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Basin Modeling: Fluids Distributuion Around Hassi-Messaoud

The petroleum system of the Hassi-Messaoud field and its surrounding area is still not well understood. The main source rock is the Silurian shales (type II kerogen), with average initial TOC estimated about 7.5% in the Djemaa Touggourt area and 12% in the Oued Mya area. The Silurian hot shale distribution is controlled by an early Silurian paleorelief and by the Hercynian erosion. The hydrocarbon generation and expulsion occurred during the major Early Cretaceous structuration, except for the Oued Mya area where they occurred during Devonian or Carboniferous times.

Large amounts of hydrocarbons were expelled towards the Hassi-Messaoud area from the draining areas located in the North. The oil potential is especially increased when the Triassic sandstone was used as a drain for long distance migration.

For the petroleum system simulation, 2D TemisPack cross-sections were used around Hassi-Messaoud. Oued Mya represents the deepest part of the basin in which the source rocks were buried and preserved from the Hercynian erosion. Upper Jurassic and Middle Cretaceous burial was the most important parameter that controlled the source rock maturation. The Triassic-Liasic salts constitute an hydrostatic barrier between the Mesozoic and Palaeozoic formations.

According to the simulation results, most of the oil charging Hassi-Messaoud and satellites fields came from the North and North-West of this area. The models show a vertical downward and upward migration towards the immediate reservoirs which will then laterally drain the hydrocarbon. The reservoirs and faults are the main parameters controlling the migration pathways.