iberian Chain (Northeastern Iberian Plate, Spain). The Río Grío Fault, with NW-SE strike, has a tectonic evolution of probably Mesozoic extension and Tertiary transpressive dextral movement, and it is characterized by the presence of a well-developed cataclastic zone 200m width. The structure of the core is characterized by elongated along strike and narrow lenses separated by subvertical fault planes with well-developed fault breccias and gouges. The lenses usually conserve intact stratification, and it may be recognized several lithologies, including Ordovician quartzites, slates and clay, and red-colored Permo-triassic clay and sandstones. The internal structure of these lenses shows folds, brechified zones, and localized foliation in clay lenses. Cinematic indicators (striations, S/C structures…) show strong reverse dip-slip and dextral strike-slip components, indicating strain partitioning between the different lenses, and it is interpreted as the result of the reactivation of previous normal faults, like a strike-slip shear, during the NNE-SSW to NE-SW Cenozoic compression of the NE Iberian Plate.

Samples of AMS study were collected from two areas (SG and RG) of the fault zone, separated by 4.5km along strike. Samples provide a magnetic susceptibility highly dependent on lithology, between ±5*10-5 [SI] in the white fault gouge and ±20*10-5 [SI] in red-colored clay. The low susceptibility in several sites results in high imprecise AMS measurements.

AMS results for the first area (SG), obtained in red and black colored clays, show the same magnetic fabric in all sites. K-min axis of the magnetic ellipsoid corresponds to the pole of the fault planes measured in the outcrop, and the magnetic lineation is nearly horizontal, probably related to strike-slip movements. In the second area (RG), the AMS shows a grater variability and dependence with lithology-magnetic mineralogy. In Permo-triassic red-colored lenses, the k-min corresponds to the pole of the fault plane too. Nevertheless, the magnetic lineation is scatered in a vertical plane. In gouges, exists two different groups: The first one shows a subvertical E-W magnetic foliation and a girdle distribution of K-max and k-int, and it may be interpreted as a P-foliation related to principal shear. The second one has a NNE-SSW striking magnetic foliation, with K-max nearly horizontal. This second group has a complex interpretation in the context of dextral transpressive movement of the fault. It could be associated with a reverse fabric or, considering the very low magnetic susceptibility, it could be not representative of the deformation in the fault zone.

Temperature versus susceptibility curves (from 40 to 700ºC) were carried out in order to determine the magnetic carriers of the bulk susceptibility and to ensure the reliability of the AMS results. The main magnetic carriers are phyllosilicates and hematite in red colored clay.