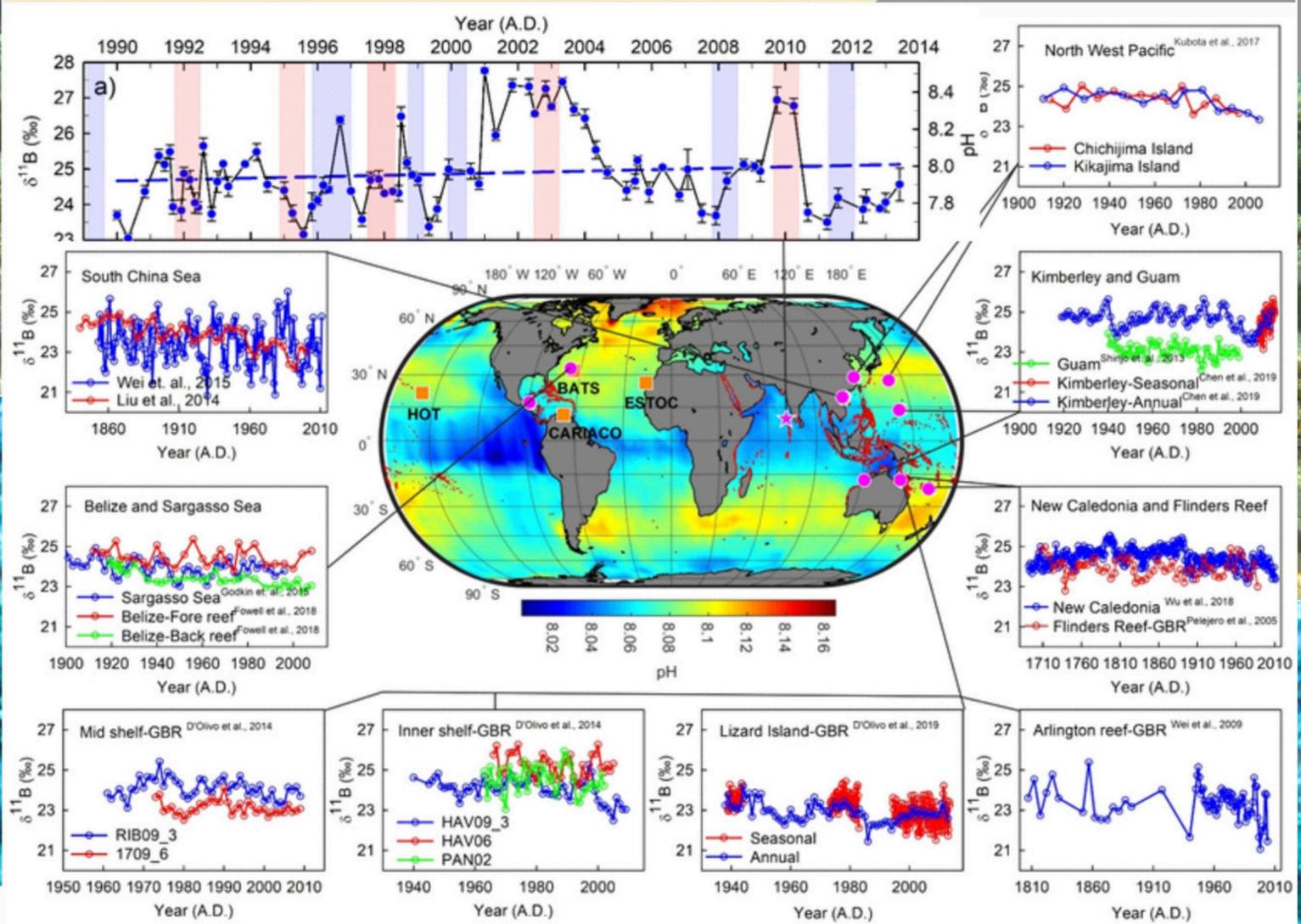
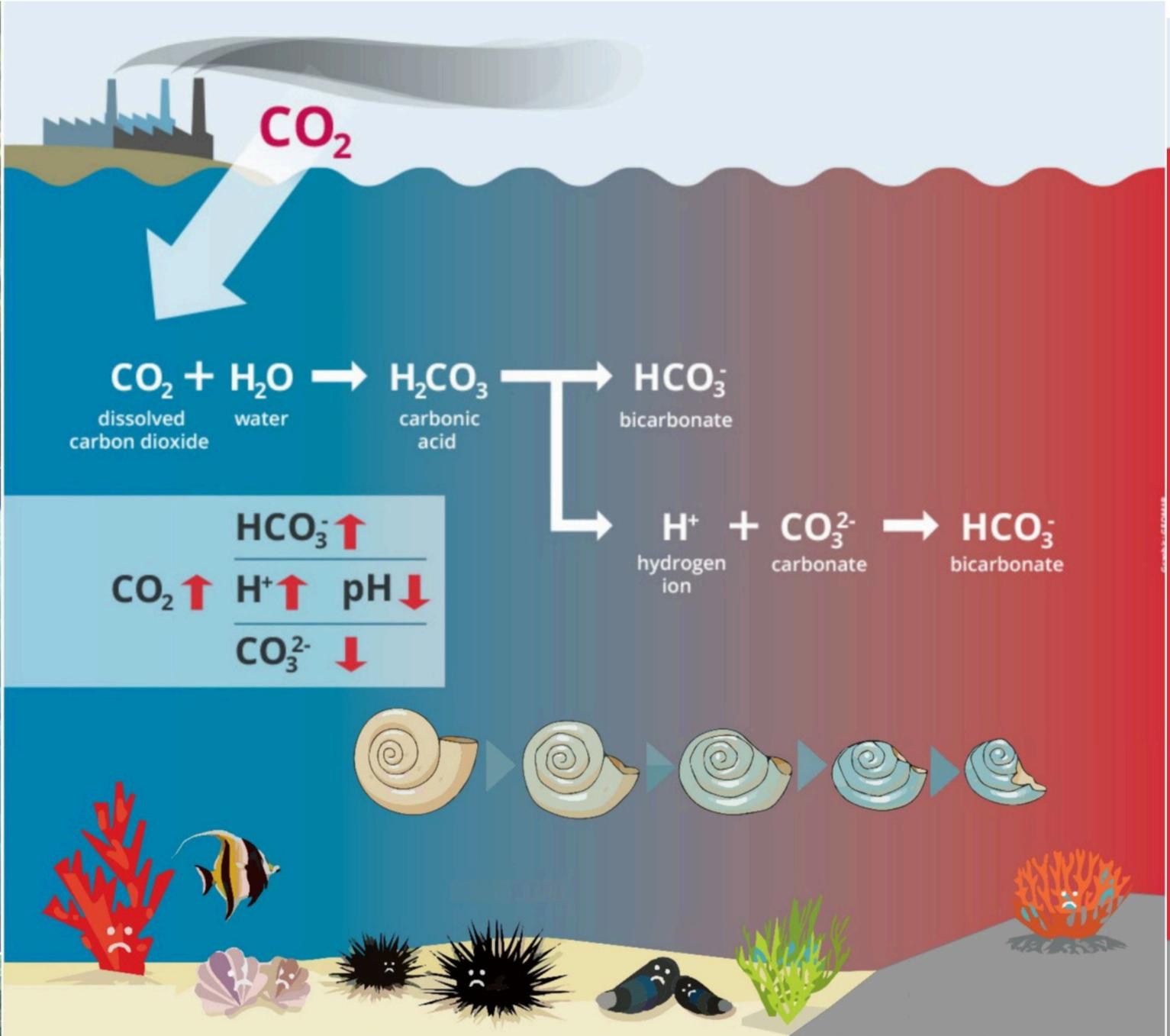


