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| Please fill in your abstract title. | Sequence Stratigraphy and Facies Distribution Model of the Late Jurassic Hanifa Reservoir South of Rimthan Arch, Saudi Arabia | |
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Abstract

The Hanifa formation has substantial hydrocarbon potential that can be realized through high-resolution reservoir characterization. Therefore, this subsurface study aims to characterize and establish the sequence stratigraphic framework of the Late Jurassic (Oxfordian-early Kimmeridgian) Hanifa Reservoir, revealing a temporal and spatial distribution of reservoir facies in a field south of Rimthan Arch.

Cores with a total thickness of approximately 485 m were collected from eight wells. These cores were described in detail, recording mineralogy, type of bedding surface, texture, sedimentary structures, ichnofossils, grain type and size, and estimated visual porosity type and percentage. The types of fossils and faunal assemblages were confirmed by examining the thin sections. Core-to-log shift values were determined by matching core plugs porosity trends with that of wireline porosity logs, followed by the integration of core data with wireline logs (gamma ray, density, and neutron logs). Interpretations began with assigning facies on the basis of sedimentary structures, texture, constituents and faunal assemblages. Afterwards, we defined the stratigraphic surfaces by assessing bed contacts, facies proportion changes, and the degree of facies offset.

The analysis suggested that the reservoir in the study area could be divided into 8 distinct facies; 1) planar-laminated peloidal grain-dominated packstone, 2) *Thaumatoporella* grain-dominated packstone, 3) coral-cladocoropsis floatstone/rudstone, 4) mollusk-stromatoporoids floatstone/rudstone, 5) peloidal mud-dominated packstone, 6) reworked stromatoporoids and cladocoropsis floatstone, 7) skeletal wackestone/mud-dominated packstone, and 8) bioturbated spiculitic wackestone/mud-dominated packstone. Based on the vertical stacking pattern of the facies and their distribution, nine sequences (3–8 m thick) were identified that compose the stratigraphic framework and define the layering scheme and architecture of the reservoir. The facies trend maps of each highstand and transgressive systems tract of each sequence show a predominantly southward progradation of reservoir facies across the field. Overall, the stratigraphic model indicates open marine conditions in a middle to outer ramp as the main depositional setting for the Hanifa Reservoir.

This study adds to the regional understanding of the stratigraphy of the Hanifa Reservoir in Saudi Arabia. In addition, the stratigraphic framework and facies distribution model improve facies prediction in un-cored wells and in between wells. This represents significant economic benefits by allowing for more precise well placement plans.