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Determination of Climate Change Impact to the Coastal Community in the Northern Indian Ocean

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Abstract

Climate change is a causative factor of profound series of changers including sea level rising, increasing of sea surface temperature, storm surge condition during a cyclone and, extreme tide event along the coastal area around the world. Sea level rising is a major threat to the living right of 200 million of coastal communities in low lying coastal areas and Island state countries. The sea level observation was collected from Bay of Bengal (BOB), Arabian Sea and around Sri Lankan waters using global sea level monitoring network conducted by Intergovernmental Oceanographic Commission (IOC). High frequency sea level data was used from Sittwe: Myanmar, Visakhapatnam: India Chittagong: Bangladesh representing Bay of Bengal, Karachi: Pakistan, Omara: Pakistan, Marmagao: Indian, and Male: Maldives representing Arabian Sea. The satellite observations were used same location of permanent sea level station from Achieving, Validation and Interpretation of Satellite Oceanography (AVISO). T_TIDE harmonic analysis function was computed to quantification of tidal constituents using one minute frequency tide gauge data obtained based on availability of non-missing reading more than one year. The residual sea level change was obtained by the difference of observed variation and predicted tidal constituents derived by harmonic analysis. The quantified tidal constituents were used to manipulate of spring and neap tidal rangers according to the criterion introduced by Hicks in 2006. The resulted sea level variation of both tide gauge and satellite were superposition with 2-3 mm per year positive trend and 80-90 cm of seasonal variation in Northern Indian Ocean. Tsunami like waves were recorded without seismic events and inter-annual variability were recorded related to the El Nino Southern Oscillation (ENSO) events with a frequency of 4-6 years. The irreversible gradual rising of sea level enhance the intensity and the frequency of ocean based disaster events such as storm surge, Meteotsunami and coastal flood challenging to the breathing right of coastal community.

Keyword: Sea level, Disaster, Bay of Bengal, Arabian sea, Climate change