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The role of the Eastern Arabian Sea in sea-air CO_2 exchange during the last termination event

TSUNGROJUNGLA WALLING[1], SATYA CHANAKYA VENKATA ILINDRA[1], SAMBUDDHA MISRA[1], PRANAY KUMAR TIRPUDE[2] AND KANNAIYAN NEELAVANNAN[3]

[1]Indian Institute of Science

[2]University of Delaware

[3]Indian Institute of Technology, Kanpur

Presenting Author: awaling18@gmail.com

The role of the northern Indian Ocean, specifically the East Arabian Sea (EAS) in air-sea CO_2 exchange during the last termination event remains unresolved. High fidelity quantitative paleoclimate reconstructions from this region are sparse. We will present a high resolution (1000-2000 year) Boron isotope based seawater pH record from the EAS for the last 50 kyrs. This reconstruction will focus on determination of surface to deep water pCO_2 gradient over the last glacial-interglacial cycle(0-19 kyr). We aim to quantify the flux of CO_2 from seawater to the atmosphere during this interval.

The EAS is characterized by seasonal upwelling, primarily driven by changes in wind direction during the two monsoons (Southwest vs. Northeast). The published body of work, based on foraminiferal abundance study, indicates that the EAS was characterised by higher levels of primary productivity during the last glacial, providing secondary evidence for increased upwelling in the region. However, a recent line of evidence argues for insignificant changes in the productivity between glacial and interglacial, contradicting the strong glacial upwelling theory. In this study, we will quantitatively address this ambiguity surrounding the nature of glacial-interglacial upwelling in the region. We will utilize foraminiferal lattice bound $\delta^{11}B$ as a proxy for paleo-seawater pH for reconstruction of seawater carbonate chemistry.

Site SK-322/GC-02 is located at a water depth of 517m near the Lakshadweep, and lies well above the regional lysocline. This site has two distinct sedimentation rates, varying between 1.9 to 5.2 cm/ka for the intervals of 0-66cm and 66-162cm respectively. Published $\delta^{18}O$ records and SST reconstructions indicate that the glacial-interglacial cycles are well captured by the planktonic foraminifera of these sites. We will utilise size fraction specific (355-455 μm) multiple species of foraminifera for geochemical analysis. For example: *Globigerinoides ruber* and *Globigerina sacculifera* will be utilised for the reconstruction of surface ocean chemistry, whereas *Orbulina universa* and *Neogloboquadrina dutertrei* will be utilised for reconstruction of the thermocline and deep thermocline carbonate chemistry. The high resolution water column pCO_2 structure will enable us to identify the importance of the EAS in supplying CO_2 to the atmosphere during the termination event.