Sea level rise and monsoon intensification from the Last Glacial Maximum to Recent: oxygen isotope record from the Bay of Bengal and the Andaman Sea

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ABSTRACT

The Bay of Bengal (BoB) and the Andaman Sea are the core convective region of Indian monsoon system and among the most seasonally impacted of all monsoonal regions by glacial melt water, monsoon precipitation and runoff. Oxygen isotopes of surface, thermocline and bottom dwelling foraminifera were analysed from well-dated Andaman Sea cores and combined with other previously published records from the BoB and Andaman Sea for reconstructing ice volume effect and changes in hydrological cycle. Combined with temperature estimates and the observed seawater $\delta^{18}O$-salinity relationship, these data are used to estimate past changes in BoB salinity structure and sea level. Comparison of records with both benthic and planktonic $\delta^{18}O$ suggests large changes in the LGM to mid-Holocene meridional surface water $\delta^{18}O$ structure in the BoB. The deglacial amplitude (LGM to mid-Holocene) for Andaman and southern BoB benthic records combined have a narrow range (1.38±0.16‰). In contrast, the deglacial amplitude of the planktonic records systematically increases from south-north (1.49‰ to 2.1‰). This indicates LGM to mid-Holocene, freshening Andaman surface waters relative to southern BoB waters in response to sea level rise. Compared to modern, mid-Holocene surface waters in the northern BoB were 8% fresher, Andaman Sea were 12% fresher, and southern BoB were 3.5% fresher indicates enhanced monsoon precipitation and high sea level stand than present. Conversely, during the LGM, surface waters in the northern BoB were 9% more saline while Andaman Sea were essentially unchanged and southern BoB were 4.9% more saline compared to modern. The relative freshness of the Andaman during the LGM is likely the result of basin morphology during sea level low stand.

Keywords: sea level rise; oxygen isotope; salinity gradient; stratification; summer monsoon.