

## **Chronostratigraphic framework and gross depositional environments of the Shu'aiba Formation petroleum system based on newly acquired data in the under-explored Eastern Rub' Al-Khali basin, Saudi Arabia**

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### **ABSTRACT**

The Shu'aiba Formation was deposited during the Aptian stage of the Early Cretaceous on the southern part of the Arabian Plate, in and around the intra-shelf Bab Basin, over a period of approximately 12 million years. Based on regional well and seismic based synthesis of the Shu'aiba Formation, at least five third-order sequences (Apt 1, 2, 3, 4, 5) have been identified. The Lower Aptian Shu'aiba Formation in the Shaybah field was formed on a rimmed shelf margin, prograding northerly into the intra-shelf Bab Basin, and is productive from Aptian Sequences 2, 3, 4. Newly acquired 3D seismic data and recent exploration wells demonstrate the Bab Basin's effective oil source kitchen extends into Saudi Arabia.

Newly discovered fields A and B are located over the Shu'aiba platform-to-basin transition and show the complex stratigraphic evolution across shelf, slope and basin environments. Correlations between these two fields, in collaboration with additional well control, show predictable cyclicity and lithofacies. Seismic attribute analysis and interpretation of the recently acquired 3D seismic data, proved to be critical, in identifying depositional geometries and multiple time- transgressive shelf margins. Integration of core, wireline logs and seismic interpretations, combined with the established regional stratigraphic framework of the Shu'aiba Formation in the region, have all contributed to defining the stratigraphic trap potential of the upper and lower Shu'aiba reservoirs in the eastern Rub' Al-Khali basin.