

Correlation of Syn-Rift Structures Between Offshore Morocco and Nova Scotia, Canada

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The reconstruction of the relative positions of the North American and African continents before the opening of the central Atlantic Ocean have either been based on morphological fits using coastlines and different isobaths, seafloor magnetic and fracture data or on matching prebreakup paleomagnetic poles of the stable cratons. None of the existing reconstructions utilize syn-rift structures, which are expected to be preserved on these conjugate passive margins.

Based on 2D/3D reflection seismic and potential field data acquired offshore Morocco, an anomalous basement high is defined beneath the Tafelney Plateau. This high not only has a bathymetric expression, but it has a pronounced signature in various satellite-based and shiptrack potential field data sets. Its NW trend is oblique both to the coastline/shelf-edge and the expected orientation of Atlantic transform faults. The anomalous basement high beneath the Tafelney Plateau is interpreted as an accommodation zone analogous to many well-studied examples in the present-day East African rift system. It developed between two normal fault systems with opposing polarities, i.e. SE-dipping syn-rift faults to the north of it and NW-dipping syn-rift faults to the south of it. The actual Early to Middle Jurassic breakup between Africa and North America occurred obliquely across the accommodation zone leaving most of it on the Moroccan margin.

The correlation of syn-rift structural elements across the central Atlantic basin based on seismic reflection and potential field data has important implications for hydrocarbon exploration in these frontier deepwater provinces.