



Tectonics and sedimentology of post-rift anomalous vertical movements: the rifted margin of Morocco

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Roughly 15 years ago it was discovered that substantial parts of the Morocco passive continental margin experienced km-scale, post-rift exhumation. It was predicted that the sands resulting from the associated erosion would be present in the offshore and potentially form hydrocarbon reservoirs. At the same time, anomalous post-rift vertical movements have been documented in various localities of the world and rifted continental margins are at present exciting objects of research.

Following intense research efforts the knowledge of the kinematics of vertical movements and their implications for sedimentary systems is increasing. The low-T geochronology initially limited to the classical Meseta-Massif Ancien de Marrakech transect has been expanded reaching the Reguibate Massif to the S and covering, possibly more importantly, one transect in E-W direction along the Anti Atlas.

Exhumation occurred along two dominant trends. In N-S direction a several hundred-kilometers long exhuming domain developed roughly parallel to the Atlantic margin. Changes in magnitude and timing of exhumation are observed along this elevated domain associated with E-W trending undulations. The timing of main stage of upward movement of E-W trending highs seems to be Late Jurassic-Early Cretaceous in the Meseta and High Atlas and somewhat older, Early to Middle Jurassic, in the Anti-Atlas and Reguibate.

The discovery of E-W trending highs and lows has major implication for sediment distribution and dispersal. At the large scale, it means that the drainage basins were smaller than initially predicted. This seems to be compatible with the paucity of sands encountered by recent exploration wells drilled offshore Morocco. At the scale of several kilometers, W-E trending anticlines and synclines developed in a generally subsiding coastal environment. These folds often had an expression at the sea floor documented by ravinement surfaces and (Jurassic) reef build-ups on top of the anticlines. Detailed outcrop correlation and facies mapping in the Agadir-Essaouira basin shows E-W trending highs and lows formed salient and embayment's conditioning Cretaceous topography and palaeodrainage. Integrated palaeogeography, sequence stratigraphic analysis and renewed biostratigraphy further highlight the temporal and spatial restriction of coarse-clastic sediment input in an otherwise mud-dominated system.