

Jurassic carbonates and evaporites of the Middle East: A new look at an old play

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The Jurassic tectonostratigraphic megasequence of the Arabian plate contains nearly 25% of the reserves in the Middle East. A detailed regional study of the petroleum system around the Arabian plate provides a new look at the play fairway and shows the complexity of the depositional environments.

The southern and central part of the Arabian plate is dominated by carbonate deposition around shallow intrashelfal basins/lagoons. Jurassic grainstone shoals rim the Diyab basin and form the dominant reservoirs. The majority of the oil resources in the area are in the mixed carbonate and evaporite reservoirs of the Arab Formation. These carbonates and evaporites form shallowing upward cycles and sequences, which were deposited in large shallow evaporitic lagoons. The world's largest oil field (Ghawar) lies within this area.

The Gotnia basin, contrary to the southern and central part of the Arabian plate, is underexplored. The northern part of the Arabian plate is dominated by deposition around a large, deep intrashelfal basin filled with the most prolific source rock (Naolekan/Sargelu) and later with thick deep-water evaporites (Gotnia). Reservoir carbonates deposited along the margin and composed of grainstone shoals interfinger with the source rock. Mg-rich fluids derived from the basin followed permeable pathways and subsequently dolomitized part of the shallow ramp carbonates with coarse anhedral to euhedral crystals. The abundance of petroleum inclusions at the outer rim of euhedral dolomite suggests that major hydrocarbon migration occurred during the later stages of dolomitization. Although, the Jurassic is heavily explored in large parts of the Arabian plate, it still remains largely untested around the Gotnia basin.
