



Shoreline advance and sedimentology in a modern epeiric sea, the Arabian Gulf, Abu Dhabi

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The southern shore of the Arabian Gulf comprises a low-angle carbonate-evaporite ramp system ideal for studying sedimentary facies distribution and shoreline advance in a modern epeiric sea. The region provides one of the few modern analogues of many ancient epeiric settings, including a large number of carbonate petroleum reservoirs.

This study is based upon a 3 km long transect that was established oblique to the modern coastline. Some 16 sites were selected at regular intervals along this transect. Sample pits were dug, accurately logged, and sampled at a centimeter-scale.

Previous studies have proposed laterally continuous facies belts that largely parallel the modern coastline. However, this study clearly demonstrates that facies geometries are much more complex; with variations in thickness and lateral continuity being exhibited even at the sub-meter scale. The distribution of evaporite minerals is particularly of interest as this is now established as occurring in much lower regions of the intertidal zone than previously observed.

Selected samples of skeletal carbonates and microbial mats were dated using ¹⁴C accelerator mass spectrometry. The results provide internally consistent dates for samples ranging from 697±26 to 2600±34 BP. These data indicate vertical Holocene sediment accumulation rates of between 0.13 mm/yr to 0.39 mm/yr and coastal progradation rates of between 1.6 and 2.5 m/yr.

These observations have important implications when undertaking subsurface correlation of ancient sequences using a limited core-based dataset. A lack of accurate dating, be it biostratigraphic or radiometric, will make it virtually impossible to discern between laterally synchronous and diachronous facies.