EAGE

EA15

Contourites as a Primary Regional Control on Deep-Water Sediment Deposition: Examples from the Mozambique Basin

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Summary

The South-Central Mozambique Basin is a magmatic margin that originated during the break-up of Gondwana. Until the Early Paleocene, the main sedimentary processes controlling deep-water deposition were gravitational and density currents.

The subsequent Early Tertiary Sequence (ETS) constitutes the interval of interest for this study. During the Eocene, marine passages were opened and closed around the globe (Rebesco et al, 2014). This likely resulted in a change in the oceanic circulation pattern and distribution and strength of currents. In the Mozambique basin, this event coincided with a time when the deep water environments were starved of sediment supply. The combination of these two factors could have resulted in a deep water environment dominated by water-bottom current activity.

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A series of seismic observations have been made in the ETS that support this view. Sediment deposition is often observed to be concentrated adjacent to steep margins and unconnected to shelfal feeder systems. These accumulations often occur in the form of plastered drifts that are deposited onto high angle escarpments. In addition, isolated giant bodies within the basin are observed, with seismic facies consistent with fine-grained material and morphology and orientation consistent with contourite drifts. Associated with these, seismic scale bedform geometries can be seen in abyssal environments. In addition, such bodies typically show an absence of feeder systems and mass-flow depositional systems such as channel complexes and basin floor fans.

In conclusion, the ETS in the Mozambique offshore deep-water area is interpreted to consist predominantly of contourite deposits. This sequence terminates with the occurrence of the Middle Oligocene Unconformity (MOU), which is believed to be linked to a continent-wide uplift event. This event may have influenced the establishment of the Zambezi River catchment which resulted in a dramatic increase in sediment supply to the basin. As a consequence, the main sedimentary process operating in the deep water environments changed at that time from bottom currents to density currents. The contourites in the ETS therefore constitute a basin shaping event and their geographical distribution is a primary control on subsequent sediment deposition. The Mozambique Basin is an example of a basin where contourites play a key role on sediment distribution and facies on a regional scale.

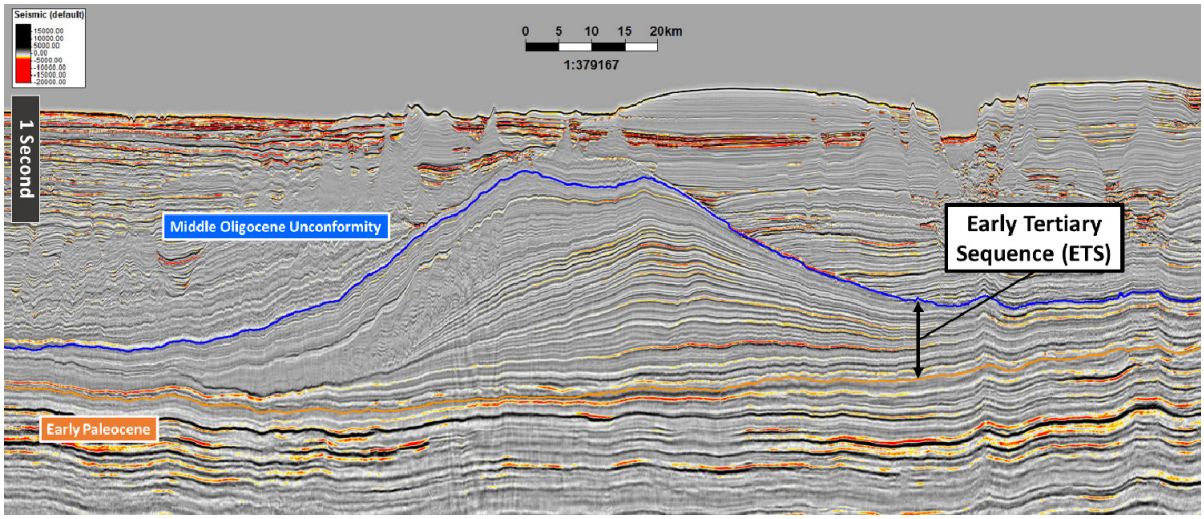

Figure 1 *Seismic example of a giant contourite drift in the Early Tertiary Sequence. Seismic data licensed by WesternGeco and Instituto Nacional de Petroleo.*

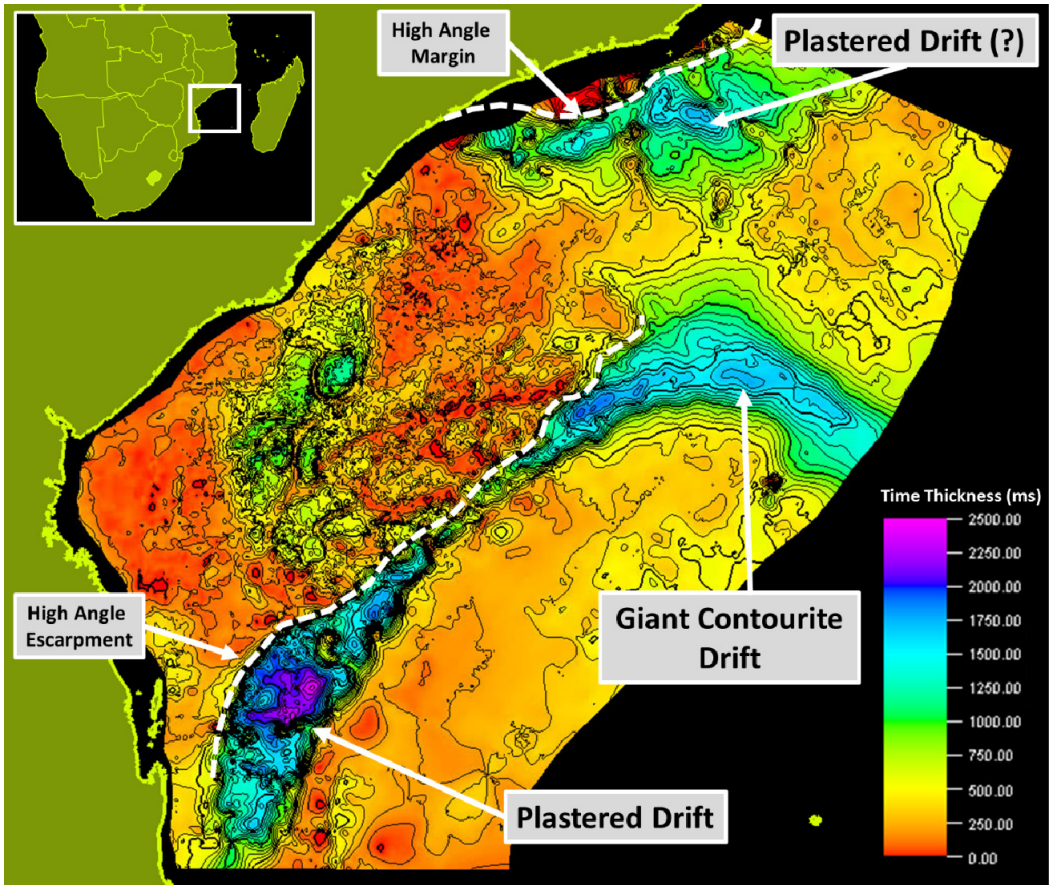

Figure 2 *Thickness Map in time (milliseconds) of the Early Tertiary Sequence.*

Rebesco, M., Hernandez-Moline, F., Van Rooij, D. and Wahlin, A. [2014] Contourites and associated sediments controlled by deep-water circulation processes: State-of-the-art and future considerations. *Marine Geology,* 352 (2014) 111-154