

Coastal and offshore provinces of Timor-Leste — Geophysics exploration and drilling

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Abstract

Regional geophysics research provides for prospect assessment of Timor-Leste, part of the Southeast Asia Archipelago in a region embracing the Banda Arc, Timor Island, and the northwest Australia Gondwana continental margin edge. Timor Island is a microcontinent with several distinct tectonic provinces that developed initially by rifting and drifting away from the Australian Plate. A compressive convergence began in the Miocene whereby the continental edge of the large craton collided with the microcontinent, forming a subduction zone under the island. The bulk of Timor Island consists of a complex mélange of Tertiary, Cretaceous, Jurassic, Triassic, Permian, and volcanic features over a basal Gondwana craton. Toward the north, the offshore consists of a Tertiary mini basin facing the Banda Arc Archipelago, with volcanics interspersed onshore with the basal Gondwana pre-Permian. A prominent central overthrust nappe of Jurassic and younger layers makes up the mountains of Timor-Leste, terminating south against an accretionary wedge formed by this ongoing collision of Timor and Australia. The northern coast of the island is part of the Indonesian back arc, whereas the southern littoral onshore plus shallow waters are part of the accretionary prism. Deepwater provinces embrace the Timor Trough and the slope of the Australian continental margin being the most prospective region of Timor-Leste. Overall crust and mantle tectonic structuring of Timor-Leste is interpreted from seismic and potential field data, focusing mostly on its southern offshore geology where hydrocarbon prospectivity has been established with interpretation of regional seismic data and analyses of gravity, magnetic, and earthquake data. Well data tied to seismic provides focal points for stratigraphic correlation. Although all the known producing hydrocarbon reservoirs of the offshore are Jurassic sands, interpretation of Permian and Triassic stratigraphy provides knowledge for future prospect drilling risk assessment, both onshore and offshore.

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