

Records of Indian Ocean Dipole events between 1750 and 1850 in the northern Bay of Bengal from coral microatolls

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Indian Ocean Dipole (IOD) events are interannual oscillations between atmospheric and oceanic circulations. Effects of the event include decrease of sea surface temperature (SST) and rainfall from November to February in both eastern Indian Ocean and western Pacific Ocean. Wind anomaly also causes the sea level to drop by several tens of centimeters in eastern Indian Ocean based on modern observations. For the northern Bay of Bengal, occurrences and properties of IOD events before the 19th century are poorly known due to the lack of records. To understand the paleo-IOD events in this area, we utilized coral microatolls as a proxy from western Myanmar. The highest level of survival (HLS) recorded by coral microatoll morphology can provide the annual relative sea-level history for identifying sea level anomaly (SLA) during IOD events. Stable oxygen isotope record ($\delta^{18}\text{O}$) of corals reflects a combination of SST and sea surface salinity (SSS) variations, and Sr/Ca ratio of coral skeleton is used to reconstruct past SST. We collected slabs from two coral microatolls that were uplifted and killed by two different historical earthquakes (the 1762 Arakan earthquake and the 1848 regional earthquake). Based on the results obtained from these two coral slabs, abrupt drops in sea level ranging from 3 to 10 cm every 8 to 15 years can be correlated with signals of positive $\delta^{18}\text{O}$ anomalies relative to the winter average, and likely indicate records of IOD events. Combining SST estimated by Sr/Ca ratio, we were able to obtain paleo-IOD event characteristics including SST, SSS and SLA from mid-18th to mid-19th century in the northern Bay of Bengal area.