

A Palinspastic Reconstruction of Southern Tunisia: Multiphase Tethyan Rifting, Paleogeographic Inheritance and Petroleum Systems

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Abstract

Basin frameworks in Southern Tunisia since the Lower Cambrian were governed by deposition, tectonics and rifting. We describe fifteen Supercycles delineated by sequence boundaries, subcycles and facies units varying both vertically and laterally. Tethyan rifting overprints the overall trends of Panafrican tectonics. Plays on NW-SE striking faults from Gafsa to Sidi Toui caused Paleotethyan rifting with sensibly E-W conjugate trends from Jeffara to El Borma or even beneath the Salt Marshes. The Jeffara basin underwent rifting since the Upper Kasimovian, isostatic adjustment and rift-shoulder uplift. Neotethyan rifting during the Lower Triassic, indicated by volcanic activity to the West in the Salt Marshes area, records approximately a 5 Ma period of time, with isostatic adjustment and flexure of the lithosphere. The Upper Jurassic-Lower Cretaceous outcrop units are: (1) Lower Kimmeridgian-Tithonian marine sand, dolostone and clays, (2) Berriasian-Hauterivian sand, Green Clays and dolostone, (3) Barremian-Lower Aptian coarse sand, (4) Middle to Upper Aptian dolostones delimited by the Austrian unconformity at the base, and (5) Albian sand. In addition to outcrops, wells and seismic data help define the basin frameworks. The E-W fault transtension before the Aptian, shifted transpressional since this stage and started rift closure. Transpression culminating in the Lower Turonian generated syndepositional tectonics, erosion, debrite, olistolite and olistostrome. Faults NW-SE and E-W of strike that inherited Paleotethyan and Neotethyan trends help explain graben, rift and uplift formation. Sand reservoirs, and shale source rocks providing seal, accumulated in Ordovician to Carboniferous Paleotethyan basins. The Low-Mid Triassic provided additional sand reservoir, whereas evaporites, shales and marls deposited in the Upper Triassic-Lower Cretaceous time interval provided seal for oil traps recognized in this study.