

Abstract

Title: Mitigating Early Cretaceous reservoir risk along the offshore Morocco passive margin through analysis of the coastal delivery systems exposed in the Agadir-Essaouira Basin.

Tim Lubber, Jonathan Redfern, Luc Bulot, Angel Arantegui, Remi Charton, Giovanni Bertotti

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The Jurassic to Early Cretaceous postrift succession is one of the main reservoir targets in the offshore basins along the Atlantic Margin. However, recent drilling in Morocco has failed to find commercial reservoir sands. This study focuses on mapping exceptional Early Cretaceous outcrops in the Agadir-Essaouira Basin (EAB), to address the timing and location of the feeder systems and answer the question “has enough coarse clastic material reached the shelf margin”.

Structural studies and apatite fission track data suggest the hinterland experienced 1-2 Km of exhumation during the Late Jurassic/Early Cretaceous, atypical for a passive margin flank, and potentially providing significant erosion areas. However, in the EAB (this study) the Early Cretaceous succession is mud-dominated with only restricted coarse siliciclastic input.

Extensive field mapping, involving sedimentary logging, biostratigraphy and integration of subsurface well data, has allowed the generation of high-resolution depositional environment maps for each stage of the Early Cretaceous. Throughout most of this time the area was a large low relief shelf extending up to 100 km inland from the continental slope margin, providing limited capacity for siliciclastic input into the deepwater. New high-resolution biostratigraphy allows accurate dating of a second order maximum flooding surface and sequence boundary from the Barremian to Aptian. Following highstand conditions a forced regression in the uppermost part of the late Barremian *G. sartousiana* ammonite zone allowed coarse clastics to reach the proximity of the shelf margin, as sediment supply is interpreted to have exceeded the rate of sea level fall. The sequence is terminated locally by fluvial deposits incising into the underlying deltaic and shoreface deposits. A subsequent abrupt transgression close to the base of the early Aptian (*D. forbesi* ammonite zone) drowns the system with return to a mudstone dominated succession.

The results help constrain timing, provenance and location of coarse clastic sediment delivery in this underexplored basin and are being integrated with a linked study to the south (Tarfaya Basin). Further work will assess the provenance for the system, with candidate locations being the Meseta, Massif Ancien and the Anti Atlas. This source to sink project will serve as a valuable analogue for the conjugate margin and the entire Atlantic margin system to help mitigate reservoir risk.