# OCEAN DIGEST



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*From the Editors' Desk*

As the last quarter of 2025 ushers in the winter season, the crisp air brings with it a sense of anticipation and renewed energy. This spirit was evident at INTROMET-2025, held at IITM Pune, where scientists and scholars gathered to exchange ideas on tropical meteorology and ocean science.

In this issue of *Ocean Digest*, we spotlight a landmark achievement: the first-ever reconstruction of seawater pH in the Indian Ocean using coral archives. The invited article, led by Dr. Waliur Rahaman and his geochemistry group at NCPOR, Goa, draws on boron isotope analysis of corals from Lakshadweep to trace oceanic pH changes from 1990 to 2015. This pioneering work underscores the value of corals as natural record-keepers of ocean processes.

Beyond their scientific significance, corals are also celebrated for their vibrant beauty. Dr. George Bubra, an eminent carbon cycle scientist and avid sea traveler, enriches this issue with a stunning collection of coral photographs from reefs across the globe—from the Great Barrier Reef to Hawaii—reminding us of the color and life they bring to marine ecosystems.

We also feature a technical article on the Marine Ballast System for India's human-occupied vehicle, Matsya-6000, authored by scientists from the National Institute of Ocean Technology, Chennai. This contribution highlights the engineering strides being made to support India's deep-sea exploration ambitions.

Adding to these scientific and technological highlights, we are proud to announce the *OSI Fellowship* and *Honorary Fellowship* to be awarded to three distinguished scientists. Their recognition stands as a testament to sustained excellence, mentorship, and pioneering contributions that continue to shape the future of ocean research.

Complementing this, the *OSI Postgraduate Dissertation Awards* honour young researchers whose innovative work in ocean science exemplifies the promise of the next generation. The awards will be presented to eight scholars across seven themes of ocean science and engineering. These awards highlight the creativity, rigor, and dedication of emerging scholars who are already contributing meaningfully to the field.

Finally, readers will find highlights from the special OSI Session at INTROMET-2025, capturing the lively exchanges and collaborative spirit that define our ocean science community.

Together, these contributions reflect the diversity of ocean research—from geochemical reconstructions to marine fauna to engineering innovations, fellowships, dissertation awards, and community dialogues. As winter sets in, may this issue inspire warmth, curiosity, and a deeper appreciation for the oceans that connect us all.

Yours faithfully,  
The Editorial Team



This issue's cover showcases the first-ever reconstruction of seawater acidity (pH) in the Indian Ocean using coral archives. Corals act as natural record-keepers, embedding subtle chemical signals in their skeletons that reveal how ocean conditions have changed over time. By analyzing boron isotopes, scientists can trace long-term shifts in pH, offering a window into the ocean's response to climate change. The image symbolizes both the vulnerability and resilience of coral reefs, reminding us that these living archives not only sustain marine ecosystems but also help us understand the past and prepare for the future.

## Millennial CO<sub>2</sub> Dynamics and the Emerging Acidification Trend in the Arabian Sea

### Invited Article



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### Abstract

The ocean is one of the Earth's biggest regulators of climate because it constantly exchanges CO<sub>2</sub> with the atmosphere and maintains a critical balance. But human activities have altered this natural balance. As more CO<sub>2</sub> from burning fossil fuels enters the air, a large part of it dissolves into the ocean, making seawater gradually more acidic, a process known as ocean acidification (OA). Computer model simulations predict future OA trends under various CO<sub>2</sub> scenarios, but these forecasts often come with large uncertainties. One of the most powerful approaches for reconstructing past ocean acidity is the measurement of boron isotopes ( $\delta^{11}\text{B}$ ) preserved in the shells of corals and foraminifera. Although this proxy is conceptually robust, its application is analytically demanding, and only a limited number of laboratories worldwide can achieve the high-precision  $\delta^{11}\text{B}$  measurements required for marine biogenic carbonates. We have now successfully applied this technique in India for the first time, analysing samples from the Arabian Sea. Our study offers two major insights: (a) how the tropical Indian Ocean exchanged CO<sub>2</sub> with the atmosphere over the last 136,000 years, and (b) how seawater pH has varied in recent decades. Using Lakshadweep corals, we have generated the first long-term pH record (1989–2013) from the western Indian Ocean. Surprisingly, this record does not show a clear long-term acidification trend despite rising atmospheric CO<sub>2</sub>. Instead, it exhibits large, rapid pH fluctuations “pH extremes” primarily driven by El Niño–Southern Oscillation (ENSO)–related changes in upwelling intensity. These strong natural swings pose serious threats to the resilience of coral reefs and other organisms that rely on stable seawater chemistry, particularly in a future with higher CO<sub>2</sub> and a warming climate.

### Introduction

Antarctic ice core records show that atmospheric CO<sub>2</sub> varied between ~180 and ~300 ppm during glacial and interglacials over the past 800,000 years (Luthi et al., 2008). These changes are thought to be driven mainly by how carbon moves between the deep ocean and the atmosphere, influenced by ocean circulation, upwelling, and biological activity (Sigman and Boyle, 2000; Sigman et al., 2010). However, the exact role of different ocean regions in controlling past CO<sub>2</sub> levels is still unclear. In modern times, some parts of the ocean act as major CO<sub>2</sub> sources, while others absorb large amounts of CO<sub>2</sub>. The Southern Ocean is known to influence long-term CO<sub>2</sub> changes, but the role of the tropical oceans has not been well constrained (Fig. 1a) (Fay et al., 2021; Gruber et al., 2009; Landschützer, 2023). We reconstructed surface ocean CO<sub>2</sub> in the Arabian Sea over the past ~136,000 years using boron isotopes in tiny marine shells of foraminifera. This record is the longest high-resolution CO<sub>2</sub> reconstruction from the tropical Indian Ocean. By comparing surface ocean CO<sub>2</sub> with atmospheric CO<sub>2</sub> from ice cores, we identified when the Arabian Sea acted as a CO<sub>2</sub> source or sink. Our results provide new evidence that the tropical Indian Ocean played an important role in releasing CO<sub>2</sub> to the atmosphere during past climate cycles (Fig. 1) (Tarique et al., 2023).

