

## Geological Characteristics and Hydrocarbon Potential of M'Rar Formation Within NC-210, Atshan Saddle Ghadamis-Murzuq Basins, Libya

**Authors :** Sadeg M. Ghnia, Mahmud Alghattawi

**Abstract :** The NC-210 study area is located in Atshan Saddle between both Ghadamis and Murzuq basins, west Libya. The preserved Palaeozoic successions are predominantly clastics reaching thickness of more than 20,000 ft in northern Ghadamis Basin depocenter. The Carboniferous series consist of interbedded sandstone, siltstone, shale, claystone and minor limestone deposited in a fluctuating shallow marine to brackish lacustrine/fluviatile environment which attain maximum thickness of over 5,000ft in the area of Atshan Saddle and recorded 3,500 ft. in outcrops of Murzuq Basin flanks. The Carboniferous strata was uplifted and eroded during Late Paleozoic and early Mesozoic time in northern Ghadamis Basin and Atshan Saddle. The M'rar Formation age is Tournaisian to Late Serpukhovian based on palynological markers and contains about 12 cycles of sandstone and shale deposited in shallow to outer neritic deltaic settings. The hydrocarbons in the M'rar reservoirs possibly sourced from the Lower Silurian and possibly Frasinian radioactive hot shales. The M'rar Formation lateral, vertical and thickness distribution is possibly influenced by the reactivation of Tumarline Strik-Slip fault and its conjugate faults. A pronounced structural paleohighs and paleolows, trending SE & NW through the Gargaf Saddle, is possibly indicative of the present of two sub-basins in the area of Atshan Saddle. A number of identified seismic reflectors from existing 2D seismic covering Atshan Saddle reflect M'rar deltaic 12 sandstone cycles. M'rar7, M'rar9, M'rar10 and M'rar12 are characterized by high amplitude reflectors, while M'rar2 and M'rar6 are characterized by medium amplitude reflectors. These horizons are productive reservoirs in the study area. Available seismic data in the study area contributed significantly to the identification of M'rar potential traps, which are prominently 3- way dip closure against fault zone. Also seismic data indicates the presence of a significant strikeslip component with the development of flower-structure. The M'rar Formation hydrocarbon discoveries are concentrated mainly in the Atshan Saddle located in southern Ghadamis Basin, Libya and Illizi Basin in southeast of Algeria. Significant additional hydrocarbons may be present in areas adjacent to the Gargaf Uplift, along structural highs and fringing the Hoggar Uplift, providing suitable migration pathways.

**Keywords :** hydrocarbon potential, stratigraphy, Ghadamis basin, seismic, well data integration

**Conference Title :** ICPGE 2023 : International Conference on Petroleum Geology and Engineering

**Conference Location :** Istanbul, Türkiye

**Conference Dates :** February 16-17, 2023