Morondava Basin, Offshore Madagascar – New Long Offset Seismic Data Highlights the Petroleum Prospectivity of this Emerging Frontier Basin*

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Abstract

The Morondava Basin is a large (220,000 km^2) basin situated on the southern half of Madagascar's west coast (Figure 1). It covers both the onshore and the offshore. Onshore, exploration started over a hundred years ago but has been dominated by heavy oil discoveries such as those at Tsimiroro and Bemolonga with some oil and gas shows but no commercial production. Offshore the Basin is more lightly explored, with regional seismic data in the Mozambique Channel and a small number of wells (6) in the shallow offshore. The presence of an active hydrocarbon system is indicated by gas shows in some of the wells; by gas chimneys and brightening on seismic data (Tamannai 2008, Tamannai et al 2009); and by geochemical sampling of sea-bottom sediments (by SApetro) – the latter indicating oil with similarities to samples found in Anadarko's Windjammer well in the Rovuma Basin of Mozambique (Oil Review Africa, Issue 3, 2012).

Introduction

This poster paper is based on the analysis of data from a new 13,300-line km long offset 2D seismic survey (plus gravity and magnetic data) acquired in the first half of 2013 in the offshore part of the Morondava Basin by BGP (Figure 2). This was part of a multi-client survey under the jurisdiction of the government authority (OMNIS) and in preparation for a new International Bid Round.

With the recent large discoveries on the East African margin, interest is turning again to the virtually unexplored Morondava Basin. Pre break-up Madagascar was connected to its conjugate Tanzanian margin. Since the Cretaceous, it has undergone passive margin sedimentation including reef development.

Discussion

Hydrocarbon plays are expected to range from the pre-rift Permian to Lower Jurassic Karoo sequences (e.g. in tilted fault blocks); through to Jurassic to Lower Cretaceous syn-rift (e.g. in drape and rollover anticlines), Upper Cretaceous fans and the Tertiary of the post-rift (e.g. fans, stratigraphic plays and reefs). Examples of some of these plays have been published by Omnis and are shown below in Figure 3 and Figure 4:

Seeps and DHIs have been reported in the offshore part of the Basin (Wessex website), whilst oil and gas shows have been found in some of the offshore wells (Omnis 2006, 2010 and 2012). An active (heavy) oil province exists in the onshore part of the Basin. The Chronostratigraphy of the Basin is summarized on the left hand side of Figure 5.

Summary

Acquisition of the survey began in January 2013. At the time of writing and extended abstract deadline (early February 2013), with the first data shipment still to be offloaded from the vessel and sent to the processing center, we have no new seismic sections to include in this Extended Abstract. However, the final paper will feature seismic sections from the new survey and will cover the different play types and trap styles in the Basin and allow us to draw firmer conclusions about its prospectivity as regards to both oil as well as gas. Updated versions of this Abstract will then be available on request from the authors via gfr@specpartners.net.

Acknowledgements

We thanks Envoi Ltd for the cross section used in Figure 2, Ophir for the map used in Figure 2, and Omnis for the material used in Figure 3, Figure 4, and Figure 5.

Selected References

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Websites

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Omnis (Office des Mines Nationales et des Industries Stratégiques, Madagascar): www.omnis.mg

