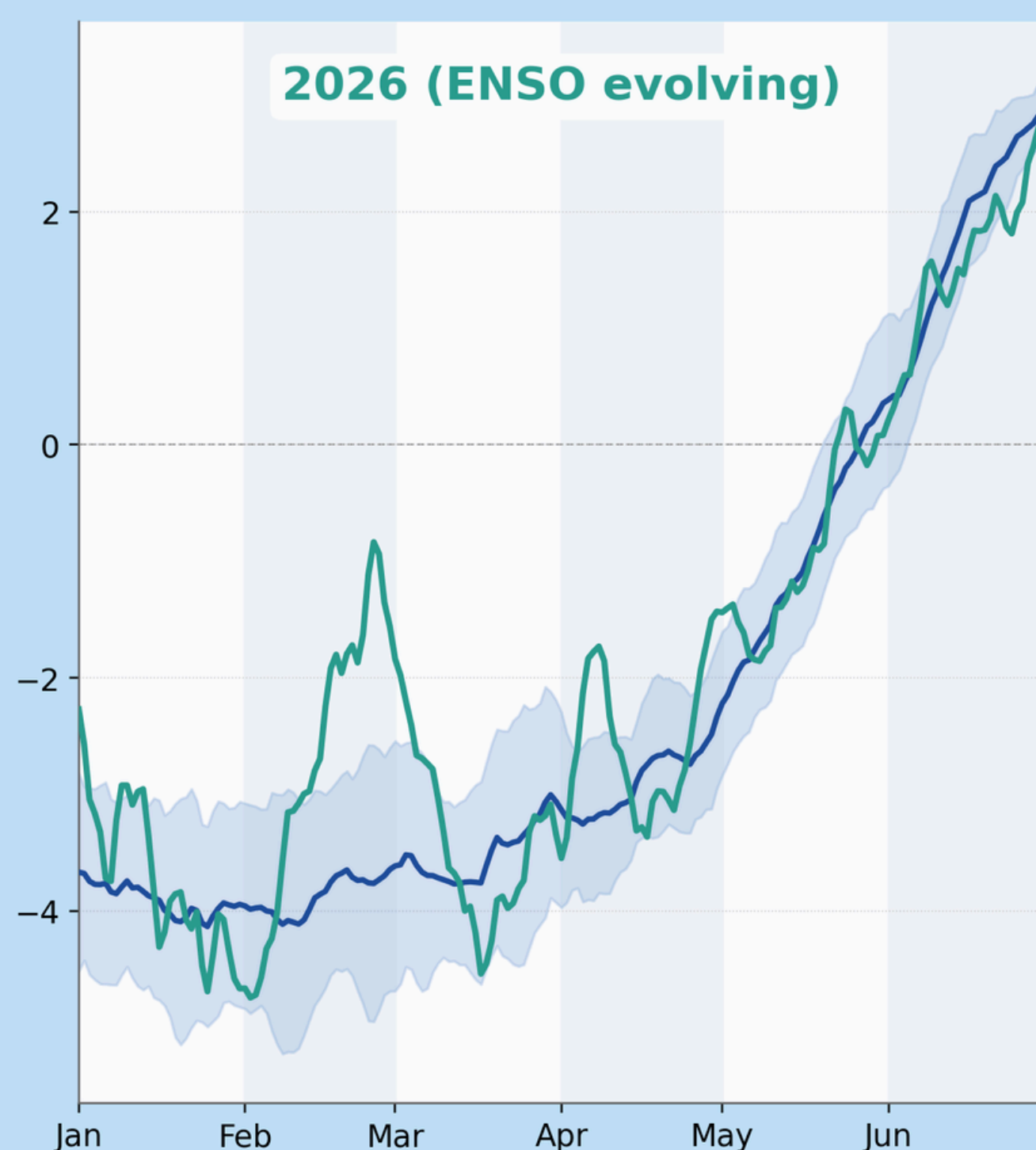
