



2nd International
Indian Ocean
Expedition
2015-2025

Newsletter

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(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.



Seasonal and intraseasonal modulation of near-inertial wind power associated with fluctuations in unidirectional wind speed in the Bay of Bengal

Previous studies showed that the mean annual contribution of near-inertial energy flux into the upper ocean mixed layer due to temporal fluctuations in the wind field is around 0.4-1.4 TW. However, there is disagreement over the exact magnitude of the global wind power input to near-inertial motion. As a result, research on the wind power input to surface mixed layer near-inertial motion is critical for quantifying the energy available for interior mixing caused by wind-induced near-inertial waves, even on a regional scale. In addition to the rotating wind fields associated with tropical cyclones, previous studies have demonstrated the generation of near-inertial waves in response to accelerating and decelerating unidirectional wind stress in the Southeast Pacific and the central Arabian Sea.

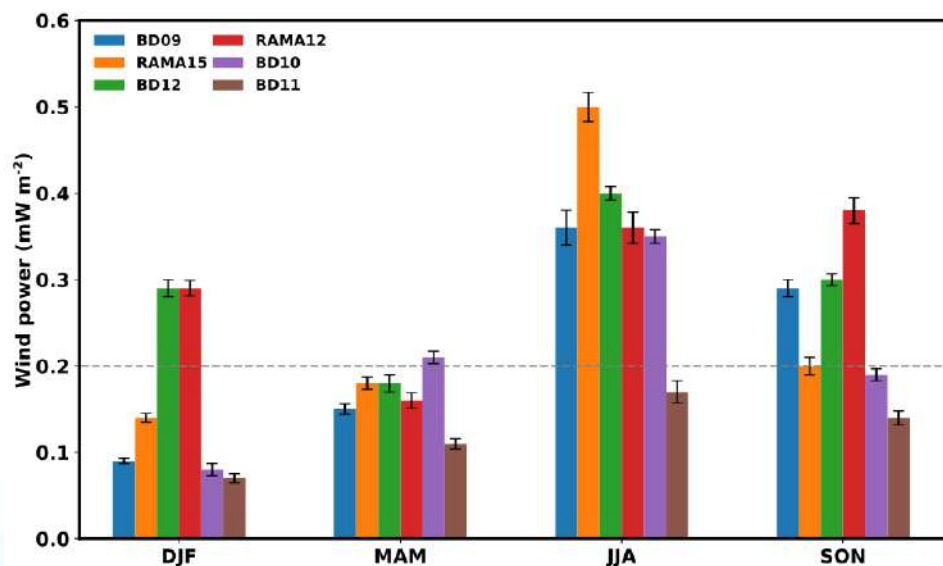


Figure. The seasonal mean of near-inertial wind power (mW m^{-2}) at mooring locations in the BoB (BD09: blue; RAMA15: Orange; BD12: green; RAMA12: red; BD10: purple; BD11: brown) after removing the impact of tropical cyclone influence from the data. The error bar represents the one-standard error of the mean, and it is estimated based on the deviations from the respective seasonal mean. The dashed horizontal line represents near-inertial wind power of magnitude 0.2 mW m^{-2} .

Like in the Arabian Sea, steady wind conditions prevail in the Bay of Bengal(BoB) throughout the year except for occasional tropical cyclone activity. Here, we used long-term observation of high temporal resolution of in-situ wind and near-surface current vectors measurements from RAMA and OMNI mooring to understand the seasonal and intraseasonal variability of near-inertial wind power input to the surface layer of the Bay of Bengal due to accelerating unidirectional wind stress. It is found that in response to the seasonal evolution of monsoonal wind forcing, near-inertial wind power shows significant annual variability, with a maximum during summer ($\sim 0.4\text{-}0.5 \text{ mW m}^{-2}$) and fall ($\sim 0.3\text{-}0.4 \text{ mW m}^{-2}$) and a minimum during winter ($\sim 0.1 \text{ mW m}^{-2}$) and spring ($\sim 0.2 \text{ mW m}^{-2}$). In addition, it is also found that modulation of near-inertial wind power due to summer monsoon intraseasonal oscillation (MISO), such as its magnitude, reaches as large as $\sim 1 \text{ mW m}^{-2}$ at the mooring in the northern BoB during phases 3-4 of MISO. The near-inertial Kinetic energy NIKE budget using high-resolution vertical profile of current and wind data from a mooring in the northern Bay of Bengal further indicates that a significant portion of near-inertial wind power dissipates in the mixed layer and rarely energises the depth regime underneath the mixed layer.