Since the Industrial Revolution (~1850 CE), atmospheric CO<sub>2</sub> has increased at an unprecedented rate and now exceeds 420 ppm (year of 2025 CE) (<https://gml.noaa.gov/ccgg/trends/>). This is far above the natural range of 180–280 ppm seen during past glacial-interglacial cycles. This rapid increase has also driven more CO<sub>2</sub>

into the surface ocean, lowering seawater pH by about 0.1 units. This process, known as ocean acidification (OA), poses a threat to marine organisms that build calcium carbonate shells or skeletons, such as corals, foraminifera, and brachiopods (Fig. 2a, b). Thus, understanding the impact of OA on these calcifiers is critical in predicting the future of these ecosystems (Gagnon et al., 2021; McCulloch et al., 2017).

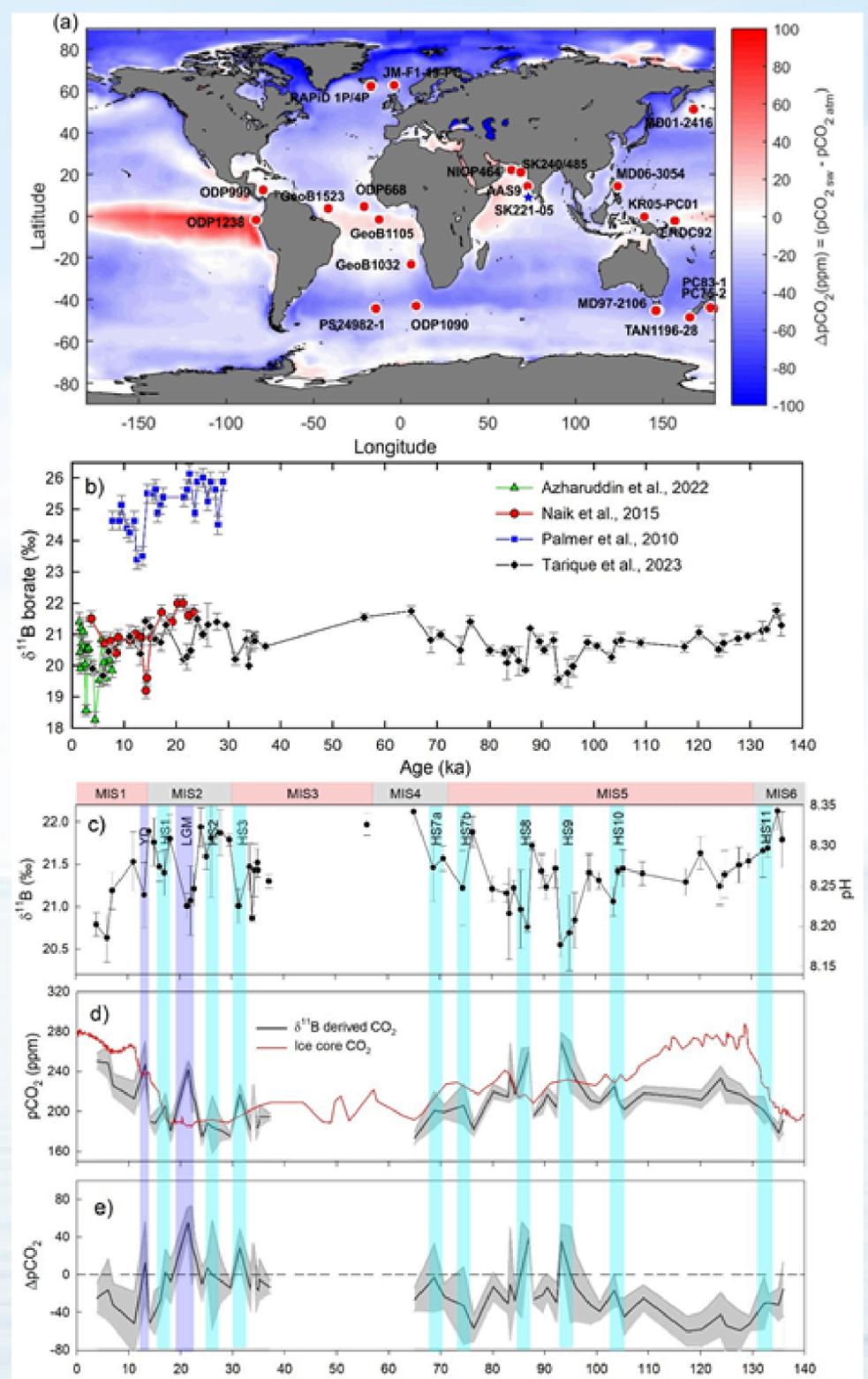


Fig. 1: Evaluation of surface  $\Delta\text{pCO}_2$  variability across global tropical oceans. (a) Modern surface ocean  $\Delta\text{pCO}_2$  map; red circle and blue star represent the location of published foraminifera  $\delta^{11}\text{B}$  records and our study, respectively. (b) Comparison of our  $\delta^{11}\text{B}$  record with all the available records from the Arabian Sea (Azharuddin et al., 2022; Naik et al., 2015; Palmer et al., 2010). (c) Our  $\delta^{11}\text{B}$ , (d) reconstructed  $\text{pCO}_2$  and (e)  $\Delta\text{pCO}_2$  record. The strong positive excursion events in  $\Delta\text{pCO}_2$  during the cold intervals, such as younger Dryas (YD), the LGM, and Heinrich Stadials (HS), are marked by colour bands.

Instrument-based long-term (multi-decadal scale) pH records of seawater are sparse and are restricted to the Pacific and Atlantic oceans. So, we have to rely on boron isotopes ( $\delta^{11}\text{B}$ ) in corals as a proxy for reconstructing past ocean pH. Coral-based  $\delta^{11}\text{B}$  records have been widely used to track ocean acidification from seasonal to millennial timescales, but no such long-term record existed for the Indian Ocean (Chen et al., 2019; D'Olivo et al., 2019; Rae et al., 2018; Wei et al., 2021; Wu et al., 2018). We have generated the first high-resolution pH record (1990–2013) from the Arabian Sea using  $\delta^{11}\text{B}$  from *Porites* corals collected in the Lakshadweep Islands. This record allows us to detect long-term ocean acidification trends in the Indian Ocean and to separate the influence of natural oceanographic processes from the impact of rising human-made  $\text{CO}_2$  (Tarique et al., 2021). This work highlights the first successful demonstration of boron isotope measurements using a state-of-the-art Multi Collector Inductively Coupled Plasma Mass Spectrometry (MC-ICPMS) in any laboratory in India. It has enabled us to generate the first long-term pH record from the Indian Ocean, providing crucial insights into how anthropogenic  $\text{CO}_2$  emissions are altering regional ocean chemistry.

