

Dating Structures in Sedimentary Basins from Analysis of Remagnetizations: an example from Moroccan High Atlas

Torres. S ⁽¹⁾, Villalaín. J.J ⁽¹⁾, Casas. A ⁽²⁾, El Ouardi. H ⁽³⁾, Moussaid. B ⁽³⁾, Ruiz-Martínez. V.C ⁽⁴⁾, Mahmoudi. A ⁽³⁾.

⁽¹⁾ Dpto. de Física. Escuela Politécnica Superior. Universidad de Burgos. Avd Cantabria S/N, 09006 Burgos, Spain. storres@beca.ubu.es, villa@ubu.es

⁽²⁾ Dpto. de Geología, Facultad de Ciencias, Universidad de Zaragoza, 50009 Zaragoza, Spain.

⁽³⁾ Département de Géologie, Moulay Ismail University, Meknès, Morocco.

⁽⁴⁾ Dpto. de Geofísica, Facultad de Ciencias Físicas, Universidad Complutense de Madrid, 28040 Madrid, Spain.

This work shows the results obtained from a paleomagnetic study performed on syn-rift sedimentary rocks of strongly subsiding basins of the High Atlas (Imilchil area). The High Atlas is an intracontinental ENE-WSW mountain chain developed during the Cenozoic inversion of Mesozoic basins. In spite of the good outcrops and the relatively well-constrained structure of the chain, there are many problems still unsolved, regarding the age of particular structures, especially diapirs and intrusion-related anticlines.

Thirty-nine sites (300 samples) corresponding to black limestones, marls and marly limestones, early to middle Jurassic in age, were studied. Sites are distributed along two transects (90 km) cutting across the basin, perpendicular to the main structures, including intrusive bodies of alkaline gabbros, diapirs and their associated structures.

The magnetic properties of samples are very regular. NRM intensity is very high (2-80 mA/m). Thermal and AF demagnetization showed a single stable paleomagnetic component with unblocking temperatures and coercivities spectra of 250-450°C and 20-100 mT, respectively. This characteristic remanent magnetization (ChRM) showed systematic normal polarity suggesting a widespread remagnetization. Several fold tests in different structures indicate that the remagnetization is pre-folding in the small scale compressive folds, but it shows a syn-tectonic acquisition in other structures.

Using the small circle intersection method we have calculated the Earth magnetic field direction at the ChRM acquisition time. The comparison of this component with the apparent polar wander curve of Africa indicates that it was acquired during Early-Late Cretaceous.

Following the technique proposed by our group we have restored the geometry of beds to the pre-inversion stage from the remagnetization directions. Hence, we can determine the tilting of beds at the time of acquisition of remagnetization (Early-Late Cretaceous). Among others, the results of restoration indicate that anticlines related to the emplacement of gabbros predate the remagnetization and some asymmetric anticlines apparently related to syn-rift diapirism are probably post-remagnetization compressive structures.