Citation: Aswathy, V.S., Girishkumar, M.S. & Athulya, K. Seasonal and intraseasonal modulation of near-inertial wind power associated with fluctuations in unidirectional wind speed in the Bay of Bengal. Ocean Dynamics (2023).

<https://doi.org/10.1007/s10236-023-01589-1>

[Report Courtesy: Girishkumar, M.S., INCOIS, India; E-mail: girish@incois.gov.in]

Exploring Arabian Sea's Water Column Features Linked to Extensive Algal Bloom

In the northern Arabian Sea, dynamic algal blooms led by a dinoflagellate, *Noctiluca scintillans* (hereafter *Noctiluca*), create a suite of environmental perturbations. Scientific observations reveal unique physico-chemical conditions, showcasing the intricacies between these algae and the changing ocean environment. As climate patterns evolve, understanding these blooms becomes crucial for deciphering the intricate balance of marine life in the northern Arabian Sea.

In February 2017, a team of Indian scientists from the National Remote Sensing Centre (NRSC) and the Indian National Centre for Ocean Information Services (INCOIS) took a close look at the bloom event of the northern Arabian Sea, during a 20-day exploration focused on *Noctiluca* bloom. The selected stations, influenced by *Noctiluca*, exhibited distinct characteristics such as lower temperatures and higher salinity, signaling the impact of convective mixing. Microscopic analysis unveiled a higher cell count of *Noctiluca*, reaching 52,600 cells per liter. As the scientific gaze delved deeper, surface variations in oxygen and pCO_2 revealed a peculiar disconnection. Although there was a slight over saturation observed around the *Noctiluca* bloom in contrast to the nearby regions, the stations undergoing convective mixing suggested a possible alteration in pCO_2 because of subsurface ventilation. In a noteworthy stride, this study pioneers the examination of CO_2 dynamics in tandem with *Noctiluca* bloom, marking a significant contribution to our understanding of this complex ecological phenomenon. As the first of its kind, these observations pave the way for future research endeavors seeking to understand the intricacies of *Noctiluca* blooms and their interaction with the changing climate of the Arabian Sea.

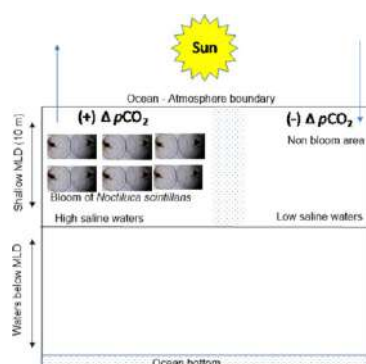


Figure: Schematic showing water column properties in relation to *Noctiluca* bloom in the Northern Arabian Sea

Citation: Roy, R., Lotliker, A. A., Baliarsingh, S. K., & Jayaram, C. (2024). Water column properties associated with massive algal bloom of green *Noctiluca scintillans* in the Arabian Sea. Marine Pollution Bulletin.

<https://doi.org/10.1016/j.marpolbul.2023.115913>

[Report Courtesy: Sanjiba K. Baliarsingh (baliarsingh.s@incois.gov.in) & Aneesh A. Lotliker (aneesh@incois.gov.in), INCOIS, Hyderabad, India.]

Cruising the Blue Tapestry: Unravelling the Intricacies of Jellyfish Aggregation in the Western Bay of Bengal

Jellyfish aggregations are intriguing phenomena that have garnered increasing attention due to their ecological and socioeconomic implications. Along the Western Bay of Bengal, these aggregations remain a relatively understudied aspect of marine ecological applied research. As an initial step, the Indian National Centre for Ocean Information Services (INCOIS) carried out a comprehensive review on identifying jellyfish aggregation hotspots along the Indian coast and proposed a conceptual framework for the possible genesis of the Jellyfish Aggregation Advisory Service (JAAS). Several attempts have been made to provide a plausible scientific basis for the jellyfish beach stranding and aggregation events in different pockets of the Indian east coast. However, a comprehensive time-series case study at a jellyfish aggregation hotspot is of pivotal importance to understand the conducive conditions and possible advection to the nearshore.

