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Mesozoic and Early Cenozoic sediment influx in the Mozambique basin.

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Mozambique Basin is together with the Somali Basin the oldest rifted sedimentary basin developed along the eastern African margin in Jurassic times. The basin hosts a continuous record of sediments since Jurassic times, when Antarctica separated from Africa. The primary objectives of this study were to extend the regional stratigraphic framework north of the Zambezi Delta and to review geological events documented in the Mozambique Basin. Nine Multi-Channel seismic reflection profiles are used to extend the regional stratigraphy in to the deep abyssal plains of the basin.

We identify six major stratigraphic units that correlate to Jurassic, Early Cretaceous, Late Cretaceous, Paleogene, Neogene and Quaternary periods. Mesozoic sedimentation rates of 3-5 cm/kyr are observed in the deeper basin and 1-2 cm /kyr during Paleogene (neither compensated for compaction). The presence of Domo shales from existing wells point to a restricted circulation in the basin until mid-Cretaceous. Mesozoic sediments have a high velocity that exceed 4.5 km/s with an exception of a distinct low-velocity zone of 3.7 km/s in the mid-Cretaceous that may indicate under-compacted overpressured shales. Higher sedimentation rate in Late Cretaceous can be attributed to rapid denudation of the African continent after a major tectonic uplift episode at approximately 90 Ma and simultaneous increase in the catchment area of the proto-Zambezi. Increased sediment influx into the basin from the Zambezi in Late Cretaceous resulted in the formation a submarine delta fan lobe progressing into the Mozambique Channel around the northern periphery of Beira High. Strong north-south bottom currents commenced within the channel in Late Cretaceous that forced the aggradation of sediments of the submarine fan lobe on the southern flank. In addition, we observe several current-controlled drift bodies in the deeper basin that are influenced by the north-south bottom current. Low sedimentation rates in Paleogene are attributed to a relative quiet tectonic phase onshore and erosion during global marine regression in mid-Oligocene.