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Himalayan upliftment enhanced moisture transport during Miocene: Evidence from clumped isotope thermometry and oxygen isotopes in *Globigerinoides Quadrilobatus* from the Bay of Bengal

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Seasonal reversal of wind accompanied by seasonal rainfall and interhemispheric exchange of moisture and energy are features found in the South Asian Monsoon circulation (SAM) [1]. The evolution of SAM in geological time can be retrieved from sedimentary records from continental margin. The majority of the study focusing on the evolution of SAM utilized proxy of chemical weathering [2] to infer about the wind strength and atmospheric circulation over Northern Indian Ocean [3] and correlated with the upliftment rate of Himalaya. Here, we present the reconstructed Sea Surface Temperature (SST) and the estimated freshwater flux near the Southern Bay of Bengal (BoB) during Miocene time. Simultaneous use of clumped isotope thermometry and oxygen isotope in *Globigerinoides quadrilobatus* from different depth intervals of ODP758 core allowed the display of SST during Miocene. We observed a maximum temperature of 35±3°C at the Mid-Miocene Climate Optima (MMCO) and drop to a minimum temperature value of 24±1.5°C at the Mid-Miocene Climate Transition (MMCT). The observed trend in temperature match with the SST reconstructed using TEX_{86} from western Arabian sea [4], providing confidence of SST reconstruction using clumped isotope method. A drop in SST value at MMCT coincided with high primary productivity in the region and involvement of MIOJet as recorded in the foraminiferal ε_{Nd}. The westerlies triggered regional upwelling and supplied cold pool of nutrient-rich water onto the surface ocean. The estimated equilibrium $\delta^{18}O$ of seawater established here matches the chemical weathering proxies available from the Bay of Bengal and Arabian sea regions [2]. We found a 1.3±0.7‰ drop in $\delta^{18}O$ of water, salinity equivalent of ~7 psu decrease [5], corresponds to 15% excess in chemical alteration index at MMCT. Our observation is supported by the climate model simulation study, where overall strengthening of SAM from the Eocene to late Miocene was documented, SAM evolved further post MMCT [6].

Refs: [1] An et al., 2002. *Science* 6043(333); [2] Clift et al., 2008. *Nature Geoscience* 1(12); [3] Gupta et al., 2015 *PPP* 438; [4] Zhaung et al., 2017. *Geology* 45(7); [5] Delaygue et al., 2001. *JGRL* 106(C3); [6] Farnsworth et al., 2019. *Science Advances* 5(10).