

Interpretation of 3D seismic data of Concession NC2, Ghadames Basin, Libya

Рашад Хатем Ахмед

Студент

геофизика, Высшая школа инновационного бизнеса МГУ, бингази, Ливийская

Арабская Джамахирия

E-mail: hatemrashad772003@yahoo.com

The Ghadames Basin is a large intra-cratonic basin covering parts of Algeria, Tunisia and Libya extending over 350000 km². The basin contains up to 6000 m of Paleozoic and Mesozoic sediments. It is bounded to the north by the Dahar Naffusah high, to the south by the Qarqaf Uplift its western limit is represented by the Amguid-El Biod Arch, and the eastern is overlapped by the western flank of Sirt Basin. Three countries are independently conducting petroleum exploration in their portions of the basin, using different play concepts and consequently obtaining different exploration results. Exploratory wells have been drilled in three countries, resulting in the discovery of 160 oil pools with at least 9 500 million barrel of oil (MMBO) in place. Most wells were located in the structurally higher parts of the basin, at that deeper parts are unexplored because of hazards presented by shifting sand dunes and because of a previous perception that Paleozoic reservoirs will thin or shale out in this region, suggesting that a great volume of oil remains to be discovered in the Ghadames Basin.

Concession NC2 occupies the area of the northern flank of the basin. The study area situated in southeastern part of NC2 was proposed by the Arabian Gulf Oil Company (AGOCO) for exploration Program. TOTAL petroleum company operated in concession from late 1950's until 1969 and drilled 11 wells within the current concession boundaries. NC2 was drilled by N.O.C. in 1975 who undertook a seismic program which was shot by CGG in 1975-1976. Additional seismic programs were shot during 1980-1981 by Western Geophysical Company AGOCO resumed in drilling 8 wells in the concession from 1985 to present date.

The rock units of concession NC2 are represented by six stratigraphic sequences. Proven hydrocarbon reservoirs are present in the lower Acacus Member (Late Silurian) and the Memounite formation (Ordovician), other potential reservoirs are middle and upper Acacus Member and Tadrart formation. The main source rock generating hydrocarbons in the basin is the Tanzzuft Formation (Early Silurian).

Lower Acacus Member is composed mainly of interbeddings of sandstones and shales. The individual sandstone layers are between 5 to 35 ft thick. Sandstone porosity is poor to fair. The total thickness of the Lower Acacus Member is up to 770 feet.

Middle Acacus Member is represented by transgressive marine shales with thin silty sandstone streaks in its middle part. Its upper boundary is conformable with the overlying Upper Acacus Member, The total thickness of the Middle Acacus Member is anticipated to be 290 feet.

Upper Acacus Member consists of depositional sequences of transgressive marine shales which grade upward into regressive shallow-marine and fluvial sandstones. Its upper boundary is unconformable with the overlying Tadrart Formation. The total thickness of the Upper Acacus Member is anticipated to be 587 feet.

Momouniat Formation represented by sandstone with minor shale and siltstone interbeds. The total thickness of Mouniat is anticipated to exceed 450 feet.

Tadrart formation consist (Early Devonian) of blocky to graded fining upward units. The Tadrart formation is of early Devonian age, the total thickness of Tadrart is anticipated to be 240 feet.

Tanezzuft Formation (Silurian) is the source for most of petroleum occurrences in the Ghadames Basin. This formation consists mainly of dark grey shales and siltstones with minor interbeddings of sandstones, mainly at its top part. It is worth mentioning that the top part of Tanezzuft Formation has good oil shows within clean sandy units. The base of this formation is marked by a bituminous shale unit. Its upper boundary is unconformable with the overlying Lower Acacus Member, The total thickness of the Tanezzuft Formation is anticipated to be 1367 feet.

Aim Of my study is to interpret 3D Seismic Data obtained from NC2 of the Arabian Gulf oil Company. The objective of seismic work was the hydrocarbon exploration of the Paleozoic and Mesozoic rocks in this part of Ghadames Basin. Results of the work should be very helpful for further exploration and should give better understanding of the area of prospect P1-NC2 lying on the southeastern flank defined by well B2-NC2

Data Given: Location Map of Concession NC2 with wells locations-3D Seismic Lines Seg Y, well logs, formation tops, checkshots.