Hydrodynamics of Chwaka Bay, a shallow mangrove-fringed tropical embayment, Tanzania

Abstract
N. Nyandwi, O.U. Mwaipopo

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Time-series data of currents, sea levels and temperatures from Chwaka Bay,Zanzibar were analysed with the view of understanding the water circulation of the bay. The analyses show that there is a tidal asymmetry in the bay, with peak ebb tidal currents in the deep channels (45 cm s^{-1}) being stronger than flood tidal currents (35 cm s^{-1}), and ebb periods (7 hours) being longer than flood periods (5 hours). The velocity and time asymmetry as well as the asymmetry in the current direction are controlled by the morphological variations of the tidal basin. It was found that, as the water flows from the inner bay during the ebbing tide, it first drains towards the main tidal creek which leads to concentrated but delayed flows. The temperature variations in the inner part of the bay are predominantly diurnal, whereas at the mouth of the bay they are semi-diurnal. There is a general temperature gradient between the inner bay and the mouth, the highest temperatures being recorded in the inner bay (30.14°C). This indicates high residence times of the bay waters, presumably resulting from entrapment.