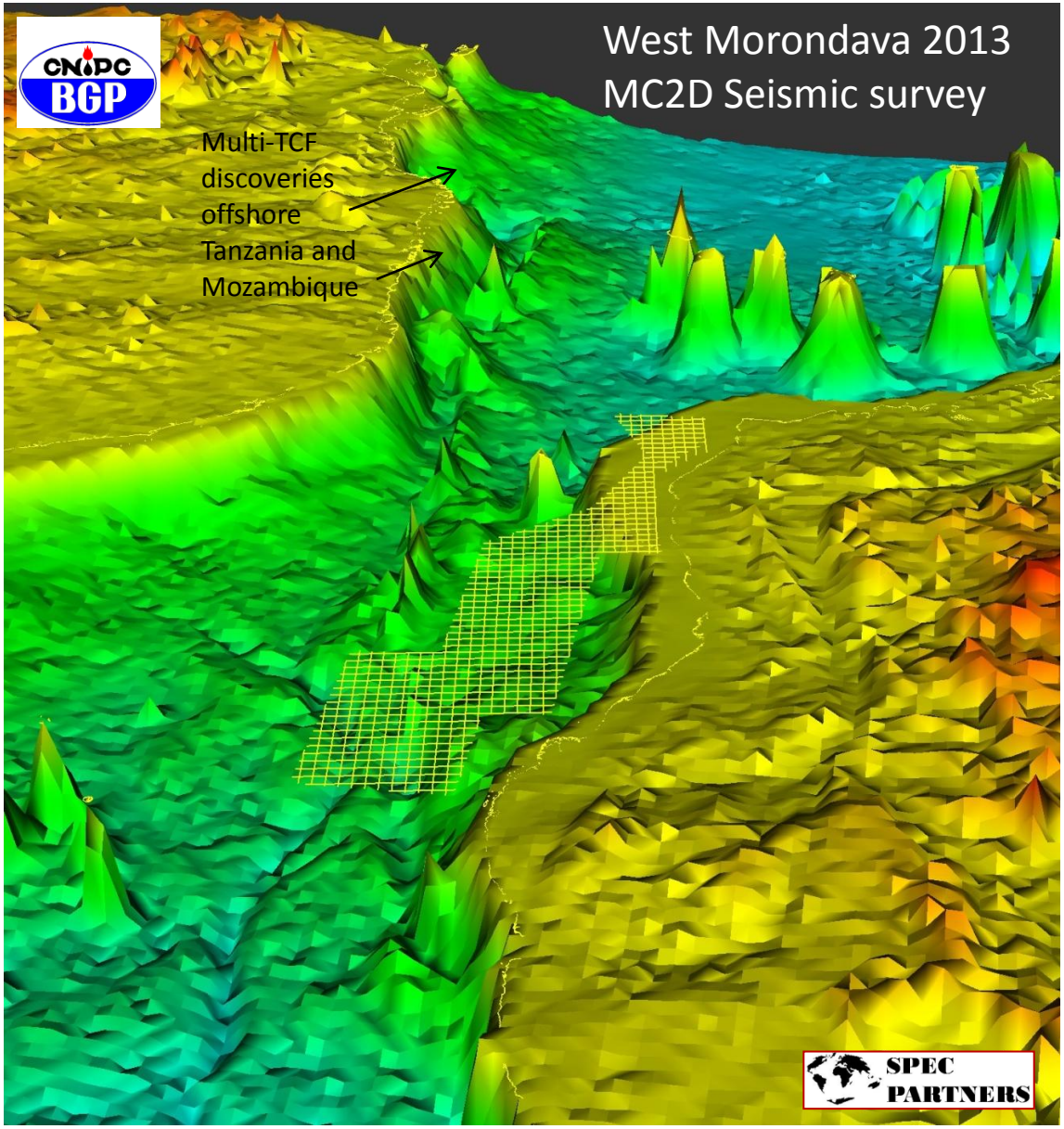


Figure 1. Survey location posted onto digital elevation model (Spec Partners).

