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**Sedimentology and sequence stratigraphy of the Tournaisian F1 and F2 sands
Block 405a , Berkine Basin**

Andrew Hughes(1) Andy Lever(2) and Nick Miles(3)

(1) Burlington Resources, (2) Time Trax Limited, (3) Robertson Research International

The F1 and F2 Sands of Tournaisian age form significant reservoirs in Block 405a of the Berkine Basin. Unlike the prolific TAG-I in this part of the basin, the F1 and F2 sandstones are geographically restricted. To the south and east, the sands pass into non-reservoir muddy facies, while to the north and west they eroded by the Hercynian Unconformity.

Coring through the Tournaisian sands reveals a broadly shallow marine sequence for the F1 and F2 interval. Two depositional styles can be recognised. For the lower most interval the sands appear at the top of m-scale coarsening-upward units. In these cases they are interpreted as the culmination of a prograding, wave-dominated shoreline and are often capped by a thin transgressively reworked interval before a return to offshore clay deposition. In some wells, however, the sands are more sharply-based, and possible interpretations include a more channelised environment.

Palynological analysis has been used to verify the overall depositional environment and also to provide a chronostratigraphic framework for more detailed reservoir modelling. A number of palynological markers have been identified, based on the inception or extinction of distinctive palynomorphs. These are generally believed to represent “time lines”, though some are distinctly diachronous and are probably facies-controlled.

The core-based sedimentology and the palynological analysis have been combined with wireline log analysis to produce a sequence stratigraphic framework for the Tournaisian in this part of the basin. Maximum flooding surfaces are generally easy to identify, though the MFS broadly equating to Top Tournaisian is only truly revealed by coring. Sequence boundaries are often more ambiguous. The resulting sequence stratigraphy reveals three depositional sequences for the Tournaisian: these may be eustatically controlled but are more likely to be influenced by intra-basinal subsidence rates.