
Undeveloped Fields and Remaining Potential of a Typical Sirte Basin Graben, Libya

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A 3600 Km² area covering a 14,000 feet thick Upper Cretaceous-Miocene graben and parts of two platforms in Sirte Basin was studied for undeveloped fields opportunities and remaining E&P potentials. The study found that a number of early discoveries remained un-produced including a field with >100 MMSTBO of reserves. The tectonic evolution of the studied area can be divided into five stages: 1. Pre-rift intra-cratonic Paleozoic basin stage, Hercynian uplift and regional Triassic and Jurassic erosion, 2. Lower Cretaceous incipient Sirte Basin rift, 3. Upper Cretaceous syn-Sirte Basin rift, 4. Maastrichtian transitional stage and 5. Paleocene post-Sirte Basin rift sag. The tectonic history overprinted four groups of evolving local structures: 1. Pre-rift structural anomalies, 2. Syn-rift structural anomalies, 3. Transitional stage structural anomalies and 4. Post-rift structural anomalies. The operating petroleum system is charged by the source rocks of the Upper Cretaceous Sirte Shale, and it can be divided into three subsystems on basis of Kerogen type, domain and time of maturation. In all three, the presence of proximal source rocks, and any combination of the seven proven reservoirs within a voluminous structural closure does not create a successful trap without the presence of an effective overlying Upper Cretaceous Sirte Shale or Palaeocene Hagfa Shale seals, which form the critical factors of most successful traps in the studied area. The petroleum system of this graben can be used as a model for Sirte Basin grabens.