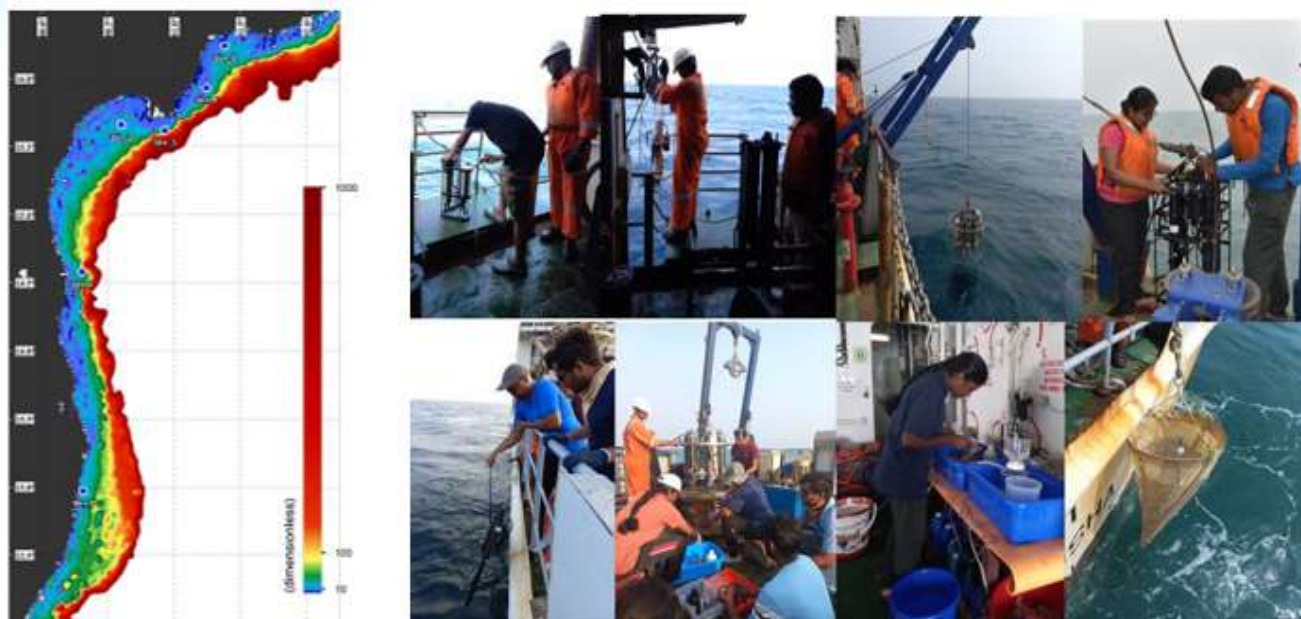


Figure- 1: Sampling locations (blue circles with white border) in the western Bay of Bengal (left) and operations of various equipment onboard during the cruise (right)

INCOIS is ruminating on establishing a service for satellite-based detection and monitoring of jellyfish aggregating areas in Indian seas. For this purpose, in the initial stages, two scientific cruises- in the monsoon (June) and in the post-monsoon (November) season have been proposed in the Bay of Bengal (with a time series sampling location at Machilipatnam) (Figure-1), that has been recognized as a hotspot for jellyfish aggregation. These proposed expeditions are crucial for understanding the jellyfish aggregation dynamics and its conducive conditions in the coastal waters of the Western Bay of Bengal by shedding light on the environmental and ecological factors driving these phenomena and thus provide valuable insights for coastal management, fisheries, and the conservation of the marine ecosystem. The first post-monsoon cruise in this program was conducted from 8th -18th November 2023 onboard ORV Sagar Manjusha (Cruise ID: SAMA 24/2023-24).



