

Post Glacial Sealevel Rise Captures a Record of the Northward Movement of the Arabian Plate through an Early Permian, Mid-Latitude, Southern Hemisphere Desert

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The Permo-Carboniferous Unayzah reservoirs and the Permian Khuff Formation capture the dramatic change from the glacial deposits of the lower Unayzah (B&C); through the dry mid-latitude desert deposits of the upper Unayzah (A); to the humid tropical carbonate environment of the Khuff Formation. The change and preservation of the depositional facies is in response to: Rapid northward movement of the Arabian-plate from the Carboniferous through the Permian and steady but cyclical rise in sea level (post-glacial transgression). Together they capture the Arabian plate movement northward through a variety of climate-controlled depositional environments, each with a distinct lithological signature reflecting the passage from one depositional environment to the next. Eolian and eolian-related deposits characterize the Unayzah 'A' package. Five distinct facies can be recognized in core and on image log namely dune, sand-sheet, paleosol, playa and fluvial deposits. Barren of datable organic material, the Unayzah 'A' reservoir is sandwiched between, the (P4) Early Permian glacial deposits of the lower Unayzah (B&C), and the (P2) Middle Permian Khuff Carbonates. The dominant west-to-east wind direction identified on image logs would place the eolian Unayzah around 45 degrees south latitude in the location of the prevailing westerlies. This would make the Unayzah a mid-latitude desert. An unconformity separates the Unayzah from the overlying Khuff Formation carbonates. The same cyclicity recognized in the eolian Unayzah reservoir continues up into the Khuff Formation.