Contrasting the High-Resolution Sequence Stratigraphic Concept of Two Mixed Carbonate/Evaporite Platform Interiors

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Shallow carbonate/evaporite systems have been deposited throughout the earth's history. Evaporites are often interpreted to have formed during late highstands. The Upper Jurassic Arab Formation and the Lower Cretaceous Acatita Formation are examples of these shallow mixed carbonate-evaporite systems. For both formations a high-resolution sequence stratigraphic interpretation was established. While both stratigraphic intervals exhibit mixed carbonate/evaporite cycles and sequences, the position of the evaporites in the sequence stratigraphic framework is different.

The Arab Formation is composed of fining- and shallowing-upward cycles of dolomitized grainstones passing upward to fenestral mudstones to laminated mudstones. Individual cycles might be capped by carbonates with anhydrite nodules or massive anhydrites. The cycles within individual fourth- or third-order sequences fine upward to evaporite-dominated cycles. Therefore, the evaporites have been interpreted to have been deposited during the late highstand systems tract. Within the Acatita Formation, carbonate/evaporite cycles are interpreted to coarsen upward from evaporite/mudstone to grainstone facies and are often topped by tidal flat or mechanical laminites. Thick cycles at the base of fourth- and third-order sequences suggest that high accommodation space is dominated by evaporite lithofacies deposition. Thinner cycles toward the top of fourth-order and third-order sequences are dominated by carbonates. Therefore, evaporites are interpreted to have been deposited predominantly during the transgessive and early highstand part of the sequence.

These two examples demonstrate that evaporites can form during the transgressive systems tract as well as during the highstand systems tract. It is therefore important to understand what other mechanisms control the inflow/outflow of these shallow platform basins and the formation of evaporites. Platform margin composition, platform interior geometry, and climate are some of the most important ones. Improved understanding of the formation of evaporites in a sequence stratigraphic framework might help us to better predict the distribution of associated carbonate reservoirs.