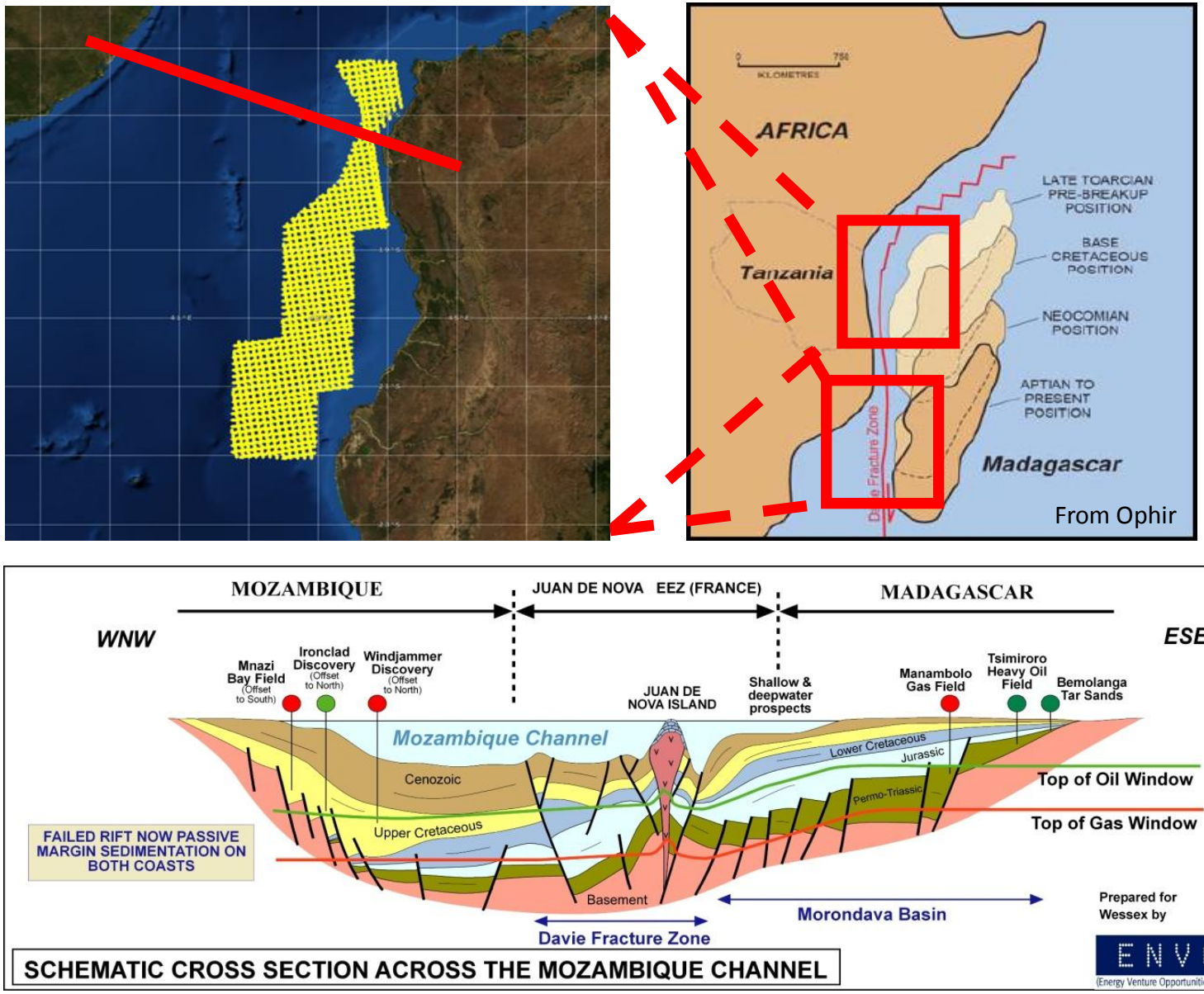
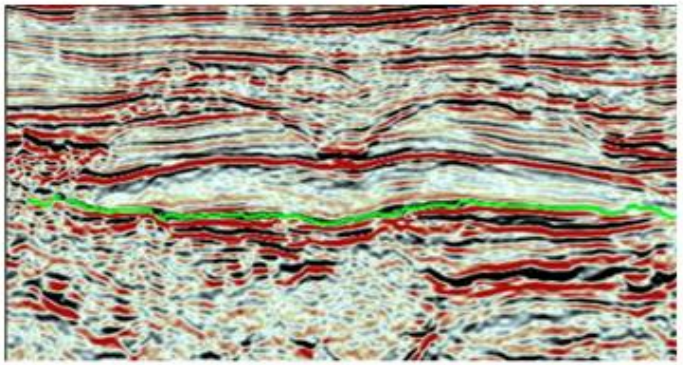


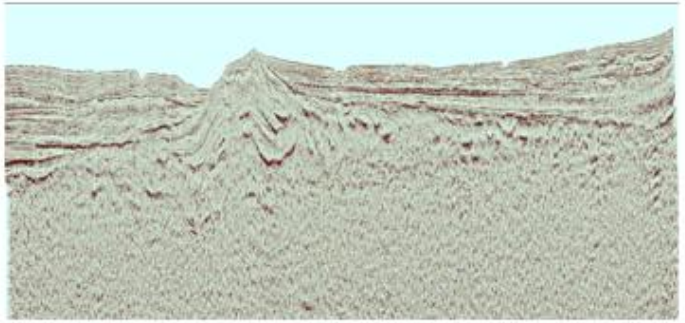
Figure 2. Survey location, Drift map (Ophir) and Geosection across the Mozambique Channel (courtesy of Envoi 2012). Location of line shown in the figure.

