

Tertiary Structure - Rharb Basin: Oil and Gas Potential

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Over a dozen sedimentary basins are present in Morocco, both on and offshore, covering an area of 15,000 square kilometers. Of these, only three contain or have contained oil and gas production. These are the Essouira, Rharb and Pre-Rif basins. Oil and gas production in these basins has been shut-in and no production exists today in Morocco.

The Rharb basin is considered part of the Pre-Rif area, which is a topographically flat area in northern Morocco between the Rif Mountains to the north, and the geologically distinct Meseta to the south. The area is occupied by the foreland basin to the Rif orogenic belt which, as part of the Western Mediterranean Alpine orogenic system, has a complex stratigraphic and structural history.

Discovered in the 1920's, the Rharb Basin in northern Morocco contains three small gas fields, which represent a Tertiary foreland, filled by a marine clastic series during Miocene and Pliocene times. The Pre-Tertiary geologic history of the area is one of a typical passive continental margin, and it changed to an active margin with the Rif orogeny in the Miocene. The sedimentation that occurred in the resulting foreland basin was mainly marine with an increasing influence of non-marine sediment in the upper Tertiary. During the Early to Middle Miocene, carbonates and coarse clastics were deposited in a turbidite sequence; an Olistrome unit deposited during the Late Miocene overlies these. The olistrome is likely a passive unit which slid into a pre-existing low area, it may be seen as an unconformable sedimentary unit (Pratt, 1996). Overlying this olistrome unit is the Pliocene carbonates and clastics again deposited as a turbidite sequence. Both the turbidite sequences are attractive reservoirs for gas. The compression from the orogeny also caused a structurally complex area consisting of folds and faults. The Rharb basin is characterized by thrust sheets and folding of the foreland features around the margins of the Rif. West of the Rif the thrust front has been lost under the Atlantic Ocean. Immediately onshore, the thrust front is buried under the overlapping, post deformational sedimentary rocks. The basin becomes constricted eastward and finally pinches out against the positive feature of the Middle Atlas Mountains. The faults and folds set up by the compression act as structural hydrocarbon traps with fault closures and anticlines.