Geophysical Research Abstracts
Vol. 15, EGU2013-7389, 2013
EGU General Assembly 2013

Magnetic fabrics study of Cretaceous syn-extensional units from the Maestrazgo basin (SE Iberian Range, Spain)

Cristina García-Lasanta (1), Belén Oliva-Urcia (2), Teresa Román-Berdiel (1), Antonio Casas-Sainz (1), and Inmaculada Gil-Peña (3)

(1) Departamento de Ciencias de la Tierra, Universidad de Zaragoza, Zaragoza, Spain, (2) Procesos Geoambientales y Cambio Global, IPE-CSIC, Zaragoza, Spain, (3) Instituto Geológico y Minero de España, IGME, Madrid, Spain

Anisotropy of Magnetic Susceptibility (AMS) is known to be related to the prevailing strain ellipsoid during sedimentation. However, even in weakly deformed sediments, this primary fabric can be modified by subsequent deformational stages. This work is focused in the study of AMS registered in marls and marly limestones from a strongly subsiding basin that subsequently underwent a tectonic inversion process, relatively weak in the studied area.

The Maestrazgo Basin (NE Spain) is one of the most subsiding areas of the Iberian Range during the Early Cretaceous rifting stage. Subsidence is mostly associated to (i) listric faults rooted in Triassic or Palaeozoic units, striking NW-SE to E-W, related to the Iberian Basins development, and (ii) NE-SW normal faults, linked to the opening of the Western Tethys realm, active during the Mesozoic rifting and later reactivated during the Tertiary subsidence in the Valencia Trough. Tectonic inversion took place during the Cenozoic, and no penetrative compression-related structures were developed. The most widespread rock types in this basin are platform limestones but our AMS study is centred in the intercalated marls and marly limestones also present in the sedimentary sequence.

A total of 36 sites (582 standard specimens) were analyzed in a KLY-3S Kappabridge (AGICO) susceptometer. Magnetic carriers were determined by carrying out 14 temperature-dependent susceptibility curves (from 40 to 700ºC) combining the susceptometer with a CS-3 furnace. Sites are scattered throughout the Lower Cretaceous outcrops in the basin, and divided in 3 geographic sectors for their interpretation.

Bulk magnetic susceptibility ranges between 9.18 and 390.7x10-6SI, although 88.9% of samples have values from 50 to 250 x10-6SI. Thermomagnetic curves indicate the presence of a main fraction of phyllosilicates in 12 runs. In two cases, hematite and phyllosilicates are present in a similar proportion, coinciding with samples of red beds from the Morella Fm. Neoformation of ferromagnetic phases (magnetite and sulphides) is common during heating.

Magnetic ellipsoids show the kmin axes subperpendicular to the bedding plane, according to a sedimentary fabric except in 2 sites (BE6 and AL2) where the kmin axes appears clearly interchanged with the kint axes. The kmax axes shows a NW-SE orientation in 16 sites from all geographic sectors. A NE-SW orientation for the magnetic lineation is shown in another 9 sites, all from the northern sector. The kmax axes in the other 9 sites are strongly scattered, but with two directional maxima (NW-SE and NE-SW).

We interpret a negligible influence of compressional structures in the magnetic fabrics, as the kmin axes lay subperpendicular to the bedding plane and no cleavage is recognized in rocks. Therefore most of them can be explained in terms of extensional tectonics, dominant during deposit and diagenesis of sediments. The orientation of magnetic lineation suggests two main extension directions (NW-SE and NE-SW) perpendicular to the main fault sets.