The Tectono-Sedimentary Framework of the Jurassic Carbonate Platform in Atlantic Passive Margin of Morocco

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This paper will focus on the tectono-sedimentary features of the carbonate Atlantic continental passive margin of Morocco.

The geological interpretation of the passive margin is based principally on the data acquired from petroleum industry including seismic reflection surveys and wells. Prior to the opening of the Atlantic Ocean, a continental rifting during the Upper Triassic–Lower Lias was marked by the deposition of continental red beds which grade upward to evaporates.

The break up unconformity is believed to be Toarcian in age. Carbonate sedimentation prevailed in the Jurassic time. More than 4000 m carbonate sequences were deposited on the shelf.

Laterally, the Jurassic becomes thinner towards the slope and the abyssal plain reflecting starved sedimentation with most of the carbonate being deposited in the shelfal areas. The carbonate sedimentation is marked by high energy carbonates which are expressed on seismic profiles as prograding reflectors. These progradations correspond to sand shoal oolitic carbonate beds which were deposited during the high stands. During the Lias and Dogger, these sand shoal oolitic deposit were prograding and aggrading. The carbonate platform evolved from ramp type platform in the Lower and Middle Jurassic to shelf margin platform in the upper Jurassic. This evolution is associated with rapid rise of sea level and the carbonate platform was catching up in the upper Jurassic.

However and locally salt tectonic prolongated the ramp type to up to upper Jurassic.

The salt uplift compensated for the rapid sea level rise and prevented the carbonate platform to evolve to self margin carbonate platform.

Coral Reef Morphology and Growth History, North West Shelf, Australia

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The North West Shelf is a tropical ramp with Cretaceous-Tertiary carbonates and clastic reservoirs at depth. Coral reef systems, discontinuously developed during the Late Tertiary-Quaternary, vary from fringing reefs to isolated reefs rising from deep-ramp settings. Quaternary evolution was documented seismic imaging, coring and U-series dating, and sea level data from the Houtman Abrolhos carbonate platforms (at 28-29 deg S).

The Ningaloo fringing reef at 20-22 deg S, records Holocene and Last Interglacial phases of reef growth overlying Tertiary carbonates of the Cape Range, which is flanked by uplifted Plio-Pleistocene terraces and reefs.

Scott Reef (at 14 deg S) is an isolated reef which overlies a carbonate platform and a major gas discovery. Seismic profiles reveal a Last Interglacial (ca. 125,000 year) reef system, but reefs which apparently grew to sea level are 30m below present sea level, indicating significant subsidence in the Late Quaternary. Holocene reefs grew in the accommodation space provided by subsidence. The Rowley Shoals (15-17 deg S) comprise a morphological series of emergent, annular reefs rising from depths of 200-400 m. Seismic profiles suggest Late Quaternary differential subsidence has influenced reef morphology.

As the spatial association between reef systems and hydrocarbon seeps and the reservoir potential of the Tertiary section receive attention, further exploration and development in and around coral reefs will require better understanding of human and natural impacts, and bio- geological controls on reef growth and development.

Carbon Isotope Proxy for the Discrimination of Eustatic from Transgressive-Regressive Changes in Accommodation Space for Carbonate Ramps: Oxfordian Smackover of Alabama USA Example

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Separation of vertical (eustatic) from horizontal (transgression-regression) changes in accommodation space is commonly conducted through the interpretation of stacking patterns of Walter's Law lithofacies. However, distinguishing such changes is problematic when lithofacies changes are gradational as can commonly occur in carbonate ramp environments.

The sequence stratigraphy of the Upper Jurassic (Oxfordian) Smackover marine carbonate sequence was investigated from a chemostratigraphic analysis of core sequences of the Conecuh Embayment and the Manila Embayment of southwest Alabama, Gulf Coast of United States. The results demonstrate the effectiveness of using stable carbon isotope chemostratigraphy as a proxy for differentiation of vertical from horizontal forcing functions upon sedimentary responses.

During sea level lowstands, combination of both local and global effects caused negative ä13Ccarb excursions. In the ensuing transgression and relative sea level highstands, low to absent siliciclastic contamination increased carbonate sedimentation and resulted in heavier ä13Ccarb values. In contrast, these Jurassic changes in ä13Corg appear reflect the interplay between terrestrial nearshore biochemistry (heavy) with open shelf biochemistry (light) carbon excursions, opposite to the Holocene.

Chemostratigraphy can be a powerful tool for differentiating global effects from local effects in carbonate sequence analysis. Carbonate ramp platforms such as the Smackover, owing to rapid changes which can occur laterally owing to small changes in vertical sea level, make ideal proxies for testing hypotheses of global versus local effects of sea level upon carbonate sequence development.