TRAPPING SYSTEM

Channel and fans in the Upper Cretaceous



Anticline and thick sequence on the Davie ridge



Karoo tilted faulted blocks

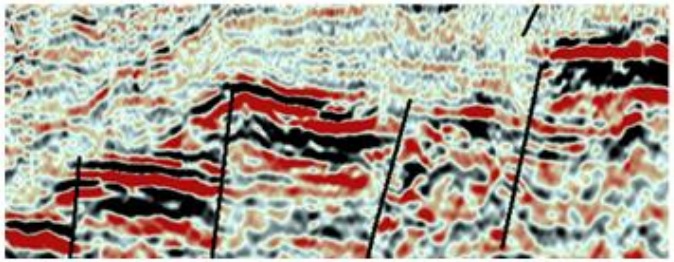


Figure 3. Trapping styles (Omnis AAPG 2010, Calgary and Upstream Africa Capetown, 2012).

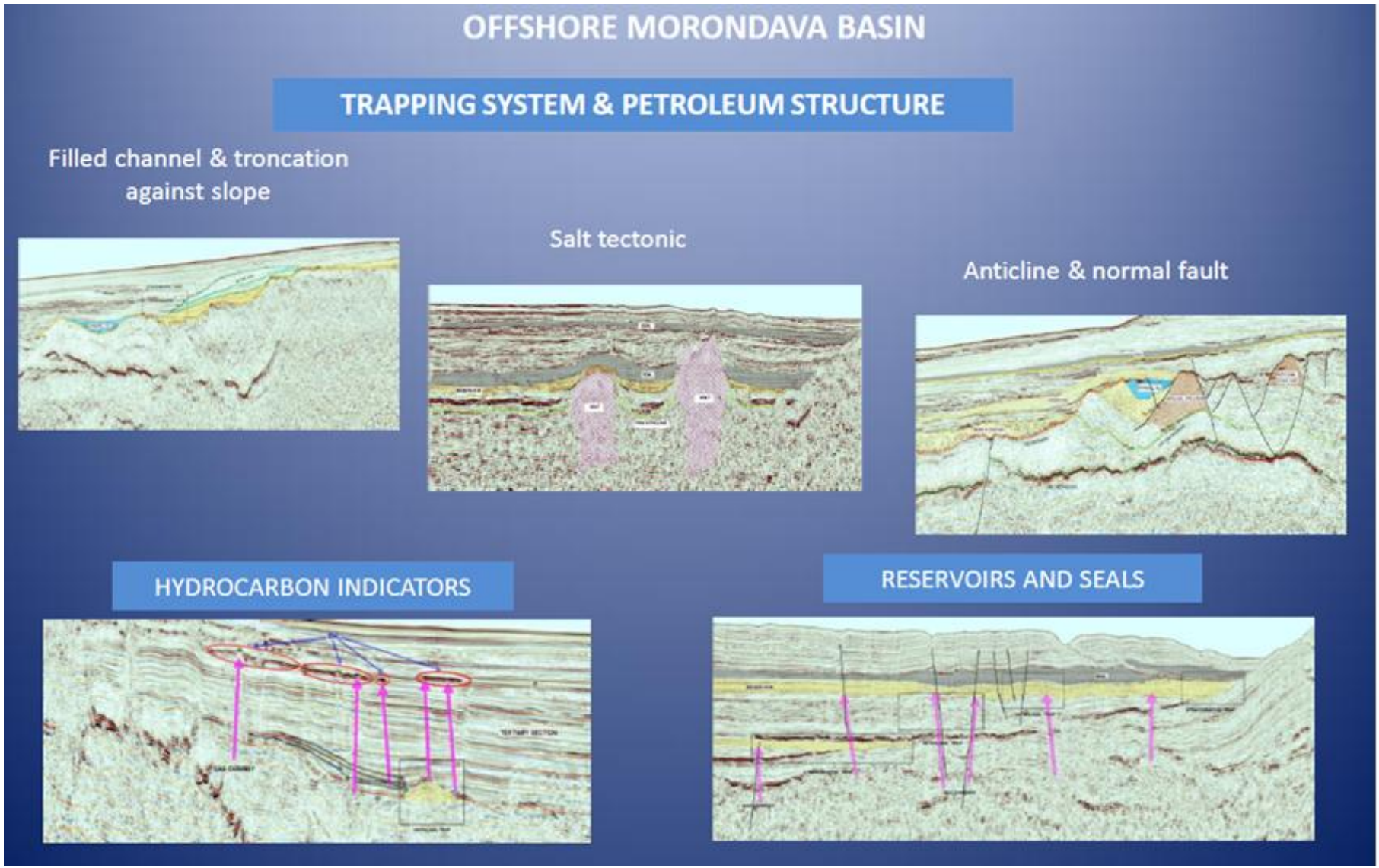


Figure 4. Trapping system and Petroleum structure (Omnis AAPG 2010, Calgary and Upstream Africa Capetown, 2012).

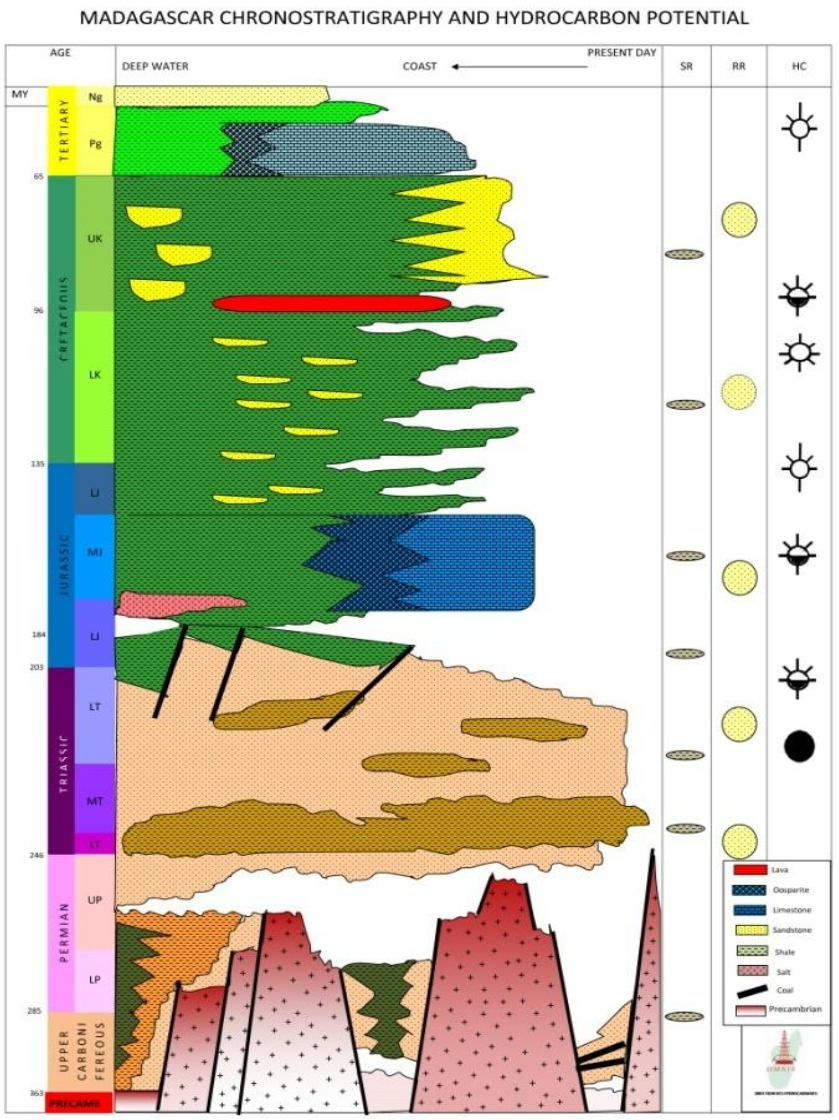


Figure 5. Chronostratigraphy: Madagascar basins (Omnis website).