

CLAYCOAT: CLAY COATings in shallow marine deposits to improve reservoir quality prediction

Objectives

In many hydrocarbon fields, reservoir properties are strongly linked to chlorite grain coatings occurring during sedimentation and early stage of burial history (Erhenberg, 1993; Worden et Morad, 2003; Dowey et al., 2012). These coatings, during the burial history of the reservoir network, can reduced or improve the porous network and modify the connectivity. The future of oil and gas exploration and production will focus on deeper and hotter geological reservoirs, and the risk to discover lower porosity and permeability reservoir will increase. Chlorite grain coating is one of major processes that control high reservoir quality in siliciclastic rocks.

The objective of this Research and Development project consists in identifying proxies of coating processes by clay development around detrital grains occurring during the early diagenesis of sandstones, in shallow marine depositional environments, typically shoreface, tidal and estuarine.

Master 1 internships:

Variability and distribution of clay coatings in space/time from modern analogs:

Modern analogs : Gironde estuary and Arcachon Bay

It is planned to acquire 5.5 meters cores in one or two bars in Gironde estuary and Arcachon Bay in order to understand the occurrence of clay coatings through time. Sedimentological investigations will be completed by geophysic measurements (seismic) to better characterize the sand geometry in estuary environment.

Clay and/or clay coatings around detrital grains will be analyzed in optical and electronic (SEM or TEM) microscopy. The nature of clay minerals will be determined thank to X-ray diffraction, FTIR spectroscopy and microanalyses, and its vertical preservation along cores will be also studied. Nanopetrography and mineralogy of early diagenetic coatings will be observed and the crystal-structure and crystal-chemistry will be reconstructed.

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