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A sensitivity study on the petrographic parameters affecting the reservoir quality modelling in sandstones from the Djeno Formation, Congo offshore.

Simone Ricci, Andrea Ortenzi, Azzurra D'Atri, and Francesca Golfetto

Reservoir Quality Prediction is a technique through which it is possible to model porosity and permeability of a sandstone taking into account the combination of the following different factors:

- Quantitative petrographic composition of a set of samples, measured through thin section point counting and comprising both detrital components and cements (diagenetic modification);
- Paragenetic sequence of the diagenetic phenomena based on the geometric relationship of the cements;
- Rock-experimented burial, thermal and stress histories;
- Rock lateral and vertical continuity at basin/local scale.

In this study the Reservoir Quality Prediction in the Neocomian-Barremian Djeno Formation of Congo offshore was appraised using two software, namely Touchstone™ and T>Map™. The first software models mainly mechanical compaction and quartz cementation taking into account all the petrographic and diagenetic data coming from calibration wells. The other non-modelled cements are taken into account by directly defining their range of time-depth-temperature of precipitation (paragenesis classes assignments). The modelling is carried out in the frame of the burial, thermal and stress histories of the calibration wells in order to assess the set of variables that influence the reservoir quality. The mapping of reservoir quality is achieved through T>Map™, a software that distributes the Touchstone™ outcoming model at the basin scale using the burial, thermal and stress maps of the reservoir obtained usually from petroleum system modelling.

In this modelling workflow there are some critical aspects that have been investigated in order to understand what are their impacts on the prediction results. These aspects are:

- Paragenesis classes assignments: determination of diagenetic events sequence by assigning each event to a specific interval of time, depth or temperature; as an example, to assign a compaction-limiting cement to an early or late paragenetic phase changes significantly the final porosity and permeability of the reservoir;
- Percentage, composition and way of precipitation of cementing phases in the samples; as an example, the presence of clay cements can lead to have a good amount of microporosity or it can also prevent the precipitation of occlusive cementing phases;
- Percentage and composition of detrital matrix in samples;
- Percentage and composition of rock fragments in samples; for example, different types of rock fragments can belong to different mechanical compaction classes (rigid grains, intermediate grains or ductile grains) which can have a significant impact on modelling results.

A sensitivity on each one of these aspects was carried out using a real case in order to evaluate their impact on the reservoir quality modelling results.