

Monsoon-influenced variations in calcareous and siliceous plankton community structure and upper- water column stratification of the western Bay of Bengal during the past 80 kyr

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To enhance understanding of the forcing factors of marine biological community structure in the Bay of Bengal, we studied proxies for biogenic carbonate and silicate production in the western Bay of Bengal and compared them with proxies for upper-ocean stratification and strength of the Indian summer monsoon (ISM). Specifically, we investigated the record in a sediment core in the western Bay of Bengal that extended to approximately 80 kyr before the present. The records of *Globigerinoides ruber sensu stricto* $\delta^{18}\text{O}$ minus *Neogloboquadrina dutertrei* $\delta^{18}\text{O}$ ($\Delta \delta^{18}\text{O}_{\text{r-d}}$) were used to investigate changes in upper-ocean stratification. In addition, mass accumulation rates (MARs) of CaCO_3 and biogenic silica were used as proxies of calcareous and siliceous productivities. Greater difference between *Globigerinoides ruber sensu stricto* $\delta^{18}\text{O}$ and *Neogloboquadrina dutertrei* $\delta^{18}\text{O}$ during the marine isotope stage (MIS) 1 and 5a indicate intervals with less saline and more stratified conditions. In contrast, the relatively small difference between both planktic foraminiferal $\delta^{18}\text{O}$ during MIS 2 and 4 indicates diminished stratification during these periods. Elevated carbonate production during MIS 2 and 4, demonstrated by the increase in CaCO_3 MAR, could have been driven by lower freshwater influx to the western Bay of Bengal resulting from lower ISM precipitation, and thus the increased mixing and upwelling of deep nitrate into the photic zone. The relative increase in BSi MAR during periods of high ISM precipitation and decreased salinity of surface waters suggests a limited recovery in biological siliceous production under interglacial conditions, possibly due to enhanced fluvial SiO_4 delivery to the ocean. Fluctuations of $\Delta \delta^{18}\text{O}_{\text{r-d}}$ during MIS 3 indicate that freshwater stratification was moderate and insufficient to restrict upwelling. This might have induced moderate biogenic silica and carbonate productions during this period.

Keywords: Sediment record, Biogeochemical data, Bay of Bengal, Planktonic $\delta^{18}\text{O}$