Orbital scale variability and evolution of the Indian Monsoon during the Pliocene: new data from the Andaman Sea

Conference or Workshop Item

2022-02-28 22:57:20

14th International Conference on Paleoceanography

Topic:	Improving our understanding of a warmer world
Type:	Poster
Abstract no.:	A-270
Status:	submitted
Are you an Early Career Scientist?	Yes

Orbital scale variability and evolution of the Indian Monsoon during the Pliocene: new data from the Andaman Sea

J. Gan[1], K. Littler[1], P. Anand[2], M. J. Leng[3, 4], M. M Robinson[5]
[1]University of Exeter, Camborne Schoole of Mines, Penryn Campus, Cornwall, United Kingdom, [2]The Open University, Faculty of STEM, School of Environment, Earth and Ecosystem Sciences, Milton Keynes, United Kingdom, [3]British Geological Survey, National Environmental Isotope Facility, Nottingham, United Kingdom, [4]University of Nottingham, School of Biosciences, Loughborough, United Kingdom, [5]U.S. Geological Survey, Florence Bascom Geoscience Center, Reston, VA, United States

Content
The Indian summer monsoon (ISM) is a critical component of the overarching Asian monsoon system, which dominates seasonal rainfall patterns over the region. The underlying mechanisms controlling monsoon variability include internal forcings (e.g., ice volume, ocean circulation) and external forcings (e.g., solar insolation), operating over a range of time scales from tectonic to decadal. While there is now considerable data from regions dominated by the SE Asian monsoon, there remains a significant data gap for the regions affected by the Indian monsoon, particularly prior to the late Pleistocene. Many unknowns remain regarding the response of ISM to past changes in global climate, such as during the intensification of Northern Hemisphere glaciation in the late Pliocene (~2.5–3.5 Ma). Key questions centre on the role of external vs. internal forcing at controlling both long-term and orbital-scale monsoon variability, and whether wind and rainfall responses were coupled during these transitions.
Here, we present a high resolution (~4 kyr), benthic oxygen isotope age model spanning from ~2.4 to 4.0 Ma for IODP Site U1448 in the Andaman Sea. This record allows us to interrogate (X-ray fluorescence) bulk elemental data from the same core to reconstruct past ISM behaviour across this enigmatic interval. Trends in elemental ratios representing terrestrial runoff and marine productivity (linked to ISM strength) show both long-term evolution in response to changing boundary conditions, and the influence of orbital forcing. Additionally, high resolution benthic carbon isotope data allows us to track changes in both water mass and marine productivity associated with orbital-scale variability in this region. Comparison of this data with comparable data from IODP Site U1445 in the NW Bay of Bengal allow us to examine spatial and temporal trends in ISM strength during the Pliocene, and identify changing loci of dominant precipitation across this region with time.

Authors

First author:	Jinrong Gan
Presented by:	Jinrong Gan
Submitted by:	Jinrong Gan