Exploration Potential of the Cretaceous Play in Oudhref Block, Pelagian Basin, Offshore Tunisia

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Abstract

The Oudhref Open block is located at the Offshore Pelagian basin, considered as the most prolific offshore hydrocarbon province in Tunisia regarding to the number of hydrocarbon pools and remaining reserves. The area of interest includes the giant Ashtart oil field (up to 1080 mmbbls as OOIP) and the Miskar gas field (1,5 TCF and 27 mmbbls) producing respectively from the Eocene and late Cretaceous carbonate reservoirs. This near exploration opportunity block covers an area of about 2000 Sqkm and located within an extensive Oil & Gas infrastructures and processing facilities. This study provides a deep insight about the structural-stratigraphic framework of the block based on the 3D seismic and well-Log Data interpretation. A workflow was generated to enhance the seismic interpretation of the Late Cretaceous carbonates reservoirs, which are considered as underexplored targets at the block, but an emerging potential play in the offshore Pelagian basin. Main trap types in the area shows faulted blocks of late Cretaceous carbonates and especially mixed structural / stratigraphic traps for the Turonian build-ups and / or the Eocene shoals. Significant syn-sedimentary movement occurred in the Late Cretaceous leading to a thickening of the uppermost Cretaceous section in the central block area and forming a regional syncline surrounded by Paleohighs. Reefal buildups are very common in those Paleohighs or in platform-basin transition. Halokinesis had also an impact on the development of local Paleohighs and the development of restricted Reefal buildups in the southern block area. The use of some complex trace attributes, like the Instantaneous frequency; Instantaneous phase and Cosine of instantaneous phase attributes generated along the seismic lines helps us to further identify the geometry and the intra-architecture of these carbonate buildups. Additional seismic attributes analysis such as spectral decomposition, variance and Ant-tracking were also used to enhance faults interpretation. The most prominent trap is the Nimr North prospect adjacent to Miskar giant gas field. It corresponds to a three Way-dip Closure, bounded by a NW-SE normal Fault, and showing high stratigraphic potential. Carbonate multi-reservoir targets sealed by a compacted shale characterize this prospect. Other than that, and due to the basin configuration, a potential hydrocarbon charge from multiple source rocks is very likely for the prospect. The source rock correlation in the area of interest documented clearly that most of gas discovered in Pelagian basin was generated from the Albian Lower Fahdene and the Turonian Bahloul source rocks. The play risk analysis for each identified prospect was estimated based on CRS maps generated based on ETAP standards as set out in regional play evaluation & risking guidelines & Workflow. Low to moderate risks were assigned for most of the identified Cretaceous prospects.