

## **Regional Controls on Siliciclastic Input into Mesozoic Depositional Systems of the Arabian Plate**

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### **ABSTRACT**

The Mesozoic siliciclastic stratigraphy of the Arabian Plate hosts a major proportion of the hydrocarbon resources of the Middle East, mostly within simple structural traps. There are also many untested and underexplored siliciclastic stratigraphic plays. Important reservoirs and seals include the Triassic Sudair, Jurassic Dhurma and Cretaceous Zubair, Burgan, Nahr Umr, and Tuwayil Formations. All exhibit marked cyclicity and encompass a range of depositional environments, however there remains considerable debate regarding controls on their deposition and distribution. A regional perspective in conjunction with sequence stratigraphic techniques that enable data to be analysed within a consistent framework are fundamental to understanding the interlinked roles of eustacy, tectonics and climate as driving mechanisms for siliciclastic input.

This approach will aid the understanding of areal reservoir variations, definition of fairway extents and prediction of new plays, particularly those associated with lowstands of relative sea-level. Lowstand siliciclastics offer appealing targets across the Arabian Plate, with the Tuwayil Formation of Abu Dhabi demonstrating proof of concept. The Tuwayil Formation also exhibits the influences of local tectonic trends on its facies distribution, highlighting the need for an understanding of the effects and locations of basement highs on sediment pathways when evaluating depositional systems.

The influence of clastic systems can be detected in carbonate dominated parts of the succession, notably in marls and thin shales that occur in 3rd order cycles of the Early Cretaceous Thamama Group. These siliciclastic intervals usually sit on exposure surfaces at the top of pure oligotrophic carbonate packages. They are interpreted as transgressive systems tracts (TST) above a sequence boundary, marking the retreat of a clastic paralic system as sea-level rises

and a pure carbonate platform is re-established at Maximum Flooding Surface (MFS) to Highstand (HST) times. Note that the MFS lies in carbonates not in “shales” which is counter to some interpretations. The clay-rich marls and shales of the TST can be traced across the plate. In the east, they form low permeability barriers that partition the carbonate reservoirs, but westwards towards the sediment source, sandstone content increases and stratigraphic trapping reservoir potential exists. Mapping out the presence and thickness of these systems will be key to exploration success.