

## **Petroleum Systems and Prospects in the Deepwater Mozambique Channel**

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### **ABSTRACT**

The Mozambique Channel can be divided geologically into three provinces: a) The western sedimentary province with a thick Mesozoic/Cenozoic sequence representing the large Zambezi delta system. The petroleum systems are analog, in part, to those of the Rovuma basin with proximal or in situ generation of hydrocarbons in an anoxic environment migrating into overlying clastics. A more recent system consisting of Cenozoic gas generation migrating into turbidites with excellent porosity and permeability has been discovered nearshore Mozambique in areas 1 & 4. b) The Davie Fracture Zone (DFZ) consisting of Jurassic sediments capped by mid to late Cretaceous clastics which were exposed to massive erosion by the waters of the paleo-Zambezi in mid Cretaceous. The DFZ rejuvenated during the Cenozoic causing multiple exposure including the crystalline basement. The major petroleum system on the DFZ is within the Jurassic, which is proven onshore Madagascar as a source rock with migration into the Cretaceous sands. The sands with provenance from Madagascar have excellent reservoir quality and the Turonian volcanics serve as a seal. The trap is the classical anticlinal type formed by the uplift of the DFZ. Accretionary wedges and the fossil Zambezi river channel on the west flank of the DFZ may also be gas prone prospects. c) The Malagasy micro plate to the east of the DFZ consisting of a quiet province from a structural and stratigraphic standpoint. Continuous sedimentation occurred from Permian to Cenozoic. Drag folds formed, expanding into flower structures due to the reactivation of NW trending older Karoo sinistral transforms typical of the African craton caused by the rejuvenation of the DFZ during mid-Cretaceous and Cenozoic times. Six distinct petroleum systems can be found on the Macua uplift ranging from Cretaceous deep basin fans sourced from the Jurassic and characterized by DHI's, through upper, middle and lower Jurassic four way closures, and the Permo Triassic system of the Bemolanga tar sands on Triassic flower structures. In 2012, using existing exploration and production data, the USGS estimated that 22.4 billion barrels of oil, 349 TCF gas and 10.7 natural gas liquids remained to be discovered in the Mozambique channel between Mozambique and Madagascar. Based on recent discoveries, newly obtained geological/geophysical data and studies it is reasonable to expect that these figures can be doubled.