Geophysical Research Abstracts
Vol. 17, EGU2015-6009, 2015
EGU General Assembly 2015

Relationship between diagenetic history and fracturation in carbonates.

Jean Cochard, Yves Guglielmi, Philippe Leonide, and Juliette Lamarche

Aix-Marseille Université, CEREGE, IRD, CNRS, Centre Saint-Charles, 3, Place Victor Hugo (Case 67), 13331 Marseille cedex 3, France (cochard@cerege.fr)

How do fracturation interact with diagenesis is a key question in carbonate research since carbonate may experience very early diagenesis (in the deposit environment) that confer the rock early brittle behavior. Through petrographic (sediment texture, facies), diagenetic (cement stratigraphy, porosity and isotope geochemistry) and fracture patterns analyses of five 20m long cores, we studied the timing of diagenesis, pore and fractures network formation of Urgonian inner platform carbonates. The Urgonian carbonates of late Barremian/early Aptian in age from Provence (SE, France) are characterized by microporous carbonates alternating with tight carbonates at regional scale. In this way, two reservoir rock-types, based on texture, associated depositional environments, porosity and pore-types were identified for inner platform facies: 1) the Tight Inner Platform (TIP) carbonates results on the entire occlusion of the intergranular pore spaces by early marine and/or early meteoric cementation and 2) the Porous Inner Platform (PIP) carbonates preserved intergranular macroporosity during marine/meteoric early diagenesis that allows the recrystallization of micrite and the following development of microporosity. The alternating PIP and TIP rock-types correspond to decametric peritidal shallowing-up sequences. As a result, early diagenesis seems to strongly modify the TIP mechanical properties, making them more brittle and promoting complex fracturing. Developments of fractures during the first stage of burial have probably influenced the enhancement/occlusion of porosity in such carbonates. Thus, faulting during basin tectonic inversion associated to late exhumation caused mixed sursaturated and meteoric fluids circulation, which allowed the formation of new diagenetic cement phases. During these circulations, the early TIP-PIP contrasted properties may have played a basin scale hydrogeological role.

This study brings some preliminary results on 1) the impact of the early diagenesis (cementation / dissolution) that affect peritidal deposionnal sequences ; 2) the evolution and the fractures distribution in inner platform carbonates and 3) the paleo-to-current basin scale fluids circulations.