

## Evolution and facies variation of shelf margin carbonates of the Agadir-Essaouira Basin: Middle to Upper Jurassic Atlantic margin - western Morocco

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The Jurassic records the initial post-rift deposits along the Moroccan Atlantic margin following Late Permian-Triassic rifting. Jurassic rocks are well exposed in different locations of the Agadir-Essaouira Basin, which makes it a favourable area to establish a coherent stratigraphic framework. A mixed siliciclastic-carbonate depositional system characterizes the Jurassic deposits of the Atlantic margin. Following Lower Jurassic transgression and Middle Jurassic regression, the Callovian to Upper Oxfordian limestones record a major marine transgression. This continuous carbonate succession is composed of three formations with a large extent across the basin.

The Ouanamane Formation (Callovian) records the development of open marine conditions, with progressive installation of a carbonate platform from West to East. This formation overlies Bajocian-Bathonian red fluvial siliciclastics throughout the basin and presents a silty base that evolves rapidly to fossiliferous limestones and dolomites. The bulk of the unit is characterised by marly limestones alternating with fossiliferous oolitic packstones to grainstones, and locally floatstones to rudstones with very abundant brachiopods, gastropods and oysters. Intense bioturbation and encrusted and bored surfaces are common. Facies are fairly homogeneous across the basin.

Marls mark the transition to the overlying Tidili Formation (Oxfordian), which is dominated by reefal deposits. Reefs are of particular interest because they constitute offshore reservoirs. The lateral and vertical 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*) with a muddy matrix and encrustations of stromatolites and *Tubiphytes*. This is followed by a boundstone with more diverse fauna of solitary, branching and massive corals. The reef bodies present lateral evolutions to bioclastic floatstones, oolitic grainstones and oncoidal packstones. Scale of reef bodies varies from 10 m to several km. Internally, they tend to be massive towards the West, but develop decametre-scale clinofolds in the East.

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, detrital minerals, and marls. These beds are characteristic of intertidal to sabkha environments, which were affected by repeated storms that formed continuous layers with basal rip-up clasts and centimetre-scale lithoclasts.