

## **A Source Rock Evaluation of the Rovuma Basin, Mozambique**

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### **Abstract**

The Rovuma Basin is located in the north of Mozambique, straddling the border with Tanzania. The basin is approximately 400 km long by 160 km covering an area of 64,000 km<sup>2</sup> and is centered on the Rovuma Delta. The offshore Rovuma Basin has seen a number of gas discoveries since 2006 across a variety of plays, both within the Rovuma deepwater fold and thrust belt (eg. Windjammer and Barquette) and as stratigraphically trapped channels and fans outboard of the last thrust (eg. Coral and Mamba). Current recoverable reserve estimates for the Mozambique Rovuma Basin are around 140-180 TCF. The use of 3-D seismic attributes has been very successful in identifying the gas-filled reservoirs although the age of the source rock and the hydrocarbon charge history are still largely unknown.

The aims of this study are firstly to review the regional evidence from the Jurassic breakup of Gondwana to help identify potential source rocks in Mozambique. Secondly basin modeling is used to create hydrocarbon charge models for the candidate source rocks.

Geochemical analyses for source rock potential in Mozambique have been largely disappointing, although isolated higher values do occur in neighbouring countries. Examples include the Jurassic source rocks in Mandawa-7 and Mbuo-1 in Tanzania, and the Toarcian aged outcrops in the Majunga Basin of Madagascar. GC-MS studies of onshore oil seeps in both Tanzania and Mozambique identifies the Middle to Upper Jurassic as likely source rocks.

The basin modeling, however, indicates that Middle Jurassic source horizons would be fully transformed before the formation of the fold and thrust belt traps around the Middle Miocene and hence there is a timing issue. Hydrocarbons generated from a Middle Jurassic source rock would require traps to be formed in the Cretaceous. It is possible, therefore, that oil in these traps has been cracked to gas following the deposition of the Tertiary Rovuma Delta. Alternatively, multiple source horizons may be present in the syn-rift and early drift section of the Rovuma Basin and it is possible that the gas discoveries in the Rovuma basin are charged from a lower Cretaceous source rock.

There is a potential oil play to the south of the main delta area. This is supported by the existence of onshore oil seeps near Pemba, Mozambique, and a later generation indicated by the basin modeling.