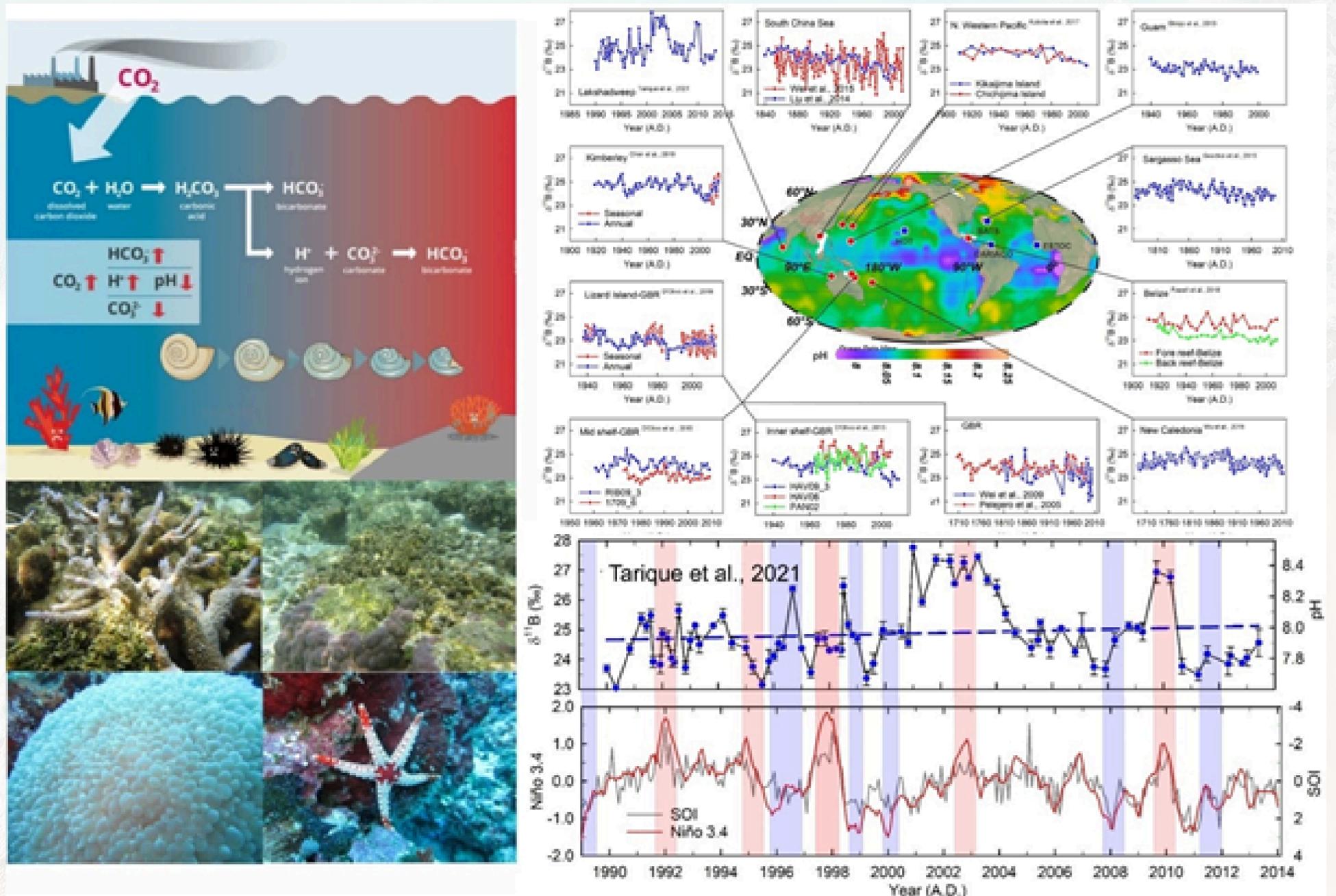
### Arabian Sea surface $\text{CO}_2$ record using $\delta^{11}\text{B}$ of planktic foraminifer record

In this study, we measured boron isotopes in the surface-dwelling foraminifera *Globigerinoides ruber* to reconstruct surface ocean pH and  $\text{CO}_2$  levels in the Arabian Sea over the past ~136,000 years. By comparing surface ocean  $\text{CO}_2$  with atmospheric  $\text{CO}_2$  from Antarctic ice cores, we calculated  $\Delta\text{pCO}_2$  (the difference between seawater and atmospheric  $\text{CO}_2$ ) to identify when the Arabian Sea acted as a  $\text{CO}_2$  source or sink. Our results show that the Arabian Sea released more  $\text{CO}_2$  to the atmosphere, up to about 50 ppm, during major cold periods such as the

Last Glacial Maximum (LGM), Heinrich Stadials (HS), and the Younger Dryas (YD). Several peaks in  $\text{CO}_2$  degassing also occurred during Heinrich Events HS1–HS3. Overall, the eastern Arabian Sea consistently behaved as a  $\text{CO}_2$  source during colder climate intervals. This pattern is consistent with the records from the tropical Atlantic Ocean. The enhanced  $\text{CO}_2$  release in the Arabian Sea was likely driven by stronger wind-induced upwelling and the upward movement of deep,  $\text{CO}_2$ -rich southern-sourced waters. These physical processes brought carbon-rich waters to the surface faster than marine productivity could absorb the excess  $\text{CO}_2$ . To fully understand the fate of this excess  $\text{CO}_2$ , more records from regions outside major upwelling zones in the tropical Indian Ocean are needed. When combined with tropical Atlantic evidence, our findings suggest that tropical oceans contributed relatively little to lowering atmospheric  $\text{CO}_2$  during cold climate periods, implying that extra-tropical oceans played a more important role as  $\text{CO}_2$  sinks. This work has been published recently by Tarique et al. (2023).

### Ocean acidification trend derived from the Lakshadweep coral $\delta^{11}\text{B}$ record

The boron isotope ( $\delta^{11}\text{B}$ ) values measured in Lakshadweep corals show a wide range, corresponding to seawater pH values between 7.93 and 8.65 (Fig. 2). This variation is far greater than measurement uncertainty, confirming that the corals captured real environmental changes. The high-resolution record (1990–2013) reveals strong year-to-year fluctuations in  $\delta^{11}\text{B}$  and pH, with pH swings of 0.4 to 0.6 units, similar to patterns observed in the Pacific and Atlantic Oceans (Tarique et al., 2021)



These large pH changes occur mainly at the timescale of ENSO (El Niño–Southern Oscillation) events, which influence temperature, currents, and CO<sub>2</sub> exchange in the Arabian Sea. Because of this strong natural variability, the expected long-term decline in pH from rising atmospheric CO<sub>2</sub> is not clearly visible in the coral record. In contrast, climate models for the region show a smoother, steadily decreasing pH trend with much smoother fluctuations. The mismatch between the coral data and model simulations highlights how strongly ENSO-driven processes control surface ocean pH in the Arabian Sea. If ENSO events become more frequent or intense in the future, as many models predict, extreme pH swings are likely to increase. These “pH extremes” pose a serious threat to corals and other marine organisms that depend on stable carbonate chemistry for building their skeletons.

