

Hydrocarbon Provinces of Libya: A Petroleum System Study

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Libya produces 1.74 million barrels of oil a day. Future exploration and development will increase this. Libya's major sedimentary basins include the Sirt, Ghadamis, Murzuq, and Tripolitania basins, collectively containing the country's major 320 producing oil fields whose reserves exceed 44 billion barrels of recoverable oil and 37 trillion cubic feet of gas. Hydrocarbons in these basins and grabens come from Silurian and Cretaceous organic-rich Type II shale, controlled by a mix of tectonic activity, sedimentation and erosion.

The Sirt Basin, the most prolific oil basin of Africa, has 89% of Libya's reserves and 16 giant oil fields with 117 billion bbl of oil in place. Its reservoirs range in age from Lower Cretaceous to Eocene. The Upper Cretaceous Sirt shale is the major source rock; a thick sequence that accumulated in major rifted grabens, while shallow marine carbonates and reefs collected on adjacent horsts and platforms.

The Ghadamis intracratonic sag basin contains up to 5200 m of Paleozoic through Mesozoic clastics. It has produced 3.5 billion barrels per day (bbl/d) of oil from the Upper Silurian Acacus Formation and Devonian Tadrart-Ouan Kasa formations. The Devonian Awaynat Wanin and the Silurian Tanezzuft shales are the basin's major source rocks, with the latter the most important. The Ordovician Melez Chograne shale appears is less important.

The central Murzuq Basin contains up to 4000 m of Cambrian to Quaternary sediments and oil reserves of approximately 2 bbl. Reservoirs include the Memouniat, Acacus, and Tadrart-Kasa sandstones, while the Tanezzuft shale is the major source rock. This reaches 500 m in this sag basin, has a highly radioactive character at its base, and accumulated during a major marine transgression across southern Gondwana when the Ordovician ice cap retreated.

Major offshore oil production in the El-Bouri oilfield of the Tripolitania Basin is from the Eocene Nummulitic Limestone, producing 60,000 bbl/d with 800 million bbl of reserves. Although the Cyrenaica Platform and the Al Kufrah Basin have had a few marginal oil discoveries and no commercial production, recent subsurface data for NE Libya reveals the presence of a thick Cretaceous-Tertiary sedimentary section with hydrocarbon potential. Also Cyrenaican Devonian sandstones and Tertiary carbonates contain natural gas and oil.