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Characterization of Late Aptian Upper Shuaiba Sequences in Western Abu Dhabi Based on Newly Acquired 3D Seismic Data

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Abstract

The Shuaiba Formation, one of the primary reservoirs of Early Cretaceous Petroleum System, has been an important exploration target in onshore Abu Dhabi due to its excellent reservoir quality specifically along the platform margin. Initially the Bab Basin carbonate development was slow but increased during lowstand sequences of Upper Shuaiba which is also known as Shuaiba Sequence 5 (Strohenger et al., 2010). The Upper Shuaiba is distinguished from Lower Shuaiba by the presence of clay, high frequency and low amplitude progradational sequences. This study is going to describe the nature of the carbonate development within these Upper Shuaiba sequences in western Abu Dhabi.

Newly acquired 3D seismic data, existing well data and regional information have been utilized for seismic interpretation and litho-facies analysis to characterize Shuaiba Sequence 5. These interpretations were then linked to the depositional processes which generated the geometries and distribution of facies.

Based on well correlations within the study area, the Bab shale is roughly 100ft near the Shuaiba platform. It forms a wedge on the slope of the platform and gradually thins out to ~17ft towards the north. The deposition of the shale is attributed to influx of terrigenous sediments during the lowstand, which were later distributed by longshore currents as inferred from seismic attribute maps. The occurrence of carbonate above the Bab shale has been related to the cessation of siliciclastic input, which created a suitable environment for a carbonate factory. Shallow water depth and frequent sea level fluctuations created several thin clinoform sequences. These fourth order sequences are observed to have an average thickness of ~20ms and are often restricted within two seismic reflectors. The orientation of the clinoforms is NW-SE. These are categorized into three sets as reported by previous authors (Pierson et al., 2010 & Whitcomb et al., 2021).

The clinoforms have higher amplitude in the top set, which gets dimmer in the bottomset.

[Skip to Main Content](#) The core data show the presence of thin beds of floatstone to packstone at the topset, which could form potential reservoir subject to better permeability development. The overlying Nahr Umr shale is the regional seal. The clinoform sets are located over a NE-SW

oriented structural trend and may form subtle traps due to updip facies change within the clinoforms. Similar type of strati-structural trapping mechanism could be found along the strike of these clinoform sequences and may become potential prospects for hydrocarbon exploration in western Abu Dhabi.

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