

Abstract

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Title: Unravelling Controls on Sediment Transport and Deposition From Source to Sink Along a Complex Passive Margin: the Agadir-Essaouira Basin, Morocco Atlantic Margin.

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Early Cretaceous deepwater clastics offer the most prospective reservoir target along the offshore Moroccan margin, however, to-date, significant thickness of reservoir quality sands have proved elusive in this underexplored basin. Onshore, extensive Early Cretaceous fluvio-marine deposits are exposed, showing laterally and temporal variability. They comprise dominantly fine-grained deposits with intervals of coarse-siliciclastic to mixed carbonate/siliciclastic deposits. Detailed analysis of outcrops, and integration of all previous data along the Moroccan Atlantic margin, suggest strong paleotopographic, tectonic control and co-eval active salt movement, producing discrete feeder systems traversing the Essaouira and Agadir Area. Offshore, equivalent aged turbiditic deposits are predicted, although as yet only supported by amplitude analysis, some channel like morphologies on seismic data and indirectly confirmed by minor sands in current and older wells.

This margin was far from “passive” during the Late Jurassic and Cretaceous. Recent studies (Bertotti & Gouiza, 2012) indicate Late Jurassic and Cretaceous exhumation of 2-3 km in the hinterland during this period, associated with enhanced subsidence in the developing deepwater basin.

This study is a multi-disciplinary approach to develop sequential gross depositional element maps across the margin by detailed logging, improved lithostratigraphy and new biostratigraphic age control for key stratigraphic sections. Significant strike-parallel and temporal variations in lithofacies are observed along the margin. Within the Agadir Area a gulf can be recognised, and preliminary paleogeographic reconstructions suggest discrete feeder systems. To the north, more marginal marine to fluvial sections are recorded in the Essaouira and Doukkala Basins. Drainage pattern analysis suggests point source inputs for the main feeder systems. Sedimentary petrography points to distinctive provenance areas, likely from the Moroccan Meseta and Massif Ancien. Initial results also highlight the importance of longshore currents possibly redistributing coarser clastics along the margin. All observations indicate that potential reservoir quality and sediment delivery varies

spatially and through time. These results will reduce risk for evaluating reservoir type and location in the deep basins offshore Morocco and are a valuable analogue for the conjugate margin of Nova Scotia and the entire Atlantic margin system.