

Hunting Early Cretaceous clastic reservoirs along a complex “passive” margin. A multi-disciplinary source to sink study from the Atlantic Agadir-Essaouira Basin, Morocco.

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NW-Africa has always served as a prime example for passive margin evolution following the Triassic breakup of supercontinent Pangaea. Controversially, recent studies (Bertotti & Gouiza, 2012) indicate a different structural behaviour during the Jurassic/Cretaceous rift to drift stage with exhumation of 2-3 km in the hinterland and associated increased subsidence in the developing deepwater basin. Early Cretaceous clastics filling the accommodation space are the most prospective reservoir target offshore Morocco, but reservoir quality sands of substantial thickness have yet to be found in this underexplored basin.

Laterally and spatially variable fluvio-marine deposits are exposed in the Agadir – Essaouira Basin and comprise mainly fine-grained deposits with mixed carbonate/siliciclastic intervals. The Agadir to Cap Tafelney Area can be described as a gulf with an outward extension westward of a very-flat shelf that does not fit the standard sequence stratigraphic models. Preliminary paleogeographic reconstructions have identified locally constrained fluvial systems. To the north, more marginal marine to fluvial sections are recorded in the Essaouira and Doukkala Basins. Localized source inputs for the main feeder systems are recognized from existing literature and field studies and help to identify major drainage divides in the area. Further initial results also highlight a period of high sediment discharge during Barremian to Aptian time producing instabilities in the upper to middle shelf that are recognized by lateral-extensive (Cap Rhir to Cap Tafelney) soft sediment deformation structures and mass movement along the margin and inland (Imi'n'Tanoute). Longshore currents orientated roughly SSW-NNE along the paleo coastline possibly redistributed coarser clastics deposited in this time interval along the margin.

The aim of this study is to develop onshore sediment thickness maps for the individual stages of the Early Cretaceous and it is linked to a similar study in the Souss – Tarfaya Basin (A. Arantegui). In a multi-disciplinary effort lithostratigraphy will be improved and new biostratigraphic ages provided to identify controls for key stratigraphic sections and major sequence stratigraphic surfaces. These controls will help to locate sediment input points into the offshore basins and to enhance seismic data-based interpretations. In the deep marine part, of the Agadir – Essaouira region, turbiditic deposits are only supported by amplitude analysis, some channel like morphologies on seismic data and indirectly confirmed by minor sands in current and older wells. Equivalent Early Cretaceous turbidites are exposed in the offshore section of the Tarfaya basin in the inverted Fuerteventura outcrops of Spain. These deposits have been logged for renewed litho- and biostratigraphy and further sampled for petrographic analysis.

This study is part of a large-scale project, which will be combined with new apatite fission track analyses and (U-Th)/He data into source-to-sink conceptual and numerical models (R. Charton) and interpretations via seismic data for the evolution for Early Cretaceous deposits and simultaneous salt movement in the Mesozoic. The project will serve as a valuable analogue for the conjugate margin of Nova Scotia and for assessing the entire Atlantic margin system.