

Carbonate Platform Seismo-Stratigraphy Along an Active "Passive Margin": The Middle – Late Jurassic Agadir Basin (Offshore Morocco)

Alessandro Lanfranchi¹

¹Oolithica Geoscience Ltd, Cheltenham, United Kingdom.

ABSTRACT

The Agadir basin sits along the inboard edge of the Triassic - Early Jurassic Moroccan Salt Basin, where the Central Atlantic passive margin intersects the Western High Atlas failed rift. Here, the interplay of syn-sedimentary tectonism with secular changes in carbonate productivity controlled the distribution and characteristics of Middle and Upper Jurassic carbonate facies, and ultimately of reservoirs. The Middle Jurassic carbonate deposystems were characterised by prospective belts of high-energy oolite and coated grain shoal facies, which protected a wide lime-mud-dominated lagoon in their lee. Callovian fault block rotation, related to early salt movement, fragmented the Bathonian platform into a series of NE-SW oriented fault terraces, dissected by ~E-W transfer faults. Syn-tectonic shingled wedge-shaped growth packages shed off fault escarpments are intercalated with more parallel reflectors marking quiescent tectonic periods characterised by shaly-limestones with planktonic biota related to platform retreat and increased siliciclastic input. A Late Callovian to Middle Oxfordian drowning event terminated the oolitic-coated grains platform forcing the carbonate deposystem to backstep further inboard. The overlying Upper Jurassic platform is marked by elevated depositional relief (>1000+m) and well defined seismic facies including (i) a steep slope of outboard-dipping reflectors evolving into a by-pass escarpment, (ii) a narrow aggrading microbial reef margin with chaotic response, and (iii) a wide platform interior with parallel discontinuous reflectors of low to moderate amplitude. Further extensional NE-SW fault activity, now within the platform interior, resulted in increased accommodation at the platform margin. Localised pulses of fault block rotation during the Tithonian are associated with growth of deep-water microbial build-ups along their crests and the gravitational collapse of the ocean-facing flank of rotated blocks. A Late Tithonian / Early Berriasian drowning unconformity associated with a >30 Ma long hiatus marks the top of the Upper Jurassic Carbonate platform. During this hiatus, calving of the shelf-edge produced coalescing debris flow fan systems further outboard. This study documents episodes of fault block rotation during the early stage of Central Atlantic drifting, which affected the distribution of reservoir intervals, and provides analogues for improved play fairway analysis in adjacent parts of West Africa passive margin.