

Facies, Sequence stratigraphy and Evolution of the Late Barremian-Turonian platforms in North Egypt

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Five Cretaceous rudist-dominated outcrops from North Sinai and the Western side of the Gulf of Suez in North Egypt form the backbone of this study. These outcrops are analogs for the subsurface Cretaceous carbonate and siliciclastics that form hydrocarbon reservoirs for a number of oil fields in the Western Desert, Sinai and the Gulf of Suez region. A detailed facies and biostratigraphic analysis has been carried out to construct a high resolution sequence stratigraphic framework. The platform deposits are subdivided into thirteen microfacies types that define eight facies belts. The intertidal siliciclastic facies is characterized by sandstone and iron-oooids packstones, whereas the peritidal facies are indicated by dolostone and mudstone. Wackestone and packstone with miliolids and cyanobacterium were deposited in restricted lagoon environments, while the open marine biota are widespread in open lagoons. The high energy subtidal shoals are dominated by oolitic or bioclastic grainstones and packstones. The rudist facies are deposited in shallow subtidal rudist biostromes in the form of baffestone, floatstone and rudstone facies. The rudist biostromes grade seaward to the foreslope and deep marine facies (mudstone, wackestone and shale with orbitolinids and planktonic foraminifers).

Based on new biostratigraphic data and facies stacking patterns, a high resolution sequence stratigraphic framework has been established for these units. The Late Barremian-Turonian succession is subdivided into 11 third order depositional sequences. The muddy facies are dominant during the transgressive system tract (TST), while the rudists flourished on the platform during highstands. The evolution from siliciclastic- to rudist-dominated platforms coincides with the southward transgression of the sea during the Middle Albian.

The siliciclastic facies characterize the North Sinai platforms during the Late Barremian-Early Albian period. The sandstone and high energy shoal facies play an important role in the formation of the reservoir during this period. On Middle Albian-Turonian platforms, the rudist-bearing facies are common in North Sinai. The dissolution of the aragonitic components of the rudist shells was the most important diagenetic process for enhancing reservoir quality. The intercalation of the rudist-bearing facies with highly permeable crystalline dolostone results in good reservoir quality.