

Oil and Gas Fields Database from Sirt Basin, Libya

Alsharhan, Abdulrahman S.¹; Hassan, Hassan S.²; Kendall, Christopher G.³ (1) Middle East Geological Establishment, Al Ain, United Arab Emirates. (2) University of South Carolina, South Carolina, SC. (3) University of South Carolina, South Carolina, SC.

The Sirt Basin contains 89% of the hydrocarbons discovered in Libya and has some 117 B bbl of in-place proven oil. The basin contains over 128 fields and discoveries. More than 23 large oil fields (>100 million barrels of oil equivalent) and 16 giant oil fields (>500 million barrels of oil equivalent). Reservoirs vary in age from Cambrian to Tertiary sediments. Cambrian-Ordovician clastic reservoirs are preserved in fault blocks related to subsequent rifting represent about 1% of the total reservoirs. The syn-rift, marine and fluvial sandstones of the Nubian Lower Cretaceous and Upper Cretaceous clastics represent 53%, of the most prolific reservoirs, with 38% in the Paleocene and 8% in the Oligocene/Eocene sections. 58% of the better reservoirs occur in clastic sediments, while 42% are carbonates. Shales and evaporites are the dominant seals for these reservoirs, but evaporites the utmost importance to petroleum accumulation because they form essential seals for the hydrocarbon migrating out of Cretaceous reservoirs along the faulted horsts and grabens.

A tensional regime dominated the history of field structures. During the late Cretaceous syn-depositional and growth faulting was associated with a terrigenous supply from local basement highs. The Cretaceous terminated with a marine transgression and the accumulation of mixed carbonate and shale, while in the Tertiary a sag system developed, dominated by carbonate platforms and some clastics.

The Campanian Sirt-Rachmat shale sequence is the major source rock of the basin with TOC values of 2-5%, occasionally exceeding 10%. The Cenomanian-Turonian Etel Formation has good source rock characteristics with TOC's ranging from 0.5 to 6.5%. The Middle shale Member of the Nubian Formation averages TOC's of around 3%, representing a likely minor source in the southern part of the basin. The peak of hydrocarbon generation started in the late Eocene-Oligocene and migration occurred during the late Oligocene and Miocene. The Sirt Basin still has significant potential in areas marginal to the horsts, in the deeper grabens and in the offshore area.