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### BREATH OF EARTH, PULSE OF OCEAN: CARBON IN MOTION



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Science & Strategy  
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Lincoln, Nebraska,  
USA

George Burba is a leading bio-atmospheric scientist, author, and inventor—he's also an adventurer at heart. His groundbreaking work on how greenhouse gases, water vapor, and energy move between land and atmosphere has shaped global research, with his instruments and methods used across continents.

His books on micrometeorology and ecosystem-atmosphere exchange have become staples in university curricula worldwide—including institutions especially familiar to Indian researchers—cementing his role as both a scientist and educator of global reach.

When he's not advancing climate science, George is chasing waves and exploring coral reefs. An avid ocean traveler, he has surfed and snorkeled in exotic waters from the Pacific to the Caribbean, capturing the vibrant ecosystems of the Great Barrier Reef and beyond. His stunning photography brings these underwater worlds to life for readers of *Ocean Digest*, blending science with the spirit of adventure.





## Indigenous development of Main Ballast System for the Human Occupied Vehicle (MATSYA 6000)



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**The indigenous development of the Main Ballast System for India’s Human Occupied Vehicle (MATSYA 6000) marks a significant milestone in the nation’s deep-sea exploration capabilities. Designed to withstand extreme pressures at depths of up to 500 meters, this system ensures precise buoyancy control and operational safety for manned missions. By leveraging local expertise, advanced engineering, and rigorous testing, the project highlights India’s growing self-reliance in ocean technology. Beyond its technical achievement, the ballast system represents a strategic step toward unlocking the mysteries of the deep ocean, fostering scientific discovery, and strengthening India’s presence in global marine research.**

National Institute of Ocean Technology (NIOT), Ministry of Earth Sciences (MoES) is developing a Human Occupied Vehicle (HOV) for 6000m Water depth applications, under the Deep Ocean Mission. The vehicle is named as MATSYA 6000. MATSYA 6000 system capable of housing three personnel inside a 2.1m diameter spherical hull called as personnel sphere (PS). The spherical hull with necessary life support system and control electronics provides a safe envelope for the three personnel. MATSYA 6000 system has an exo - structure frame to carry all its subsystems including the PS. MATSYA 6000 is designed with an endurance of 12hrs subsea operation in normal conditions and 96 hrs in emergency conditions. Maximum speed of 3knots in forward direction and 1 knot in all other directions is envisaged for the MATSYA 6000. Ascent and descent motions shall be obtained using energy efficient Ballast system. Ballast system consists of Main Ballast system (MBS), variable Ballast System (VBS) and releasable ballast weights. Apart from ballast system, fixed ballast in the form of syntactic foam makes the MATSYA 6000 system float in sea water. Subsea maneuvering except ascent and descent motions can be achieved by eight electrical thrusters. Power for operation and control of MATSYA 6000 system comes from 120 - kwh Lithium Polymer batteries assembled in the exo - structure frame and a 5-kwh lead acid battery kept inside the spherical hull. Necessary electrical and electronics components are kept in four 6000m depth rated pressure bottles. Cameras, lights, communication, safety devices and scientific payloads form the rest of the subsystems for the MATSYA 6000 system. A three-dimensional model of the MATSYA 6000 system is shown in the Fig. 1 below.

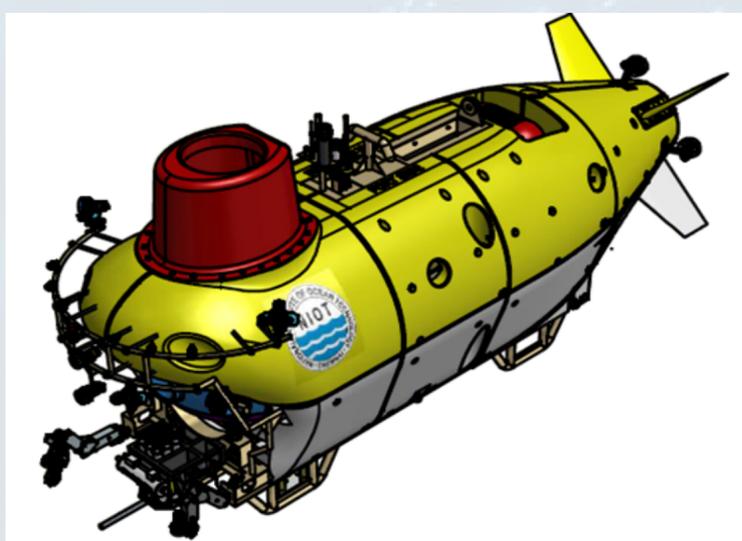


Fig.1 3D Model of the MATSYA 6000 system

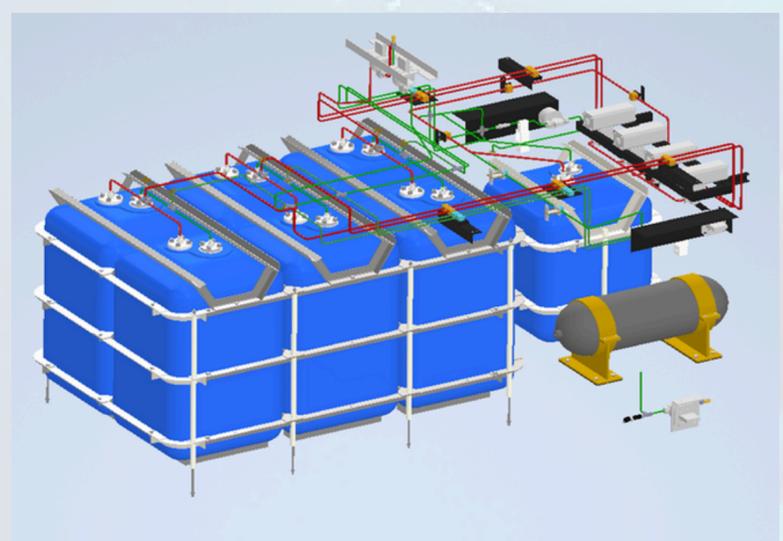


Fig 2. 3D model of Main Ballast System

One of the important working system of the MATSYA 6000 system is the main ballast system (MBS), which is responsible for the floatation of the MATSYA 6000 with free board of 1.5 m and decent motion of the MATSYA 6000. The free board is necessary for making the entry / exit hatch of PS to remain above the sea water level when it is floating at the sea surface. Descent motion of the MATSYA 6000 is achieved by filling the air-filled tanks of the MBS. After completion of the descent motion and survey, sampling etc at the required depth in sea the MATSYA 6000 system ascents back to the sea surface by dropping ballast weights. At sea surface a free board of 1.5 m can be achieved again by blowing the water in main ballast tanks (MBT) using compressed air. Finer adjustments of depth during ascent and descent motions can be achieved using the variable ballast system.