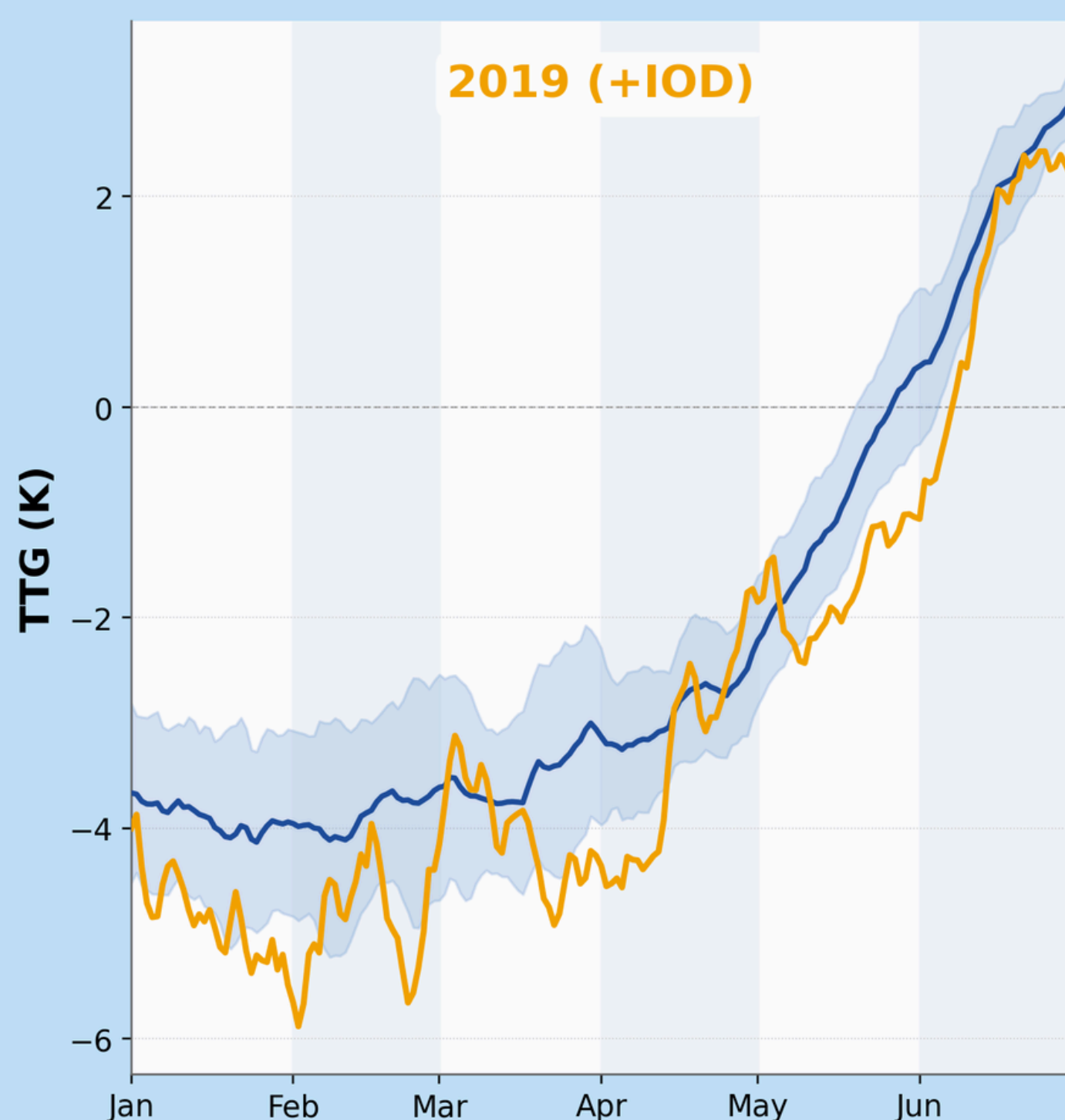
