Geophysical Research Abstracts
Vol. 16, EGU2014-10810, 2014
EGU General Assembly 2014
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Late Miocene paleogeographic evolution of the Northern Rifian marine gateway (N Morocco)

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The Rifian Corridor was one of the main late Miocene gateways connecting the Atlantic to the Mediterranean and its progressive closure exerted a fundamental control on salinity, circulation patterns and climate of the latter. Its paleogeographic progression to the closure, however, is poorly constrained.
The Late Miocene marine connection through Morocco includes two different sectors, a northern gateway via the basins of Taounate and Dhar Souk to Boudinar and a southern strand via Fez, Meknes to the Mediterranean.
Unlike the better studied southern one, the chronology and evolution of the northern strand of the corridor, often referred as 'le coloir du Nekor', remain notably unclear. The remnants of this marine gateway, i.e. the intramontane basins of Taounate and Dhar Souk (Central Rif, Northern Morocco), are the object of this study.
Literature describes them as a result of crustal rifting associated with Serravalian-Tortonian extension, possibly coupled with strike-slip reactivation of the Nekor fault. However, previous works have not addressed the lack of accurate biostratigraphy and the relationship between tectonic, paleogeography and Atlantic linkage, paying due regard to the circum-Mediterranean events that led to the MSC.
To elucidate the connectivity between scattered outcrops and reconstruct the geometry of this main marine connection, we apply the principles of tectono-stratigraphy. Connection between tectonically active sedimentary basins leads to water and sediment exchange, changes in salinity and formation of regional unconformities driven by a dynamic gateway.
We combine field mapping, structural analysis, seismic lines interpretation and geometric reconstructions. A detailed stratigraphic and micropalaeontological study provides a renovated age model. With the resulting seismic-to-outcrop scale investigation, we document the kinematic evolution of the deformed Miocene sedimentary cover. Paleogeography is inferred by restoring basin geometry before tectonic deformation.
This study clarifies the process of opening and geometric evolution of the Northern strand of the Rifian Corridor, certainly one of the main marine linkages between Atlantic and Mediterranean prior to the MSC. The complicated interplay between tectonic and sedimentation in the gateways provides an example of the relationships between the convergence Africa-Europe and the Mediterranean-Atlantic connectivity in the external zones of the Gibraltar Arc.