Geophysical Research Abstracts, Vol. 9, 09319, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09319

Normal fault damage zones involving carbonate rocks: the influence of depth, lithology and fluid origin (example from the southern margin of the Corinth rift)

M. Bussolotto (1), A. Benedicto (1), J. L. Montenat (2), P. Vergely (1), L. Moen-Maurel (2) C. Invernizzi (3), V. Plagnes (4).

(1) UMR 7072-Tectonique, Université Paris Sud XI, Bât. 504, 91405 Orsay Cedex, France, (2) TOTAL Geoscience, 64018 Pau, France, (3) University of Camerino, via Gentile III da Varano 62032 Camerino, Italy, (4)UMR Sisyphe, Université Paris VI, 75005 Paris, France (Maura.Bussolotto@u-psud.fr Tel.: +33 (0)1 69 15 67 97; Fax: +33 (0)1 69 15 49 05)

Since 2002, work in collaboration with Total (France) has allow to investigate some major parameters which mainly influence the structure of fault zones involving carbonate rocks, that have a major incidence on transmissivity properties of fault and so on, on fluid flow. Here, we aim to discuss the influence of depth, lithology and of fluid interactions on the deformation mechanisms and on the type and texture of fault rocks involving carbonates, using as example the Corinth Gulf. The southern margin of the Gulf of Corinth (Greece) represent one favourable site to analyze fault zones developed at different depths because since the rifting started, it has followed an intensive uplift which has led to the exhumation and exposition of ancient and deeper to active and superficial normal faults. Integrated studies combining different methodologies (microstructural, petrologic, fluid inclusion micro-thermometric and stable isotope geochemical analysis of calcite sealed fault related structures and fault rocks and fluid modelling) provide data allowing to discuss the role of depth, lithology and fluid circulation into deformation processes and into formation of different type of fault rocks. Into deeper and more exhumed fault zones, deformation is characterized by an indurated and well cemented hydraulic type/proto-cataclastic breccia, developed at a depth of about 2.2-2.3 Km, which is reworked into well cemented cataclasites, formed at lower depth and related to shear planes. Into intermediary fault zones, we observe a well cemented hydraulic type breccia cut by shear planes to which are associated to not well cemented and clay rich, cataclasites, formed at depth less to 1.6

Km. This type of cataclasites is also characteristic of less exhumed, active fault zones where it is associated to an open extensional/shear fracturation. Furthermore, when limestones are alternated with marly levels, we observe incohesive cataclasites related to the shear planes, in which calcite cement is substituted by a clay matrix. Stables isotopes geochemistry shows that cement of hydraulic breccia is precipitated from a fluid at equilibrium with the host rock (close system), while the other less indurated structures are cemented by a calcite precipitated from a fluid influenced by meteoric ground water (open system). Here, we aim also to present a comparison between deformation features and fault rocks of major fault zones and the deformation occurred within intra-tilted blocks (extrados).