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Holocene Sea-Level Fluctuations and Paleo-environmental changes in Maputo Bay, Mozambique, using stable isotopes

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Mozambique has been classified as a "hot-spot" for potential impacts derived from sea-level rise, yet there is little knowledge on past sea-level fluctuation in this part of the world. Further understanding of sea-level fluctuations in the region would be of great benefit. To this end a high resolution record of paleo-environmental changes in Maputo Bay, Mozambique, are determined. Stable isotope analyses (δ13Corg; δ15N; δ18O) are conducted on the sediment organic matter and foraminifera Elphidium crispum from two cores, a 3.6 m long core collected at 5m below mean sea-level (m.s.l.) (Core V13) and a 6.2 m long core collected at 13.5m below m.s.l. (Core V40). Evolution of the region is informed through a seismic study and dating of cores is under-way using 14C analysis. The two cores analysed in this study showed evidence of catastrophic flooding events, as well as environmental changes. Core V13 represents a higher resolution of environmental changes, while core V40 shows a longer period, with the system changing from terrestrial dominated environment to marine, to terrestrially dominated once again before settling at the present system of marine dominated environment. The deepest layer of Core V13 is of marine origin with evidence of beachrock formation occurring, indicating a beach environment, while the top 190 cm indicate repeated alternation between marine and terrestrial environments, representing a contemporary highstand bay-head delta highly influenced by terrestrial input. This is further supported by the seismic interpretation. Enriched δ15N signatures from the terrestrial layers from the top 190 cm, could suggest the settling of early Europeans in the area ($\sim$1,544 AD). Core V40's deepest layer is of terrestrial origin, and terminates abruptly in marine sand, most likely due to the sudden, catastrophic collapse of the dune barrier following sea-level rise. Comparisons of preliminary results with existing studies suggests that this core covers a time period of almost 10 ka yr BP and we anticipate that the 14C results will confirm this. Finally, there is evidence of vegetation change in Maputo Bay through time; core V40's terrestrial strata have a strong C3 plant (original forest) signature, while the terrestrial strata from core V13 have a C4 plant (current crops) signature. Our results suggest that Maputo Bay represents an extremely dynamic environment for at least the last 9 ka yr BP, where sudden, catastrophic events can occur, and provide important insights into the environmental evolution of the region.