

Sequence Stratigraphic Framework and Gross Depositional Environments of Jurassic Arab Formation, Kingdom of Saudi Arabia

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ABSTRACT

The Jurassic contains the world-class source rocks (Callovian to early Kimmeridgian) and exceptional high-quality carbonates reservoirs. The grainy carbonates of the Arab A, B, C, and D (late Kimmeridgian to early Tithonian) sequences are among the best Jurassic carbonates reservoirs. This paper presents a robust sequence stratigraphic framework that resulted from isopach and petrophysical mapping, seismic interpretations, and core sedimentological calibrations across the eastern Arabian and Rub Al-Khali basins. The late Kimmeridgian sea level fall resulted in the deposition of Arab-C, B, A sequences, and pervasive Hith anhydrite deposits across the region, marking the turning point from a predominantly carbonate factory to an overall evaporite factory. A carbonate platform interior depositional model was adopted to explain the higher-frequency deposition of alternating Arab-C, B, and A carbonates and evaporites. Gross depositional environment (GDE) maps of the Upper Jurassic formations have been reconstructed by integrating core sedimentology, well-log electrofacies, and seismic attributes. The integrated GDE maps depict evolving depositional environments of Arab-C, B, and A sequences. The sequence stratigraphic framework and gross depositional environmental maps are essential for 3-D basin modelling and unlocking the hydrocarbon potential, especially the stratigraphic trap opportunities.