

Paleozoic Stratigraphy of the Middle East

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ABSTRACT

The Late Neoproterozoic and Paleozoic stratigraphy of the Arabian Plate, is reviewed, with special focus on selected stratigraphic intervals corresponding to proven or potential petroleum systems, in comparison with similar occurrences in North Africa. The broad paleogeographic domain extending from present-day North Africa to the Middle East formed part of the northern margin of the Gondwana supercontinent during the late Neoproterozoic through Paleozoic times, and shared similar climatic and tectono-stratigraphic evolution. This region constituted an extensive passive continental margin which was periodically flooded by eustatic transgressions resulting in a wide, shallow-marine continental shelf characterized by the deposition of large quantities of clastic sediments mostly derived by the peneplanation of the pan-African mountain belts, located in the continent's interior. All across this vast region, a series of intra-cratonic sag basins developed mainly during the Early Paleozoic through reactivation of pan-African structures resulting from gentle intra-plate tectonic stresses, and remained active depocentres throughout the Paleozoic. The development of the prolific Paleozoic petroleum systems of Saudi Arabia and North Africa can be attributed to complex interplay of tectonic evolution, first-order sea-level fluctuations, and global climatic changes. Regionally, the deposition of large volumes of source rocks appears to be linked to periods of marine, predominantly glacially-driven, transgressions. A primary example of this relationship is the association of the extensive uppermost Ordovician glacial reservoirs and lowermost Silurian post-glacial organic-rich shales occurring throughout the northern Gondwana margin. Although stratigraphic correlation is much more challenging in pre-Cambrian sequences, evidence suggests a similar association of de-glacial transgressions and deposition of highly prolific source rock during Neoproterozoic times. Proven and potential Paleozoic reservoirs and the inherent petroleum systems is reviewed in this paper.