

The hydrodynamics of the Bons Sinais Estuary – Central Mozambique

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ABSTRACT

The Bons Sinais Estuary, located in the central Mozambique, a region with the highest tidal range and river discharge in whole Western Indian Ocean, is shallow (~10m), long (~30 km) and receives freshwater only during the dry season. These characteristics confer to the Estuary a distinctive hydrodynamics and ecological features. Current meter moorings, tide measurements and CTD profiling were conducted during the dry season, July 2011 and November 2012, and wet season, February 2012 and March 2013, and a simple 1-D, depth and width integrated, tidal hydrodynamic model, forced by the observed tides at the mouth, were applied to understand the major drivers of the hydrodynamics of the estuary. The water temperature displayed semi-diurnal variations while the salinity oscillated following the tidal cycle. The hydrodynamic model described the currents observed by about 87%; hence the currents were mostly tidal driven. The remaining 13% could be attributed to other factors, e.g. density gradient and winds. The barotropic prevailed against the baroclinic pressure gradient forces. The results of this study may contribute to understand the dynamics of the ecosystems in the Bons Sinais Estuary and may be useful in planning engineering works, dredging of the navigation channel and in tidal energy development studies.

Key words: Tides, currents, barotropic, flood-dominant, hyper-saline