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Ghadames Basin, Southern Tunisia: A Reappraisal of Paleozoic Petroleum Systems and Future Prospectivity

Prior to the late 1990s, Paleozoic targets in Ghadames Basin, Southern Tunisia were largely overlooked and considered marginally productive, in large part owing to older geological interpretations that focus in Triassic reservoirs, and to limitations in seismic data quality. Reentry of older wells and new drilling, however, have recently identified and confirmed significant bypassed reserves in low-resistivity Upper Silurian Acacus sandstones. Other Paleozoic reservoirs include lower Devonian sandstones and Upper Ordovician fractured quartzitic sandstones. Ordovician has a significant sand content and its extent has not been limited by the Hercynian uplift and associated erosion that have severely affected the Northern part of Ghadames Basin. Ordovician yielded two marginal finds and significant shows on several wells. The basal Silurian and Upper Devonian shales have been established as the principal source rocks for Paleozoic petroleum systems. Basin modeling investigations reveal a more complex multistage history of hydrocarbon maturation, and migration than previously believed. Migration is dominantly vertical via fault systems. There also appears to have a lateral component through the regionally continuous intra-Paleozoic carrier beds. Structural traps, generally fault related are the most common. Potential stratigraphic traps could, however, result from updip pinch-out of reservoir sandstones or truncation along the Hercynian unconformity. New analyses of previously and recently acquired geological and geochemical data as well improvements in seismic data acquisition and processing coupled with the recent discoveries begun to reverse the older notions regarding limited hydrocarbon presence within the Palaeozoic targets in Southern Tunisia. The Tunisian segment of the Ghadames Basin, contains a significant number of untested or lightly tested structures as well as considerable volumes of good quality Palaeozoic reservoirs and mature source rocks.