



2nd International  
Indian Ocean  
Expedition  
2015-2025

# Newsletter

Volume-8, Issue-6  
June, 2024

(A basin-wide research program co-sponsored by IOC-UNESCO, SCOR and IOGOOS)

*To advance our understanding of interactions between geologic, oceanic and atmospheric processes that give rise to the complex physical dynamics of the Indian Ocean region, and to determine how those dynamics affect climate, extreme events, marine biogeochemical cycles, ecosystems and human populations.*

## EKAMSAT Pre-Monsoon Observational Cruise 2024 (Leg-1)

The EKAMSAT (Enhancing Knowledge of the Arabian Sea Marine environment through Science and Advanced Training) program, a collaborative effort between India and the USA, is studying the Indian Ocean during the Monsoon season. It's overarching goal is to capture the evolution and breakdown of warm pool regions in the Indian Ocean as Monsoon arrives. The program has collected data on air-sea fluxes and the evolving state of the ocean and atmosphere throughout different Monsoon phases: pre-monsoon, active and break periods. This high-resolution data will be analyzed by scientists from both countries.

In 2023, EKAMSAT conducted field studies aboard the US research vessel Roger Revelle in the Arabian Sea. This year, the studies shifted to the Bay of Bengal due to operational reasons. Leg-1 of the 2024 campaign (April 27<sup>th</sup>-May 14<sup>th</sup>) covered a significant portion of the Bay (see Figure - 1). Leg-2 is currently underway (May 18<sup>th</sup>-June 15<sup>th</sup>).

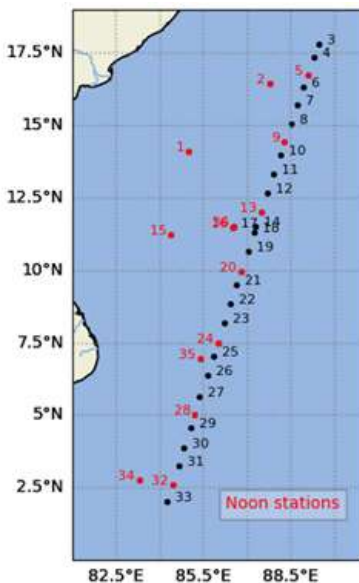


Figure-1: The CTD stations in International Waters during the first leg of the EKAMSAT cruise in 2024, onboard R/V Thomas G. Thompson.



Figure-2: Selected participants from Leg-1 teams from India and USA, onboard R/V Thompson.

This impressive collaboration for Leg-1 involved roughly 30 scientists from the USA and India, representing 10 US institutions and 5 Indian national labs. Beyond air-sea fluxes, Leg-1 achieved a significant win by gathering bio-optical measurements, including data on phytoplankton pigments, community composition, and other biogeochemical properties. This data is crucial for validating ocean color sensors from ISRO (India) and NASA, especially in a region with limited validation datasets. Scientists from INCOIS (India) and Columbia University (USA) also collected various bio-optical parameters. As these teams analyze the data and cross-calibrate their instruments, valuable insights are sure to emerge.

[Report Courtesy: Amit Tandon, Department of Mechanical Engineering/College of Engineering, Joint with DEOS/School for Marine Science and Technology, UMass Dartmouth, United States; E-mail: [atandon@umassd.edu](mailto:atandon@umassd.edu)]



