Divecha Centre for Climate Change
Indian Institute of Science
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Joint DCCC-CEAS Seminar

Title: Extreme Indian Monsoon states lead to marine productivity collapses in the Bay of Bengal.

Speakers: **Dr. Kaustubh Thirumalai,** Assistant Professor, University of Arizona, Dept. of Geosciences.

Date: **22nd November 2022(Tuesday)**

Time: **3:30 pm**

Venue: **DCCC Auditorium- D314 , 2nd Floor.**

Tea & Coffee at 3:15 pm

Speaker Bio :

Dr. Kaustubh Thirumalai is an assistant professor at the Department of Geosciences, University of Arizona, located in Tucson in the southwestern US. His main research interests are centered on (paleo)climate dynamics, paleoceanography, and biogeochemistry. Dr. Thirumalai and his research group use a combination of carbonate geochemical measurements, climate simulations, and statistical models to help constrain climatic variability and its impacts across seasonal to million-year timescales. Originally from Bangalore, Dr. Thirumalai holds a chemical engineering B.Tech from the National Institute of Technology at Surathkal, Karnataka, after which he obtained his M.S. and Ph.D. at the University of Texas at Austin. He was then awarded a Presidential Postdoctoral Fellowship at Brown University in 2017, after which he joined the Geosciences faculty at the University of Arizona in 2019. Dr. Thirumalai has authored/co-authored more than 50 peer-reviewed journal articles and is the recipient of the 2022 American Geophysical Union's Nanne Weber Early Career Award.

Abstract

Indian summer monsoon (ISM) hydrology fuels biogeochemical cycling across South Asia and the Indian Ocean, exerting a first-order control on food security in Earth's most densely-populated areas. Despite projected ISM intensification under greenhouse forcing, large uncertainty surrounds future Indian Ocean stratification and primary production -- processes key to the health of already-vulnerable fisheries in the region. Here we present centennially-resolved records of ISM runoff and marine biogeochemical fluctuations in the Bay of Bengal (BoB) since the Last Glacial Maximum (LGM; ~21 ka). We find that ISM runoff was at its weakest during Heinrich Stadial 1 (HS1; 17.5-15.5 ka) and that peak freshwater discharge occurred during the early Holocene (EH; 10-9 ka). Counterintuitively, our records indicate that BoB productivity collapsed during both extreme states of peak monsoon intensity (EH) and failure (HS1). Using individual foraminiferal analyses (IFA) we demonstrate that both extremes were associated with upper-ocean stratification; whereas thermally-mediated stratification suppressed mixing and nutrient-delivery during HS1, outflow-induced stratification driven by strengthened ISM runoff curtailed productivity during the EH. In contrast to the latest Earth-system model projections, our paleoceanographic results raise the possibility of future deterioration in BoB productivity under strengthening monsoon seasonality.

All are Welcome