

Salt Tectonics in the Atlantic Margin of Morocco: An Overview

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The Moroccan salt basin on average is ~50-150 km, but stretches for at least 1,000 km between the leading edge of the offshore pre-Rifean nappe in the north and the Canary Islands in the south. The significant along-strike variations in the cross-sectional and map-view distribution of the Late Triassic to Early Jurassic salt reflect its uneven original distribution. The seismically mapped individual salt structures such as tongues, sheets and canopies might have originated from an autochthonous, "patchy" salt layer deposited in somewhat isolated half-grabens. Therefore, updip extension may not be the ultimate driving force for the commonly observed contractional salt deformation downdip.

Nonetheless, a fairly steep margin like the Safi segment of offshore Morocco shows surprisingly similar structures to its post-salt counterparts, e.g. in the Lower Congo basin, such as rafts and turtles on the slope and allochthonous salt tongues at the toe of the slope.

The offshore Essaouira Basin (Tafelney Plateau) segment of the salt basin, displays different salt tectonic styles with more advanced allochthonous salt structures. The spectacular mid-Tertiary reactivation of salt tectonics in this segment is primarily attributed to the inversion associated with the Atlas mountain building onshore. The ongoing compressional deformation, as the result of the Africa/Europe convergence, enhanced the steepness of the slope and is largely responsible for the ongoing salt movements. However, the basinward edge of the salt basin has dormant toe-thrust anticlines.

In the Agadir segment, the rapid influx of Tertiary sediments appears to be the dominant factor in the style of salt tectonics producing a wide diapiric domain underneath the slope. However, in this segment, the downdip edge of the salt basin is also clearly allochthonous. In general, the westernmost, leading edge of the salt deformational front with a well developed mid-Tertiary toe-thrust zone along most parts of the Moroccan salt basin offers world-class structural traps for hydrocarbon exploration. Besides the toe-thrust anticlines, numerous salt-related play types were defined in the deepwater and remain largely untested to date.

Most of the published plate tectonic reconstructions a single salt basin during the Late Triassic between, for example, Nova Scotia and Morocco. Based on the regional analysis of the Moroccan salt basin, the separation of these syn-rift salt basins by a subaerial volcanic ridge is much more likely.