## Understanding the Factors Regulating Proliferation and Co-occurrence of Loricata Ciliates in the Eastern Arabian Sea

Ciliates, highly developed and diverse eukaryotes, are crucial members of the microzooplankton community. With a wide distribution range, they play a significant role in the microbial food web. However, species aggregation among ciliates is rare and underreported, especially in Indian waters. A team of researchers from the Centre for Marine Living Resources and Ecology, Ministry of Earth Sciences, India, and the CSIR-National Institute of Oceanography, Regional Centre, Kochi, India, recently studied this phenomenon and discovered notable species aggregations in Indian waters, with different species dominating in different years, providing new insights into these intriguing events. In 2018, *Amphorides quadrilineata* and *Salpingella faurei* dominated and coexisted, accounting for 45–95% of the aggregation. Conversely, in 2003, *Dadayiella ganymedes* and *Helicostomella subulata* were the predominant species, making up 40% of the aggregation. Both occurrences took place during the late summer monsoon in September. Salinity and chlorophyll-a levels, particularly the nanoplankton fraction, were identified as significant factors influencing these exceptional abundances and community structures. The study highlighted distinct lorica oral diameter (LOD) patterns among the coexisting species. *Amphorides quadrilineata* and *Dadayiella ganymedes* had an upper LOD range of 28–32  $\mu\text{m}$ , while *S. faurei* and *H. subulata* had a lower range of 15–17  $\mu\text{m}$ . This differentiation delineates niches based on the resource spectrum, explaining the dominance of certain species in utilizing available resources. The study underscores the need for continuous monitoring to better understand regional dynamics. The findings show that the ecological niches of dominant ciliate species during different periods were similar during upwelling events. Coexisting species with different LODs efficiently formed niches, utilizing resources through competitive exclusion. Tracking these unusual and occasional species aggregations in the ocean remains challenging due to sampling limitations. While food concentration primarily drives plankton aggregation, future research should focus on ciliates behavioural traits linked with physical processes. Understanding these dynamics is essential for comprehending their influence on trophic interactions in marine environments.

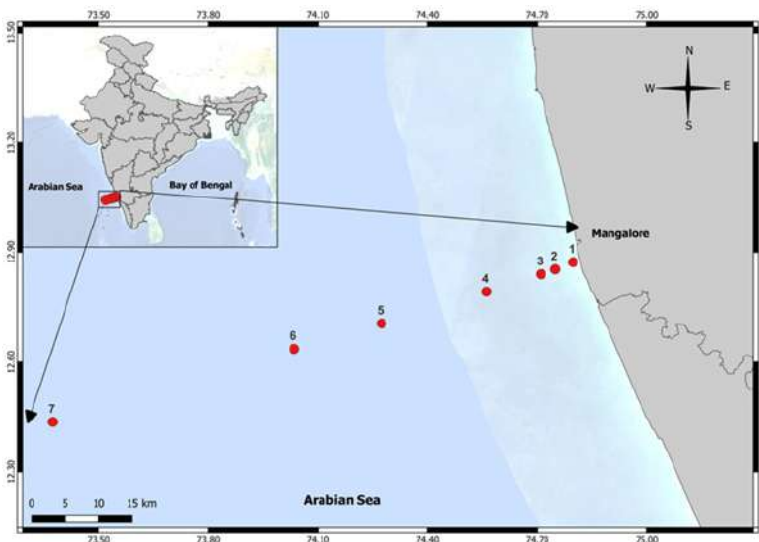


Figure-1: Study area along the Mangalore transect in the SEAS.

