

Controls on stratigraphic development and reservoir distribution of shelf margin carbonates: Jurassic Atlantic margin - western Morocco

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The Late Permian-Triassic Atlantic rifting phase resulted in the opening of the central Atlantic margin during the Early Jurassic. Jurassic deposits recorded thus the initial post-rift sedimentation along the margin and constitute a new hydrocarbon play offshore Morocco. Discoveries in the Upper Jurassic reefal carbonates of Cap Juby in the Tarfaya Basin, southern Morocco, and of Panuke, in the conjugate margin of Nova Scotia, Canada, proved the hydrocarbon potential of this basin. In order to understand the potential of Jurassic reservoirs and possible source-rocks, a coherent sequence stratigraphy framework has to be established. The Atlantic basins of Morocco have been deformed by the Atlas orogeny and present, besides offshore wells from the Agadir-Essaouira and Tarfaya basins, outcrops of the complete Mesozoic succession, which makes it a favourable area for such a study.

Here we report on the initial results of a study on Jurassic detailed stratigraphy and structural evolution that aims to identify and constrain the potential Jurassic reservoirs and source-rock facies. Two large-scale transgressive-regressive cycles form the Jurassic shelf margin deposits that are characterised by rapid facies changes.

In the east of the basin, the Anklout Anticline presents good exposures of the entire Jurassic, where a reference section has been logged. The base of the Lias is characterised by fluvial conglomerates and sandstones and a fast transition to a carbonate shoreface environment. The establishment of a peritidal environment represents the maximum of transgression characterised by grainstones alternating with dissolution breccias and stromatolites. Regression during the Middle Jurassic led to deposition of fluvial siliciclastics in the proximal study area, passing westward to shallow-marine carbonates. The second transgressive phase occurred from Callovian to Oxfordian and established marine conditions throughout the basin. The first part of the transgression is characterised by high energy bioclastic limestones and a level of marls marks the transition to the reef-dominated Oxfordian deposits. These levels are of particular interest because they constitute offshore reservoir. The last regression establishes reddish marls and dolomites facies, and is followed by the establishment of a peritidal environment during the uppermost Jurassic.