From Left: Mr. Harisha, Mr. Harsa Bardhan Dalabehera, Ms. Susmita Raulo, Ms. Baisakhi Pattnaik, Mr. Alakes Samanta, Dr. Dhanya M Lal, Dr. Sneha Jha, Dr. Sanjiba Kumar Baliarsingh, Dr. Chennuri Sathish

Water column salinity, temperature, dissolved oxygen, biological oxygen demand, dissolved inorganic carbon, coloured dissolved organic matter, total suspended matter, pH, phytoplankton size class biomass, primary productivity, and phyto- and zoo-plankton taxa were measured/studied at all the stations during the cruise. In-water inherent and apparent optical properties were measured using a Hyperspectral underwater radiometer. In order to give a comprehensive scientific understanding of the environmental conditions, aerosol optical depth, and greenhouse gas concentration were also measured at each station. The detailed analysis of all these environmental factors aims to give a

scientific basis on jellyfish aggregation in the hotspot locations along the Indian coast.

Source:

Samanta, A., Baliarsingh, S.K., Jha, S., Lal, D.M., Raulo, S., Joseph, S., & Balakrishnan Nair, T.M. (2023). Ocean Modeling and Advisory Services- Jellyfish Aggregation in Coastal Waters of The Western Bay of Bengal. Expedition Report, ORV Sagar Manjusha (ID: SAMA 24/2023-24), 21 pages.

[Report Courtesy: Sneha Jha (s.jha-p@incois.gov.in), Dhanya M Lal (dhanya.ml@incois.gov.in) & Susmita Raulo (s.raulo-p@incois.gov.in), INCOIS, Hyderabad, India]

SCOR WG 167 Copernicus Special Issue Launched

The SCOR Working Group 167, RUSTED, aims at assuring the quality of aerosol trace element solubility data produced by the international research community and its use in Earth System models.

RUSTED is now calling for manuscripts to contribute to its special issue on “Reducing the Uncertainty in aerosol Soluble Trace Element Deposition.” This is a Copernicus inter-journal special issue lead by the journal “Atmospheric Measurement and Techniques(AMT)”, but submissions are also welcome in “Atmospheric Chemistry and Physics(ACP),” “Aerosol Research(AR),” and “Biogeosciences(BG).”

Scheduled Sis (List of Special issues which are scheduled for publication in AMT):

www.atmospheric-measurement-techniques.net/articles_and_preprints/scheduled_sis.html

Scheduled Sis (List of Special issues which are scheduled for publication in ACP):

www.atmospheric-chemistry-and-physics.net/articles_and_preprints/scheduled_sis.html

Scheduled Sis (List of Special issues which are scheduled for publication in AR):

www.aerosol-research.net/articles_and_preprints/scheduled_sis.html

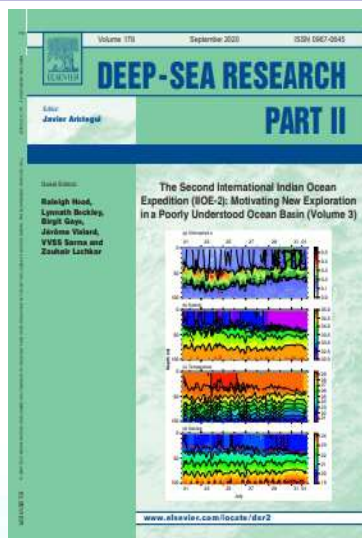
Scheduled Sis (List of Special issues which are scheduled for publication in BG):

www.biogeosciences.net/articles_and_preprints/scheduled_sis.html

The RUSTED special issue welcomes cutting-edge studies which advance our knowledge of the deposition of soluble aerosol trace elements and their impacts on marine ecosystems as well as manuscripts addressing challenges and/or recent advances in the field of aerosol trace element deposition. This call is open to the wider international researchers community working on trace element biogeochemistry at the air-sea interface. Please request for your inclusion to the RUSTED SI when submitting your manuscript to one of the above mentioned contributing journal.

