Geophysical Research Abstracts, Vol. 7, 07992, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07992

Multiscale anisotropy controlled by folding in clastic sediments from the Corbières transfer zone (NE Pyrenees, France)

L. Louis (1,2), P. Robion (2), C. David (2), D. Frizon de Lamotte (2)

(1) Department of Geosciences, SUNY at Stony Brook, NY, USA, (2) Département des Sciences de la Terre et de l'Environnement (UMR CNRS 7072), Université de Cergy-Pontoise, France

Results issued from the investigation at three different scales (outcrop > sample > thin section) of the anisotropies that developed during the building of the Chaudrons anticline (Corbières, France) are reported. We compiled early field observations (orientation of cleavage) and laboratory measurements (estimation of magnetic and acoustic anisotropies) with an original microstructural study, which was originally only aimed to account for the virtual fabrics obtained from AMS (anisotropy of magnetic susceptibility) and APV (anisotropy of P-wave velocity) estimations. This microstructural analysis was conducted in three different panels within the fold (crest, hinge and forelimb), following the zoning observed in Tavani et al. (2004) after analysis of various factors along a fold transect (cleavage spacing, cleavage height over spacing ratio, shape factor of the microlithons). The main finding of this study is the preservation of non welded boundaries between grains of calcite promoted by the presence of quartz grains. These boundaries, which appear as discontinuities in a partly recrystallized matrix of calcite, are analyzed in orientation and composition. In the three panels, a range of orientations is observed with at least two major generations of discontinuities, while the average orientation of these surfaces is still found consistent with both macroscopic cleavage and magnetic and acoustic fabrics. To account for the multimodal distribution of the discontinuities, we suggest an original scenario in which they are successively generated by sets. Two processes might have operated simultaneously during the development of the fold: 1) horizontal rock mass compaction inducing twinning, pressure solution and recrystallization, and 2) Preservation of relatively high porosity zones along plane normal to the contemporaneous maximum

principal stress due to stress heterogeneities generated at calcite/quartz interface. From these results, we suggest that microstructural processes are the same before and during folding, ruling out a passive shearing of solution surface formed during a first step of layer parallel shortening.

Reference :

Tavani S., Louis L., Souque C., Robion P., Salvini F. and Frizon de Lamotte D., 2004. Folding related fracture pattern and physical properties of rocks in the Chaudrons ramp-related anticline (Corbières, France), AAPG Memoir 'Deformation, fluid flow and reservoir appraisal', Eds: R.Swennen, F.Roure & J.Granath.