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Exploration Potential of Emerging Mesozoic Clastics Play, South Oman: Insights From Integrated Well and Seismic Interpretation

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Abstract

The Eastern Flank of the South Oman Salt Basin is a prolific oil province in the Sultanate of Oman, historically dominated by pre-salt and post-salt plays such as the Ara, Al Khlata, Haima, Nimr, Gharif, and Natih. Although these plays have delivered most discovered volumes, their maturity underscores the need for new opportunities to sustain portfolio growth. Recent discoveries within Petroleum Development Oman's South Oman Block 6 concession have highlighted the underexplored Mesozoic clastic succession (Hauterivian–Aptian), emphasizing its potential as a significant emerging play. This succession presents an opportunity to diversify the exploration portfolio of a mature yet prolific basin and unlock additional recoverable volumes.

An integrated, data-driven approach combining seismic and well interpretation at both regional and local scales was applied to evaluate the exploration potential of the Mesozoic clastics in the Eastern Flank.

Deposited as coarse continental channel fills subdivided into five subunits; their distribution is primarily controlled by accommodation space generated through salt withdrawal. Hydrocarbon charge is sourced from pre-salt Nafun/Ara intervals, with migration facilitated by back-spill phenomena, fault conduits, and capillary forces. The Base Nahr Umr shale forms an effective top seal, complemented by Khuff and intraformational shales. Trapping styles include structural closures, stratigraphic pinch-outs, and mega-truncation rims.

Despite seismic imaging challenges, particularly at truncation margins, semi-regional and detailed seismic interpretation of the latest 3D WAZ volumes conditioned with EVPFI demultiple removal and VanGogh denoising was undertaken, including subunit analysis. This work identified multiple sweet spots, with THMC-1 and THMC-2 emerging as the most prospective reservoir intervals due to their continuity and reservoir quality. Integration of multidisciplinary datasets has defined 19 risked and ranked opportunities, several of which are now being matured for near-term drilling.

This study demonstrates that a data-driven approach, using insights from well and seismic interpretation through integrated workflows, can unlock the exploration potential of the emerging Mesozoic clastics play and contribute to the sustained future growth of this mature but prolific oil province.