For more information, please email Mingjin Tang (mingjintang@gig.ac.cn) or Morgane Perron (morgane.perron@univ-brest.fr)

DEEP-SEA RESEARCH PART II



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 (rhood@umces.edu).

Important Dates:

Author Invitation Date: January 15, 2024

Date the first submission is expected: February 15, 2024

Manuscript Submission Deadline: August 15, 2024

Editorial Acceptance Deadline: February 15, 2025

For more details please visit <https://iioe-2.incois.gov.in/IIOE-2/DSRSpecialIssueInfo.jsp>

ICES - PICES 7th International Zooplankton Production Symposium during Autumn 17-22 March 2024, Hobart, Australia

SCOPE

We are living in the Anthropocene. Our oceans are warmer, more acidic, have widespread plastic and other pollution, and are subjected to increasing exploitation including overfishing. Zooplankton play a pivotal role in our oceans, as grazers of primary production, as drivers of carbon and nutrient cycles, and as prey for higher trophic level consumers including both harvested fish species and iconic marine mammals and seabirds. How zooplankton will respond to the dramatic changes in our marine ecosystems will impact the health and productivity of our oceans and our planet.



To better understand zooplankton in a changing world, ICES and PICES are holding the 7th International Zooplankton Production Symposium as a forum to discuss the latest zooplankton research. The ICES/PICES Zooplankton Production Symposium will bring together the top zooplankton researchers globally, showcasing recent advances. Understanding the current and evolving role of zooplankton will require new insights provided by:

- Assessing the impact on zooplankton of climate change, fishing, and pollution such as microplastics
- State-of-the-art sampling techniques such as DNA, imaging, and bioacoustics
- Biochemical methods applied to unravelling complex trophic ecology
- The application of cutting-edge approaches in zooplankton modelling, including size and trait-based biogeochemical and ecosystem models
- Revealing the role of microzooplankton in biogeochemical cycling and food webs
- Exploring the structure and functioning of macrozooplankton communities and their impact on carbon sequestration and trophic ecology
- Examining zooplankton in fisheries science, including dynamics of fish larvae, the impact of zooplankton on fish larval mortality and growth, and the commercial harvest of zooplankton
- Elucidating the vital role of zooplankton in polar environments
- Understanding the role of gelatinous filter feeders and jellyfish in carbon sequestration and trophic ecology
- The use of zooplankton as ecosystem indicators in a changing ocean

Our Symposium will be held over five days in the historic waterfront district of Hobart, Australia, during Autumn, from 17-22 March 2024. This event will be held in-person and provide the first opportunity since 2016 for zooplankton researchers to meet, build networks, and hear the latest science. We are monitoring the COVID-19 situation closely and will adapt our plans as needed.

The Organizing Committee invites proposals for sessions to be held during the Symposium. Proposals are welcome for sessions incorporating talks and posters, panel discussions and/or workshops. Sessions could cover, but are not limited to, the key areas listed above.

The symposium website may be accessed here: <https://meetings.pices.int/meetings/international/2024/zps7/scope>

Proposals may be submitted here: <https://meetings.pices.int/meetings/international/2024/zps7/proposals>

AOGS2024

21ST ANNUAL MEETING

Pyeongchang, Gangwon-do
Home to Winter Olympics
23 to 28 Jun 2024



Asia Oceania Geosciences Society (AOGS) was established in 2003 to promote geosciences and its application for the benefit of humanity, specifically in Asia and Oceania and with an overarching approach to global issues. Asia Oceania region is particularly vulnerable to natural hazards, accounting for almost 80% human lives lost globally. AOGS is deeply involved in addressing hazard related issues through improving our understanding of the genesis of hazards through scientific, social and technical approaches. AOGS holds annual conventions providing a unique opportunity of exchanging scientific knowledge and discussion to address important geo-scientific issues among academia, research institution and public. Recognizing the need of global collaboration, AOGS has developed good co-operation with other international geo-science societies and unions such as the European Geosciences Union (EGU), American Geophysical Union (AGU), International Union of Geodesy and Geophysics (IUGG), Japan Geo-science Union (JpGU), and Science Council of Asia (SCA).