MBS consists of six tanks each having a volume capacity of 483 liter (l) and a seventh tank having volume capacity of 300 l. Total volume of water which can be filled inside these seven tanks is ~3200 l. All tanks have inside square cross section of 660 mm side with 1125 mm height for the six tanks and for the seventh tank height is 730 mm. MBS also has two 60 l compressed air cylinder having compressed air at 200 bar pressure as shown in Fig. 2. MBS water intake and blowing of compressed air are controlled by motorized ball valves. There are four vent valves in total which controls the water intake. One vent valve each for three tanks with 1125 mm height and one separate vent valve for the 730 mm height tank. One more manual vent valve kept on top of the MATSYA 6000 system for redundancy. Two blow valves control the air flow from compressed air cylinders. Additional valves for safety and emergency operations are also provided in the system. All the valves except the manual vent valve are assembled in a manifold. The valve manifold is housed in a pressure compensated housing.

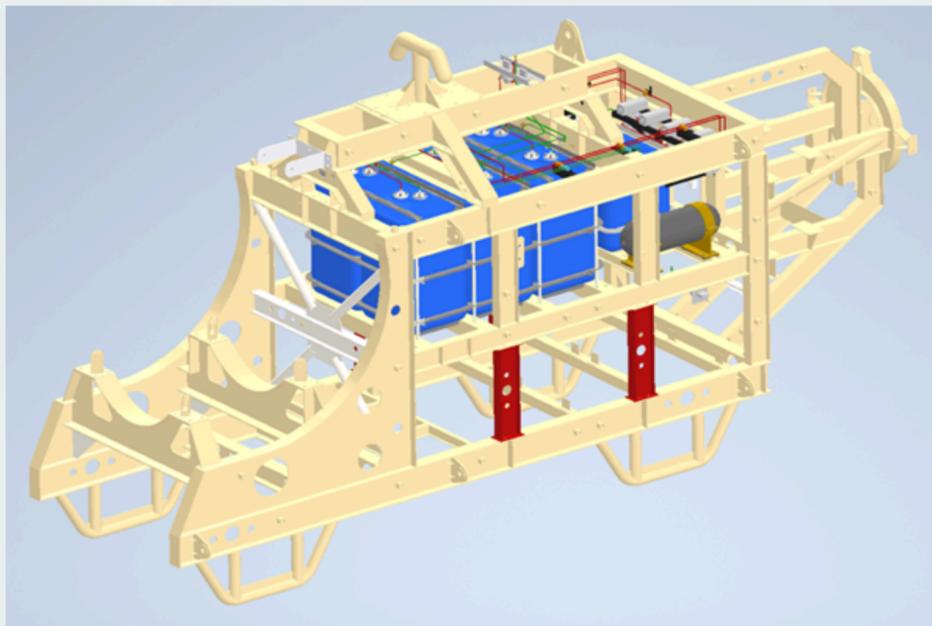


Fig. 3. Integration of MBS in MATSYA 6000 base frame



Fig. 4 (a) Integration of MBS in MATSYA 6000 (b) Six MBTs opened (c) Descent initiation by opening seventh MBT (d) MATSYA returns back to surface following blowing main ballast tanks using air from High pressure air tanks

The successful realization of the Main Ballast System for MATSYA 6000 demonstrates the power of indigenous innovation in advancing ocean science. It not only equips India with a critical tool for safe and sustainable deep-sea exploration but also reinforces the nation's commitment to technological sovereignty. As the vehicle prepares for future missions, the ballast system will serve as a cornerstone of reliability and resilience, enabling scientists to probe uncharted marine ecosystems and resources. Ultimately, this achievement reflects a broader vision—where India's engineering excellence and oceanographic ambition converge to expand the frontiers of human knowledge beneath the waves.

All seven MBT tanks are made of stainless steel as well as tested to an internal pressure of 1.5 bar. MBS uses 3/4- and 1-inch motorized ball valves that have been pressure tested to 50 bar. The high-pressure air tanks used for MBT blowing are rated for 200 bar internal pressure and have been tested with to 300 bar internal and 100 bar external pressure. Vent, blow and check valves rated for a minimum internal pressure of 200 bar are used in the development of MBS. Vent and blow valve manifolds are leak tested with compensated pressure prior to the sea water trials. The pressure transducer and hydraulic fittings are also tested up to 100 bar before being integrated into the MBS. Figure 3 shows the integrated MBS in MATSYA 6000.

As per the Concept of operations (CONOPS) all seven MBT tanks need to be filled with water before the MATSYA 6000's descent operation can begin. Following the deployment from the mother vessel, MATSYA 6000 will initially float with 1.5 m free board. When six tanks are filled the system will attain neutral buoyancy. When the seventh tank is filled MATSYA 6000 will start its descent with a velocity of 30m/min. During the descent operation the velocity of descent shall be controlled predominantly using ballast weights, finer adjustments using variable ballast system and the thrusters. After completion of subsea activity, the ascent motion initiated by dropping ballast weights at the bottom of the ocean.

The system is hydrostatically designed to have 1.5 m water column above the bottom opening of the MBT's. When the motorized vent valves and manually operated vent valve is opened, the air inside the MBT begins to vent out because of water flooding inside the tanks due to the water head available above the bottom opening of the MBT's. During the recent harbor trial of MATSYA 6000 system harbor model at L&T Kattupalli by integrating all components, as shown in Figure 4 (a) the indigenously developed MBS was tested for its functionality. During this harbor test when the six MBT tanks are filled, MATSYA 6000 achieved neutral buoyancy with 90% of the MBTs filled, or 2864 kg, as illustrated in Figure 4 (b). The time taken for filling six tanks is around 128 seconds (2 minutes and 8 seconds). After the pilot and scientists inside the personnel sphere completed the necessary pre-dive checks, the seventh tank of MBS is opened. The entire MATSYA 6000 system is submerged in 28 seconds after the seventh MBT tank is filled with water, as shown in Figure 4(c). Following the filling of all seven MBT, the vehicle attained negative buoyancy and began its descent.

After the completion of all the subsea tests and checks at 3 m water depth, high-pressure air is blown into MBTs, causing the water to drain until the MATSYA 6000 reaches its full free board in water. The time taken to blow out all seven tanks is around 136 seconds. Following the complete draining of water from the MBT, MATSYA 6000 achieved positive buoyancy and began to float on the surface with full free board, as shown in Figure 4(d). Thus, the indigenously developed MBS tested successfully during harbour trials. The design calculations of MBS are successfully verified during this test. With this successful validation of design, 500m depth rated MBS shall be developed in collaboration with industrial partners.

### Honorary Fellow of Ocean Society of India



**Sri Venkataraman Chander**, born in Brahmapur, Odisha on 16 December 1946, pursued Physics at Utkal University (BSc Hons, 1965) and Electronics & Electrical Communication Engineering at IIT Kharagpur (BTech Hons, 1968, First Class).

He later earned his MSc (Engg) by research in Electrical Engineering from the Indian Institute of Science, Bangalore in 1986, graduating with a perfect CGPA of 8.0/8.0.

