Geophysical Research Abstracts
Vol. 21, EGU2019-7934-1, 2019
EGU General Assembly 2019

Interfolding remagnetizations as a key to restore pre-compressional structures: the case of the 100 Ma remagnetization of the Central High Atlas (Morocco)

Pablo Calvín (1), Juan J. Villalaín (1), Antonio Casas-Sainz (2), Sara Torres-López (1), Bennacer Moussaid (3), Belén Oliva-Urcia (4), Vicente C. Ruíz-Martínez (5), Ruth Soto (6), and Hmidou El-Ouardi (7)

(1) Universidad de Burgos, EPS Río Vena, Departamento de Fïsica, Burgos, Spain (pcalvin@ubu.es), (2) Geotransfer Research Group (IUCA), Universidad de Zaragoza, C/ San Pedro Cerbuna 12, 50009 Zaragoza, Spain, (3) Laboratoire BGIM, Ecole Normale Supérieure, Université Hassan II. Casablanca, Morocco, (4) Departamento de Geología y Geoquímica, Universidad Autónoma de Madrid, Ciudad Universitaria de Cantoblanco, Madrid, Spain, (5) Departamento de Física de la Tierra, Astronomía y Astrofísica, Universidad Complutense de Madrid, Madrid, Spain, (6) Associated Unit in Earth Sciences, IGME/Universidad de Zaragoza, Zaragoza, Spain, (7) Département de Géologie, Faculté des Sciences, Université Moulay Ismail, BP. 11201 Zitoune, Meknès, Morocco

The Atlas system is an intracontinental inverted basin located in North Africa. After being subjected to the extensional stage in the Mesozoic, the basin was inverted during the Cenozoic due to the convergence between Africa and Europe. The Central High Atlas is located in the Moroccan Atlas and it is characterized by thick sequences of Jurassic carbonates and red beds that reach several kilometers. Observed geological features indicate the presence of synsedimentary deformational processes related to the extension, halokinesis and igneous intrusions in the first deformation stage.

The area bracketed between the transects of Demnate and Rich are affected by a regional widespread remagnetization (Torres-López et al., 2014, J. Geol. Soc. London) that affects the whole Jurassic sequence (both carbonates and red beds). This remagnetization is related to the burial and therefore not present at the edges of the basin where the sedimentary pile is thinner. In carbonates, the remagnetization is carried by magnetite and their magnetic properties are similar to those observed in chemically remagnetized carbonates around the world, which are determined by a population of neoformed superparamagnetic and stable single domain magnetite. In the red beds, the remagnetization is carried by hematite.

The mean paleomagnetic directions show systematically normal polarities and synfolding behaviors. The remagnetization direction (n: 100, Dec: 332.2°, Inc: 34.5°, η: 6.2°, ξ: 2.0°, A/n: 6.427°), which was calculated by means of the small circle intersection methods, intersect the Apparent Polar Wander Path in the North African coordinates at ca. 100 Ma. The age of the remagnetization is thus constrained between two deformation stages (Jurassic extension and Cenozoic compression) an therefore it can considered as an interfolding remagnetization.

In addition to the calculation of the remagnetization direction, the small circle methods allows to determinate the paleodips of the beds (i.e. the attitude of the bedding at ca. 100 Ma, the age of the remagnetization). Once the paleodips are known, it is possible to perform palinspastic restorations that allow to filter the structures generated during the pre- and post-remagnetization deformation stages.

The palinspastic restorations were used in the Central High Atlas to provide a better understanding of the processes that controlled the evolution of the chain both during the basinal stage and the subsequent inversion. For example, it allowed to evaluate the role of the halokinetic processes or the emplacement of the Upper Jurassic intrusive rocks in the development of the structure, or to date the cleavage present in the area. In addition, we can also restore the internal elements such as the magnetic fabrics, which offer clues about the remagnetization processes and the growth of magnetite grains.

In summary, here we offer a general vision of the results obtained by our research group during the last decade, studying the 100 Ma remagnetization present in the Central High Atlas by means of the small circle methods. We try to show the general aspects of the remagnetization (carriers and behavior) and the applicability of the small circles and the restoration methods to the study of inverted basins.