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Calciturbidites of Hanifa Formation: Stratigraphic Traps in Deep Basinal Settings

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ABSTRACT

The Hanifa Formation in the central part of the Arabian plate is comprised of two different facies associations. One represents deposition of shallow-marine carbonate facies that make excellent reservoir facies harnessed in large structural traps. The other facies association represents deposition in the Jurassic deep-marine, Arabian intrashelf basin. Several encounters of hydrocarbons have been recorded in the Hanifa within in the intrashelf basin, which contradicts previous models claiming Hanifa to be comprised of either lime mudstones and/or source rocks. A key to resolve this is understanding the sequence stratigraphic evolution of the Hanifa platform margin and its impact on the architectural shelf-to-basin relationships. This study used core, outcrop, micropaleontologic and seismic data to classify Hanifa into multiple lithofacies associations, each belonging to different sequence stratigraphic components, and to correlate Hanifa from shelf to basin. This correlation has resulted in identifying and mapping fairways of calciturbidites reworked from the Hanifa shelf during highstand and during the Oxfordian – Kimmeridgian unconformity, and redeposited as submarine fans that now form stratigraphic traps sealed laterally and vertically by deep basinal mudstones and source rocks.