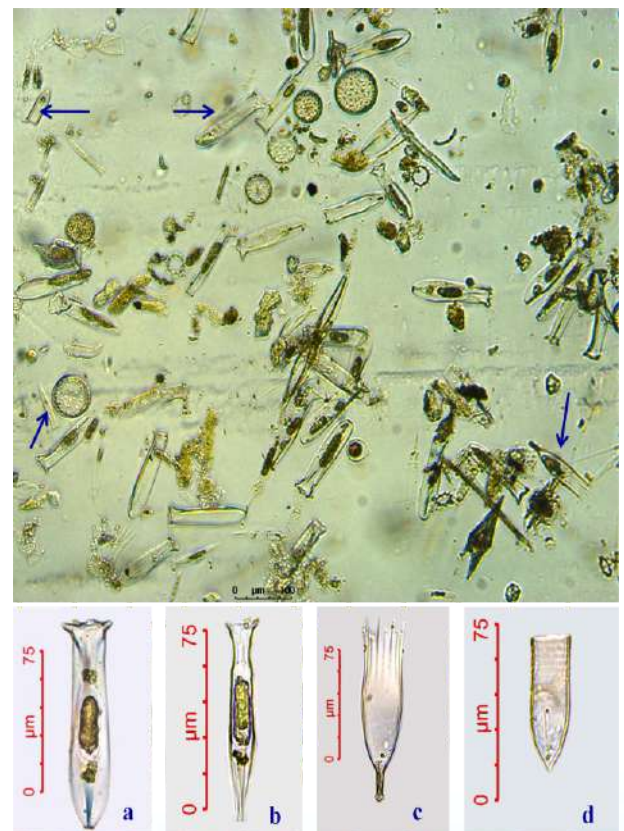


Figure-2: Photomicrograph of the species aggregation (top panel).  
(a) *Amphorides quadrilineata* (b) *Salpingella faurei*  
(c) *Dadayiella ganymedes* and (d) *Helicostomella subulata* SEAS.



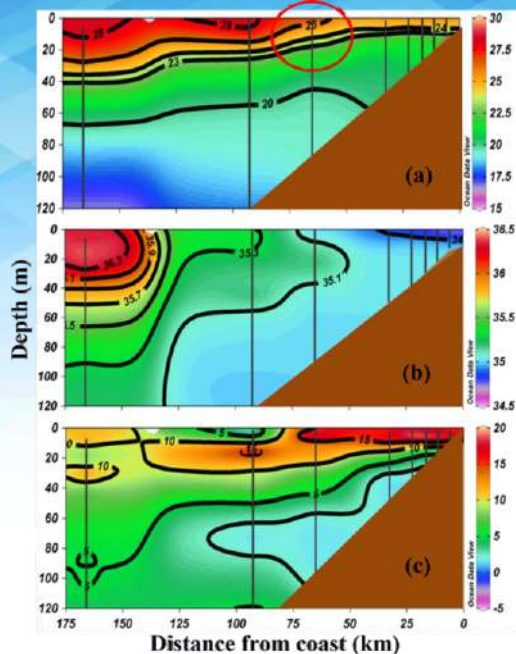


Figure-3: Vertical profiles of (a) temperature ( $^{\circ}\text{C}$ ) (b) salinity and (c) Brunt-Vaisala Frequency (cph). (Red circle-aggregation location)

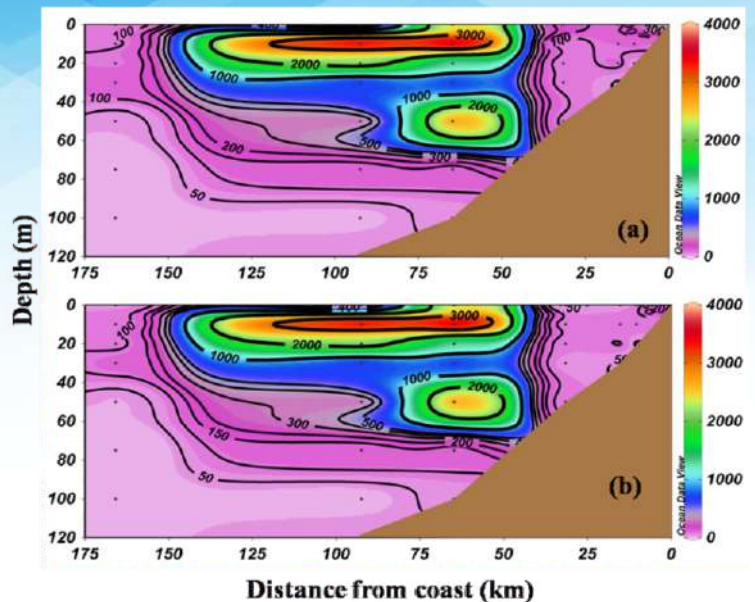


Figure-4: Vertical distribution pattern of (a) microzooplankton abundance (cells L-1) and (b) abundance of ciliates (cells L-1). Ciliates represented 90 % of the total microzooplankton