The website may be accessed here: <https://www.asiaoceania.org/aogs2024/public.asp?page=home.asp>

Session-OS06: Physics, Biogeochemistry, and Climate Dynamics of the Indian Ocean

Session Details

Section(s):

OS - Ocean Sciences (Primary)

AS - Atmospheric Sciences



Announcements

SUBMIT ABSTRACTS

17 Oct 2023 – 02 Jan 2024

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17 Oct 2023 – 02 Jan 2024

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2024 AWARD NOMINATIONS

17 Oct 2023 – 02 Jan 2024

[Guidelines](#)

Conveners

* Prof SungHyun Nam (Seoul National University)

Dr Nicolino (Nick) D'Adamo (Adjunct Research Fellow, Oceans Institute of the University of Western Australia)

Dr Dong-Jin Kang (Korea Institute Of Ocean Science And Technology)

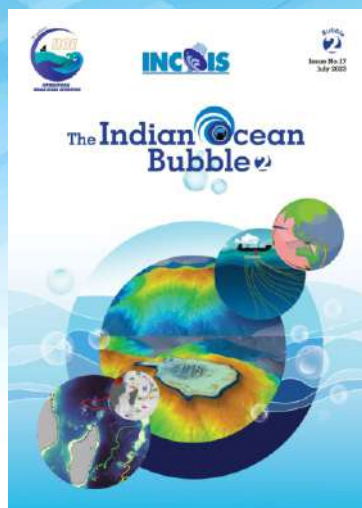
Dr Yukio Masumoto (The University of Tokyo)

Session-OS06: Description

Recent increases in extreme events such as flooding, droughts, heatwaves, and tropical cyclones have a large impact on the population living in the Asia and Oceania countries. Increasing evidence on the roles of Indian Ocean in impacting climate extremes, climate variability, and climate change via changes in energy, hydrological and biogeochemical cycles has been reported. The Indian Ocean is of particular interest, for example, as influenced by the seasonally reversing monsoon forcing and upwelling centers in the Indian Ocean are found in the off-equatorial regions unlike in the easterly wind-forced Pacific and Atlantic Oceans. The northern region is dominated by the monsoons whereas the seasonal reversal is less pronounced in the southern region. This session invites contribution of physics, biogeochemistry, and climate dynamics of Indian Ocean based on in-situ and remotely-sensed observations, models, theories, and paleo proxies that reveal processes, variability, and projected changes within the Indian Ocean. This includes, but not limited to 1) Indian Ocean variability such as Indian Ocean Basin Mode, Indian Ocean Dipole Mode, Madden-Julian Oscillations, 2) Upwelling in the Indian Ocean such as open-ocean upwellings or thermocline ridge/dome (e.g., Seychelles-Chagos Thermocline Ridge) and coastal upwellings at both western and eastern sides, 3) Processes underlying basin-scale or regional circulation, 4) Ocean-atmosphere interaction processes (heat, freshwater, momentum, carbon, etc.), 5) Biogeochemistry of the Indian Ocean water masses, 6) Links between ocean sciences and socio-economic requirements in the Indian Ocean, and 7) Interactions and exchanges between the Indian Ocean and other basins. Abstracts on related activities, such as capacity building, education, outreach, project development in the Indian Ocean, contributing to the UN Decade of Ocean Science for Sustainable Development and to the Second International Indian Ocean Expedition are also welcome.

Keyword(s): Indian Ocean; Physics; Biogeochemistry

The Indian Ocean Bubble, Issue No.17 is now available online



Web Link: https://iioe-2.incois.gov.in/IIOE-2/pdfviewer_pub.jsp?docname=IIOE-2-DOC_OM_260.pdf

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

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 52 international, multi-disciplinary scientific projects have already been endorsed to date by the IIOE-2. Yours could be the next one!

Visit <https://iioe-2.incois.gov.in/IIOE-2/EndorsementForm.jsp> for further details and for projects already endorsed by IIOE-2 https://iioe-2.incois.gov.in/IIOE-2/Endorsed_Projects.jsp.

Call for Contributions

Informal articles/short notes of general interest to the IIOE-2 community are invited for the next (January-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 January, 2024**



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