

## Sea level variability in Pemba, north of Mozambique

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### Background

Sea Level (SL) variability has been a concern for the population that lives in coastal zone. The rise in SL increases the water depth and impacts the tides in terms of their dynamics and amplitude. In this study we evaluate the SL change and tidal change in a station at Pemba harbour, on the northern Mozambique coast.

### Methods

This study is part of the Coastal Risk Information Service (C-RISe) project that aims to assess the risk of the coastal sea level rise. The sea level data used in this study are in a *metric* and were not adjusted in '*revised local reference*'. These data were obtained from a tide gauge at Pemba harbour that is located in Pemba Bay at a position: Latitude -12.96°S and Longitude 40.55°E. The data comprise monthly mean since September 1970 to November 2015, with some gaps of missing data in between that period. The processing involved a stochastic dynamical method to obtain a linear trend.

### Results

Pemba station shows a semi-diurnal regime with the lunar constituent  $M_2$  giving more contribution within the astronomical components. The sea level in this station has annual and inter-annual variability. The months October-December showed no linearity between the analysed years: in 1971 the mean level increased from October to November and then decreased from November to October; in 2007 the tendency was reversed and; in 2015 the trend from 1971 is repeated. The mean SL had its lowest value, below 230mm during 2009. Within the data of 2009 and 2015, the months of February and March showed the highest values. These were, for 2009: February- 243mm, March- 235mm, and for 2015: February- 250mm, March- 251mm. An estimate of the SL trend showed a rise 0.0183mm per year.

### Conclusion

With these results we conclude that the Sea level is highest in February-March and lowest during September-October. With regards to the trend a slow rise of the SL is observed at Pemba Bay, although this value not significant enough to induce an increase in high water levels.