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Sedimentology and Sequence Stratigraphy of the Strunian Tournaisian Reservoir in Sbaa Basin
(Southwestern, Algeria)

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The Sbaa basin is located in the Western Algerian Sahara. It includes several small oil and gas fields producing from Upper Devonian and Lower Carboniferous Reservoirs.

Integration of log, biostratigraphy and facies data in Sbaa Carboniferous basin led to identify two second order sequences during Strunian and Tournaisian periods.

Strunian corresponds to the latest progradation phase in the Sahara. In fact, it started during Famennian time. The gamma ray section displays a clear coarsening upward stacking pattern.

Core description within these sequences shows an evolution from the offshore to upper shoreface environment revealing a shoreface progradation.

Transgression started from the Tournaisian with estuarine sediment deposition. These are organized as aggrading and retrograding packages in fining upward sequences. These deposits include horizontal to planar cross bedded, fine to medium-grained sandstone interbedded with bioturbated, lenticular to flaser bedded siltstones with mud drapes witnessing a tidal influence.

The maximum flooding is indicated by the offshore shales overlying the so called “Grès de Sbaa” sandstones, which are the main target in this area. A shallow marine sedimentation followed this flooding and spread over the basin. It is characterized by lower to upper shoreface deposits which include lenticular, wavy and hummocky cross stratification bedding. These structures indicate an important storm and wave influence.

The main reservoirs occur in the uppermost Strunian, Sbaa and the Tournaisian upper sandstones.

1. The first ones (Strunian) are bioturbated, fine- to medium-grained and interpreted as shoreface deposits.

2. The Sbaa sandstones are massive, shelly and fine- to medium-grained. They are considered as estuarine deposits and constitute the second sequence transgressive systems tract.

3. The Tournaisian sandstones are similar to the Strunian ones.

From petroleum reservoirs considerations, the Sbaa sandstones have moderate petrophysical parameters with an average of 15 to 20% porosity and 100 md permeability.

In the eastern and northern part of the basin, the existence of possible pinch outs are supposed to constitute the main prospective stratigraphic traps. Also, Strunian and Tournaisian sandstones are important reservoirs on the eastern and northern borders of the basin.