Jurassic Carbonate Platforms Along the Agadir-Essaouira Basin, Morocco: An Outcrop Analogue for Central Atlantic Margin Carbonate Systems

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ABSTRACT

The Jurassic of the Agadir-Essaouira Basin records the initial post-rift deposition following the late Permian-Triassic rifting. The entire Jurassic succession is characterised by a mixed siliciclastic-carbonate depositional system including three main transgressions. The extension and the quality of the outcrops allow a good understanding of the lateral and stratigraphic facies variations. As Upper Jurassic carbonates are proven reservoirs on the conjugate margins of Morocco and Canada, these outcrop provide opportunities to constrain reservoir development and architecture. The Callovian to Upper Oxfordian limestones record a major marine transgression which began in the Late Bathonian to Early Callovian. This continuous carbonate succession is composed of three formations which have a large extent across the basin. Following the Bajocian-Bathonian red fluvial siliciclastics, the Ouanamane Formation (Callovian) records the development of open-marine conditions. The transition from continental to marine is gradual and allowed the rapid establishment of a very extensive carbonate platform. The bulk of the unit is characterised by marly limestones alternating with fossiliferous oolitic packstones, locally floatstones with very abundant brachiopods. Intense bioturbation and encrusted and bored surfaces are common. The top of the formation is made of a marls interval interpreted as a regional maximum flooding surface. The overlying Tidili Formation (Oxfordian) is the major potential reservoir unit. It is dominated by reef deposits, representing peak transgression. The variations in facies occur over tens of meters and allow the observation of reef geometries and internal facies zonation. A phase of reef establishment is dominated by platy corals (Dimorpharaea) and is followed by a boundstone with diverse fauna of branching and massive corals. The reef bodies present lateral evolutions to bioclastic floatstones and mudstones. Scale of reef bodies varies from 10 m to several km. The Iggui-El-Behar Formation (Upper Oxfordian–Kimmeridgian) records renewed regression and the disappearance of reefs. Facies are characteristic of low-energy environments, evolving from back-reef environments with corals and gastropods, to more proximal environments characterised by mudstones with foraminifers and more rarely gypsum, interpreted as intertidal to sabkha environments.