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Paul G. Nicholson¹, Dominique Janjou² (1) Saudi Aramco, Dhahran, Saudi Arabia (2) Bureau de Recherches Geologiques et Minieres, Orleans, France

The Neoproterozoic Play in Saudi Arabia

The Neoproterozoic succession in Saudi Arabia remains unexplored, largely due to the country's historical abundance of shallower and more conventional plays. In neighboring Oman, where conventional play fairways are more mature, intra-salt reservoirs of the Neoproterozoic Ara Group are now major exploration targets and prolific hydrocarbon producers. Recent field studies, combined with new lithological analyses and subsurface mapping, reveal that the Neoproterozoic is also prospective in Saudi Arabia and may represent a significant unconventional play of the future.

Two Neoproterozoic stratigraphical groups can be identified in Saudi Arabia. The Jibalah Group, mappable in outcrop and on seismic data, is younger than 600 Ma (U-Pb zircon ages) and appears contemporaneous with the Nafun Group in Oman. The Jibalah is overlain by a (currently unnamed) salt-bearing group that is only visible in the subsurface and appears equivalent to the Ara Group in Oman. The top of this salt-bearing group is marked by the base-Phanerozoic unconformity (approximately 520 Ma). Correlation of these Neoproterozoic strata across the Arabian Plate is critical to understanding the potential of this play in Saudi Arabia, and detailed age dating is in progress.

Dark grey limestones of the Jibalah Group, deposited in a middle to outer marine ramp setting, have source rock potential with typical TOC values of 3% and also represent potential seals. Fractured dolomites, limestones and cherts are candidate reservoirs, analogous to the gas producing Buah Formation in Oman. Structurally, a mappable sequence of post-depositional compressional and extensional events, combined with halokinesis, collectively provide a variety of potential trapping geometries in the Saudi Arabian subsurface.