

The Central High Atlas in Morocco: A Snapshot of a Jurassic Diapiric Rifted Basin

Vergés, J.¹; Saura, E.¹; Messenger, G.³; Martín-Martín, J.D.¹; Moragas, M.¹; Razin, P.²; Grelaud, C.²; Jousseaume, R.²; Malaval, M.²; Hunt, D.³

1. Institute Earth Sciences Jaume Almera, CSIC, Barcelona, Spain. 2. ENSEGID - IPB, Bordeaux University, Pessac, France. 3. TPD RD, Statoil, Bergen, Norway.

The Central High Atlas in Morocco exposes an inverted Triassic-Jurassic rift basin with major ENE-WSW northern and southern compressive boundaries. Internally, the Moroccan High Atlas is constituted by long and continuous NE-SW trending anticlines, which are oblique to the present limits of the compressive range. Interpretation of these anticlines is still under debate with different solutions: a) formed by magmatic intrusions in a transtensional setting; b) by Cenozoic compression and c) by Jurassic diapirism. Nonetheless, most of these anticlines (also named ridges) show Triassic shales, evaporites and basalts in their cores, which are commonly intruded by Jurassic magmatic rocks. Typically, these anticlines show strongly dipping and subparallel flanks with different Jurassic stratigraphic sequences on each limb. Thinning, onlaps, truncations and/or sedimentary facies changes decreasing in paleowater depth towards the axis of the anticlines are also characteristic features.

We interpret these structural features as linked to elongated diapiric walls and coeval sedimentation as halokinetic. Some of these diapiric structures are welded without Triassic materials between the limbs. The interpretation of geological maps, confirmed by remote sensing mapping and fieldwork, indicates a secondary NW-SE trending system of diapir walls and welds. These are interfering with the major NE-SW system resulting in a polygonal pattern of thick Jurassic minibasins, which is especially evident in the Imilchil region and south of Demnate.

We corroborate with our observations that the Central High Atlas was a transtensional diapiric province characterized by an intricate pattern of salt walls and minibasins, which formed mainly during Jurassic times. The diapiric system controlled the position, extent and growth of the early and middle Liassic carbonate platforms (Jbel Choucht and Aganane formations) and the fast deposition of the thick mixed platform upper Liassic Zaouiat Group. While some halokinetic structures like the Tazoult ridge were practically inactive during the earliest Middle Jurassic, salt migration continued through Middle Jurassic times developing 2-3 km-thick sedimentary minibasins in the Imilchil region (Lake Plateau and Ikkou minibasins). Unambiguous examples of Jurassic diapiric growth have been reported in the Atlas in Algeria and Tunisia. These results can be applied to buried large salt-related provinces in both rift basins and continental margins.