

Qatar - Geological History and Petroleum Habitat

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Qatar plays a key role in the understanding of the Phanerozoic petroleum geological history of the Arabian Plate through the continuous influence of the Qatar-South Pars Arch on the sedimentation patterns and deformation styles. This tectonic unit originated in the Late PreCambrium, when it separated as a high the Hormuz Salt in an eastern and western basin. Ever since it has functioned as a stable area in between two differently behaving halokinetic regimes, and provided in the Mesozoic at various times a relative high, with notably in the Jurassic and Cretaceous forming a shallow water barrier between intrashelf basins.

Taking into account tectonic control, depositional systems and climatic variations, the Phanerozoic history of Qatar can be subdivided into six tectono-sedimentary phases: (1) late Pre-Cambrian rifting with the development of the Qatar-Fars high surrounded by the Hormuz Salt basins, (2) Paleozoic clastic dominated, mostly shallow marine sedimentation in intracratonic basins, interrupted by a phase of erosion and non-deposition representing the Hercynian orogeny. Ice age-influenced sedimentation occurred during the Silurian and early Permian; (3) Late Permian - Triassic regional carbonate-evaporite shelf deposition; (4) Jurassic to Mid Cretaceous carbonate platforms and intrashelf basins, controlled by local subsidence patterns, eustatic sea level fluctuations and local siliciclastic influx; (5) Latest Cretaceous to Mid Miocene Foreland basin creation and infill by siliciclastics and carbonates; and (6) Mid Miocene to recent mostly non-deposition due to both uplift caused by the NeoTethys closure with continued foreland basin development and glacio-eustatic sealevel lows.

Three petroleum systems developed within this geological context: the Khuff -Qusaibah, the Arab-Hanifa and the Mid Cretaceous - Hanifa systems. The Khuff reservoirs (North field) are located on the apex of the Qatar-Fars high and were gas sourced by Silurian shales. The large Upper Jurassic and Mid Cretaceous carbonate reservoirs (Dukhan and Al Shaheen fields) are also located over the Qatar high, which influenced at that time the paleogeography of the shallow water platforms and organic-rich intrashelf basins. Oil was sourced from adjacent Jurassic organic-rich intrashelf basinal deposits (Hanifa and Jubailah Formations).