

Shelf to Basin Architecture of the Hanifa Formation, North Ghawar Field, Saudi Arabia

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ABSTRACT

Abdullrhman Al-Khunaini, Faisal Al-Shuhail, Salvatore Di Simone, Saad Al-Awwad. Saudi Aramco, Dhahran, Saudi Arabia The Oxfordian Hanifa Formation may be considered a unique petroleum system as it encompasses the three hydrocarbon play elements (source, reservoir and seal rocks), deposited during the same stage. Since this formation hosts one of the most important Jurassic carbonate reservoirs in Saudi Arabia, previous studies on the Hanifa are generally focused on the oolitic shoals and stromatoporoid reefs deposited on the shallow-marine shelf, with minimum attention given to the lateral continuity of these facies towards the basin. As such, the aim of this study is to characterize the Hanifa Formation using a process-based sedimentological approach, in order to build a sequence stratigraphic framework that correlates Hanifa facies from shelf to basin. The study area is located north of the super-giant Ghawar Field, where key cored wells were selected for sedimentological characterization and identification of stacking patterns. The established sequence stratigraphic framework was utilized to correlate shelfal facies to their time-equivalent basinal facies. This correlation highlighted the potential for new stratigraphic plays located along the Hanifa shelf margin.