Chander began his distinguished career at the Defence Research and Development Organization (DRDO) in 1969, serving until his retirement in 2006. Initially working on Electronic Warfare Systems at the Hyderabad laboratory (1969–75), he later joined the Naval Physical & Oceanographic Laboratory (NPOL), Cochin, where he rose to Director. Under his leadership, India achieved successful development, manufacture, and deployment of advanced sonar systems for ships, submarines, and helicopters. A passionate teacher, he trained ten batches of electronics scientists from DRDO and Singapore's Defence Science Organisation, with signal processing from first principles as his hallmark subject.

His 37-year career was recognized with numerous honors, including DRDO's Scientist of the Year Award (1987) and the VASVIK Award for Industrial Research in Electronics Systems (2005). He is a Fellow of the Indian National Academy of Engineering, Institution of Electronics & Telecommunication Engineers, Institute of Engineers (India), and the Ultrasonics Society of India.

Chander also founded the Ocean Society of India in 2006, serving two terms as President and initiating its flagship biennial conference, OSICON. His visionary leadership continues to inspire the Society. In recognition of his contributions to ocean technology and institution-building, OSI will confer its Honorary Fellowship on him at the World Ocean Science Congress in Goa, 24 February 2026.

### Fellow of Ocean Society of India



**Dr. Alakkat Sankaran Unnikrishnan** joined the CSIR–National Institute of Oceanography in 1985, dedicating his career to advancing oceanographic research. His work centered on sea level variability along the Indian coast and the dynamics of tidal propagation in estuaries

Through numerical modeling and observational analysis, he contributed significantly to understanding tides, storm surges, tsunamis, and long-term mean sea level changes. His pioneering studies on tidal dynamics in west coast estuaries remain influential.

Dr. Unnikrishnan's research on long-term sea level trends and extreme events has led to many reports of the Government of India for the National Communications Report on climate change impacts to the UNFCCC. Internationally, he played a vital role in the Intergovernmental Panel on Climate Change (IPCC), serving as Lead Author for the Fourth and Fifth Assessment Reports and Review Editor for the Sixth. His contributions formed part of the collective effort that earned the IPCC the Nobel Peace Prize in 2007, shared with Al Gore.

In the later stages of his career and post-retirement in 2015, he focused on internal tide dynamics in the eastern Arabian Sea and Bay of Bengal, combining continuous current observations with advanced modeling. He continues to share his expertise as Adjunct Alumni Faculty at Cochin University of Science and Technology, teaching physical oceanography.

With over 54 peer-reviewed publications, eight book chapters, and a co-edited volume on Extreme Natural Events, his scholarship is widely recognized, reflected in an h-index of 32 and multiple highly cited papers. In honor of his outstanding contributions to oceanography and climate science, the Ocean Society of India will confer upon him the OSI Fellowship on 24 February 2026 at Goa during the World Ocean Science Congress.

### Fellow of Ocean Society of India



**Dr. Chenicherry Revichandran**, born in Kannur, Kerala in 1962, is a distinguished oceanographer with MSc and PhD degrees in Oceanography from CUSAT.

He joined the CSIR–National Institute of Oceanography in 1987 as Scientist-B and rose to Chief Scientist during a career spanning over three and a half decades. His prolific research has advanced knowledge in estuarine dynamics, coastal processes, and coastal oceanography. He has led numerous R&D projects funded by MoES, BARC, and the Naval Research Board, including ecosystem modeling of the Cochin backwaters and 3D numerical modeling of the Cochin estuary. He has published 60 papers in peer-reviewed journals.

Beyond research, Dr. Revichandran has been an influential academic mentor, guiding 10 Ph.D. students and about 30 scholars and project assistants at CUSAT and Bharathidasan University. His expertise has been sought on Boards of Studies at CUSAT and KUFOS. Since 2023, he has served as an expert member of the Kerala Coastal Zone Management Authority, contributing significantly to the Coastal Zone Management Plan (CZMP-19) for Kerala.

A founder member of the Ocean Society of India (OSI), Dr. Revichandran has played a pivotal role in its growth and sustainability. He served multiple terms as General Secretary and remained on the Governing Council until 2024. His leadership was marked by successful coordination of OSICON-13 and OSICON-19, ocean modeling workshops, co-designing the OSI logo, and instituting the Society's first endowment award.

In recognition of his outstanding contributions to ocean sciences and organizational leadership, the Ocean Society of India will confer the OSI Fellowship on Dr. Chenicherry Revichandran on 24 February 2026 at Goa during the World Ocean Science Congress.

### OSI PG Dissertation Awards 2024

The details of the OSI PG Dissertation Awards for the year 2024 are given in the following Table.

