

Abstract

Title: Early Cretaceous Depositional systems along the flank of the Moroccan Passive Margin; recording a complex interplay of tectonics, eustacy and provenance on sediment delivery to the deepwater basins.

Theme: Stratigraphy and Sedimentology of passive margin sequences.

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Coastal outcrops of Early Cretaceous continental to shallow marine sediments on the flank of the Moroccan Passive margin allow reconstruction of the depositional style and evolution of the basin during the opening of the Atlantic. Offshore, Early Cretaceous deepwater clastics offer a potential reservoir target; however, recent drilling has either failed to find any sands, or as yet only encountered uncommercial reservoir quality. This study integrates a wealth of published data with extensive new field logging, biostratigraphy and access to subsurface well data, to reconstruct the onshore palaeogeography for each stage of the Early Cretaceous.

The palaeogeography was controlled by inherited basin geometry, active tectonics at various scales, as well as underlying salt tectonics. Recent studies (Bertotti & Gouiza, 2012) indicate Late Jurassic and Cretaceous exhumation in the hinterland of 2-3 km during this period, and further studies as part of this project is improving understanding of the location and timing of positive topographic massifs, critical to define sediment budgets and pathways into the basin. Relative accommodation of the subsiding domain was also controlled by tectonics, eustacy and supply.

Depositional environments comprise fluvial / coastal plain to outer shelf, extending up to 100 km inland from the continental slope margin. New high-resolution biostratigraphy provides improved dating of second order maximum flooding surfaces, sequence boundaries and hiatus in the succession on the shelf, which is being used to better constrain the input of sediment onto the deepwater basins.

Early Cretaceous sedimentary style shows markedly variability along the margin. In the north, around the Essaouira Basin, deposits are dominantly fine-grained, with discrete intervals of coarse-siliciclastic to mixed carbonate/siliciclastic input. South, in the Tarfaya Basin near TanTan, a more coarse clastic dominated system prevails, suggesting a strong control of provenance and drainage system on sediment delivery into the basins.

The results document a dynamic flank on the margin of the opening Passive Margin basin, resulting in variable sediment input to the basin both spatially and temporally. Constraining timing, provenance and location of coarse clastic sediment delivery from source to sink in these underexplored basins are key to mitigate reservoir presence risk.