



AMS as a fast and sensitive method to test and detect vertical axis rotation in fold and thrust systems. Southern Pyrenees, Aragón, Spain

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Different studies in the Pyrenees show that the magnetic fabric is acquired during syn-sedimentary conditions and blocked during the lithification. Here it is presented an analysis of two different cross-sections that are affected by structures that change its orientation from N to S. While the northern zone shows structures with a Pyrenean trend (N90-N105) the southern zone shows N-S structures.

The magnetotectonic studies show that the oblique structures were generated with an original Pyrenean trend and suffered a vertical axis rotation. The development of these structures happens during syn-sedimentary conditions.

The two selected cross-sections that represent 17 sites and 371 samples (Santa Barbara and Oroel cross-sections) go through the molassic Jaca basin and represent the Guarga syncline; from the Aragon river in the North to the Sierras Exteriores in the South.

All the selected sites show bedding strikes with Pyrenean trend (N90-105). In the southern zone where the N-S structures are, no-site shows a bedding tilting related with them. All the sites show a magnetic foliation parallel to the bedding where the K3 axis get clustered when the bedding is restored to the horizontal. In some sites the magnetic lineation gets a Pyrenean trend after bedding restoration. These arguments show sedimentary deformed fabrics acquired before tilting.

The study of the orientation of the magnetic lineation after bedding restoration shows

an orientation parallel to the structures. In the northern part the magnetic lineation is usually parallel to the strike of the bedding (no changes in orientation happen during the restoration) while in the southern part the magnetic lineation is parallel to the oblique structures and show the same changes in orientation than them. These magnetic patterns suggest that these fabrics were acquired during the development of these structures through a process of LPS without the change of the bedding that remained horizontal, later these structures and fabrics were folded by the system of structures with Pyrenean trend and without significant modification.

The southern sites have been affected by vertical axis rotations, in these sites the vertical axis rotations are of the same range than the difference between the Pyrenean trend and the measured magnetic lineation. These results show that all of these sites have record the whole rotation. The parallelism between the structures and its changes and the magnetic lineation represents that all have been rotated in a rigid manner.

The comparison of the AMS and the paleomagnetic data shows that no modification of them have happened after the acquisition, and both acquisition and blocking took place in the same moment. In the cases where the bedding and the rotated structures show a direct correlation, it can be proved that the rotations happened in a passive manner. When the bedding is not parallel to the rotated structures and not evidence of rotation exists, the difference between the orientation of the magnetic lineation and the Pyrenean trend show the magnitude of the rotation.

In settings with syntectonic sedimentation and where the magnetic fabric is acquired in syn-sedimentary conditions or very near to the lithification, the magnetic lineation can be used as an indicator of the presence of vertical axis rotations. While in the cases where the rotations are more or less controlled, the AMS as a very sensitive and fast technique can be used to control the lateral changes of the rotations or to select the sites to be demagnetized.