

Post-rift potential source rock correlations and prospectivity of the deep Atlantic conjugate margins south of the Walvis Ridge

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Several isolated, small half-grabens (5–10 km wide and 1–2 km deep) are present along the conjugate margins of the South Atlantic south of the Walvis Ridge that were produced by Early Cretaceous rifting. These half-grabens can contain source rocks (e.g., the AJ-1 well in South Africa); however, their areal extent is restricted. The main accommodation space created by Early Cretaceous extension is filled by magma that produced seaward-dipping reflectors (SDRs). The upper part of the SDRs were drilled in the Walvis and Pelotas basins and consists of subaerial reddened basalts. No source rock potential has been encountered, nor is any expected in such a subaerial sequence. Hence, the hydrocarbon prospectivity of the deepwater margins will largely rely on the presence of postrift source rocks.

Early drift, Barremian to Aptian age marine source rocks were identified in several wells including the recent Murombe-1, Wingat-1 and Moosehead-1 wells, where residual TOC levels up to 6% in source packages of up to 150 m were measured. The deposition of this source rock is interpreted to be widespread in the deepwater. It is modelled as oil-mature in several large kitchen areas currently located in water depths from less than 500 m to greater than 3000 m. Additionally, good quality Cenomanian to Santonian age source rocks are identified in several wells offshore Namibia. The 1911/15-1 well has TOC levels reaching up to 10% and a gross thickness of 170 m, and the Kabeljou-1 well an average TOC of 5.3% of approximately 50 m thickness.

The Barremian to Aptian age source rocks on the Namibian margin are now recognized to be the principal source rock for future exploration drilling and are characterized by parallel-bedded, low amplitude, low frequency, continuous low-impedance reflectors, which lie above the SDRs. The Aptian section above the SDRs in the deepwater (>2 km) Pelotas-Argentine margin has never been drilled, but seismic data indicates a similar stratal package. Recent 2D/3D seismic data from Namibia will be used to characterize the source rock package and compare with recently acquired seismic data from Argentina and Uruguay.