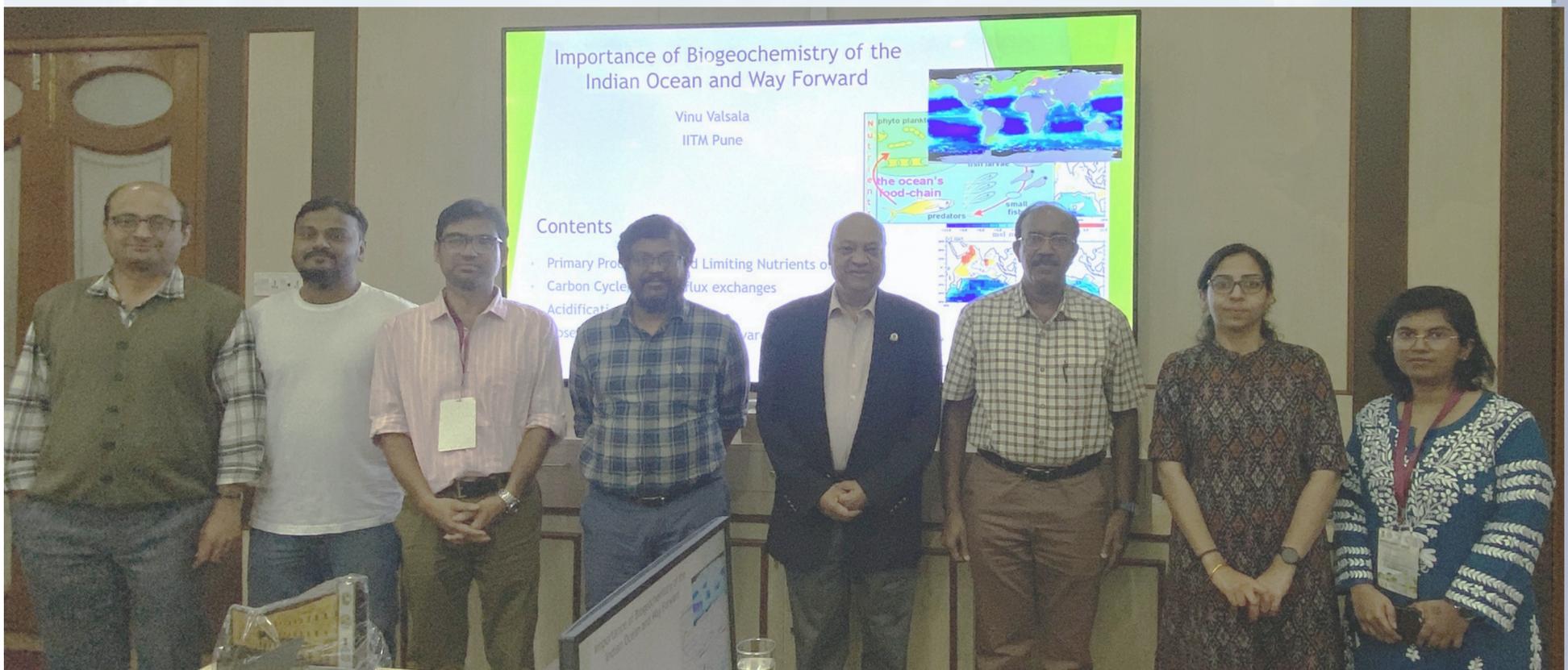
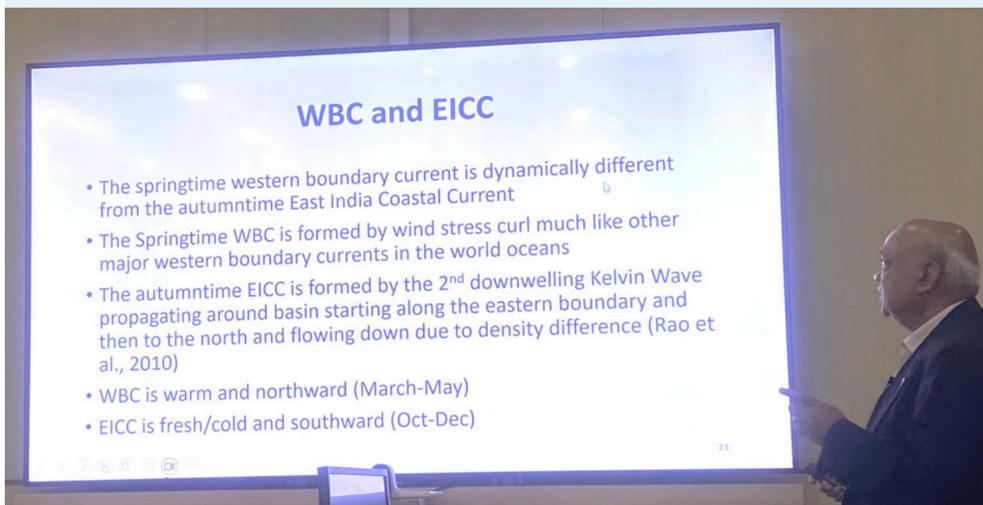
| Sl No | Theme   | Student Nominated for Award | Name of the Supervising Guide | Affiliation   |
|-------|---|-----------------------------|-------------------------------|---|
| 1     | Physical Oceanography                         | Bhushan Astik Shirwadkar    | Prof. Samiran Mandal          | IIT, Delhi  |
| 2     | Chemical Oceanography                         | Nisha R                     | Dr. Anu Gopinath              | KUFOS, Kerala   |
| 3     | Ocean Engineering & Technology                | Mandar Bharat Gavali        | Prof. Balaji Ramakrishnan     | IIT-Bombay  |
|       |   | Anand Vishnu B.             | Dr. M. Abdul Akbar            | NIT, Calicut, Kerala                                      |
| 4     | Ocean and Atmosphere                          | Deepti Dahiya               | Dr. Sandeep Pattnaik          | IIT, Bhubaneswar  |
| 5     | Marine Geophysics and Geological Oceanography | Sheetal Samal               | Dr. Raj Kumar Singh           | IIT, Bhubaneswar  |
| 6     | Marine Microbiology / Biotechnology           | Haripriya SS                | Dr. Femi Anna Thomas          | UC college, Aluva, Kerala                                 |
| 7     | Biological Oceanography                       | M. Sharumathi               | Dr. N. Jayakumar              | Fisheries College and Research Institute, Thoothukudi, TN |

### Report on the OSI Session at INTROMET-2025

The Ocean Society of India (OSI) Session was convened on 20 November 2025 during INTROMET-2025 at Aryabhata Hall, IITM, Pune. The session, chaired by Dr. C. Gnanaseelan, brought together a vibrant mix of invited talks, contributed presentations, and posters, reflecting the breadth of ongoing oceanographic research.

- Participation: A total of 26 abstracts were received, with 15 posters displayed. Three abstracts were rejected, and four presenters were unable to attend. The program featured three invited talks and three contributed talks, alongside poster presentations.
- Invited Talks:
  - Dr. Avijit Gangopadhyay provided a historical perspective on the Gulf Stream, linking it to recent findings on the East India Coastal Current (EICC) and its possible role as a western boundary current.
  - Dr. Vinu Valsala emphasized the significance of Indian Ocean biogeochemistry, particularly its implications for fisheries and ecosystem changes.
  - Dr. Anant Parekh presented new insights into shallow overturning circulation and intra-decadal variability since the 1940s.
- Contributed Talks:
  - Dr. Arnab Mukherjee discussed his thesis work on evaluating OGCM simulations of the observed EICC.
  - Ankit Sinha examined thermocline current variability along the eastern Arabian Sea continental slope.
  - Dr. Deepa J.S. highlighted the influence of the Southern Annular Mode (SAM) on the Indian Ocean.
  - Ankit Kumar Sharma analyzed decadal variability of tropical Indian Ocean heat content using century-long reanalysis data.

The session underscored OSI's commitment to fostering collaboration and advancing knowledge of Indian Ocean dynamics. Discussions were lively, with participants engaging deeply on themes ranging from circulation processes to biogeochemical variability. The chair encouraged attendees to strengthen ties with OSI, reinforcing the society's role as a hub for ocean science in India.



**Top Left:** Prof. Avijit Gangopadhyay presents an insightful lecture on the contrasting dynamics of the East India Coastal Current (EICC) and the western boundary current (WBC). His talk emphasized the seasonal drivers—winds in spring and Kelvin waves in autumn—and their distinct thermohaline signatures.

**Top Right:** Dr. C. Gnanaseelan felicitates Prof. Gangopadhyay with a token of appreciation, acknowledging his pioneering contributions to Indian Ocean circulation studies and his role in mentoring young researchers.

**Middle Right:** A detailed slide highlights the pervasive decadal variability in tropical Indian Ocean heat content. The analysis demonstrated consistent links between heat content fluctuations and a wide range of oceanic and atmospheric processes, from SST and IOD to overturning circulation and mesoscale activity.

**Middle Left:** Participants engage in lively discussions.

**Bottom:** A group photograph captures the spirit of collaboration at the OSI Session. The gathering reflected OSI's mission to foster community, encourage interdisciplinary dialogue, and advance understanding of Indian Ocean dynamics.

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We'd love to hear from you! Please feel free to send your comments, criticism, feedback, and contributions to: [osioceandigest@gmail.com](mailto:osioceandigest@gmail.com).