Citation: Asha Devi, C. R., Jhimli Mondal, N. N. S. Vishnu, C. K. Sherin, K. J. Albin, I. Anandavelu, and G. V. M. Gupta. "Factors regulating proliferation and co-occurrence of loricate ciliates in the microzooplankton community from the eastern Arabian Sea." *Aquatic Sciences* 86, no. 2 (2024): 31.

<https://doi.org/10.1007/s00027-024-01047-0>

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## DEEP-SEA RESEARCH PART II



Special  
Issue

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The 2nd International Indian Ocean Expedition (IIOE-2): Motivating New Exploration in a Poorly Understood Basin (Volume 7)

*Deep Sea Research Part II: Topical Studies in Oceanography*

Edited by

Raleigh Hood, Birgit Gaye, Lynnnath Beckley, VVSS Sarma, Laure Resplandy, P.N. Vinayachandran

THE SUBMISSION PORTAL FOR VOL. 7 OF THE DEEP-SEA RESEARCH II SPECIAL ISSUE SERIES ON THE IIOE-2 IS NOW OPEN

Submission of manuscripts that describe the results of studies related to the physical, chemical, biological, and/or ecological variability and dynamics of the Indian Ocean (including higher trophic levels) is encouraged.

Submission of manuscripts from students and early career scientists is also encouraged.

If you are interested in submitting a manuscript, please contact Raleigh Hood (rhoo@umces.edu).

Important Dates:

Manuscript Submission Deadline: August 15, 2024

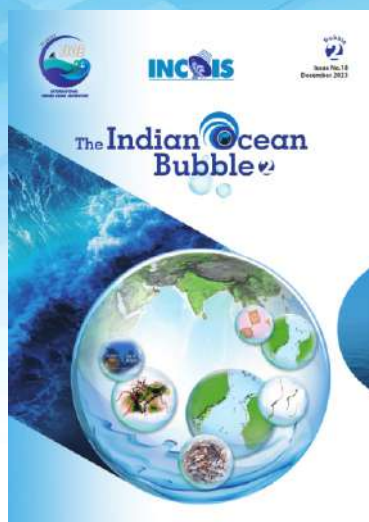
Editorial Acceptance Deadline: February 15, 2025

For more details please visit

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Informal articles are invited for the next issue. Contributions referring Indian Ocean studies, cruises, conferences, workshops, tributes to other oceanographers etc. are welcome.

Articles may be up to 1500 words in length (Word files) accompanied by suitable figures, photos (separate .jpg files)

Send your contributions as usual to [iioe-2@incois.gov.in](mailto:iioe-2@incois.gov.in)

## Endorse your projects in IIOE-2

Don't miss the opportunity to network, collaborate, flesh out your research project and participate in IIOE-2 cruises!!

The endorsement of your scientific proposal or a scientific activity focusing on the Indian Ocean region is a recognition of the proposal's or activity's alignment with the mission and objectives of IIOE-2, of its potential for contributing to an increased multi-disciplinary understanding of the dynamics of the Indian Ocean, and of its contribution to the achievement of societal objectives within the Indian Ocean region. Over 54 international, multi-disciplinary scientific projects have already been endorsed to date by the IIOE-2. Yours could be the next one!

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### Call for Contributions

Informal articles/short notes of general interest to the IIOE-2 community are invited for the next (July-end) issue of the IIOE-2 Newsletter. Contributions referring IIOE-2 endorsed projects, cruises, conferences, workshops, "plain language summary" of published papers focused on the Indian Ocean etc. are welcome. Articles may be up to 500 words in length (Word files) accompanied by suitable figures, photos.(separate.jpg files).

Deadline: **25 July, 2024**



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