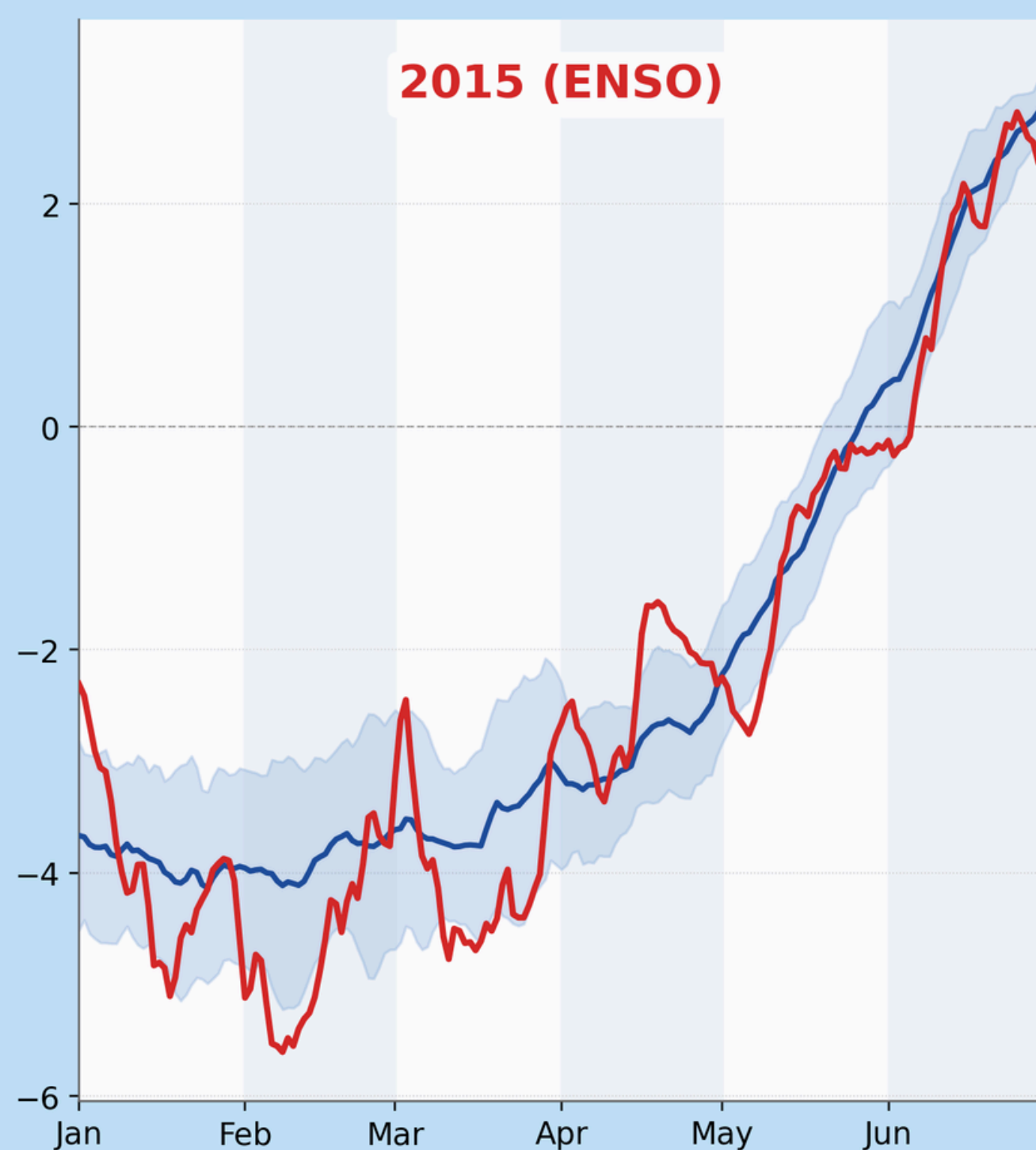
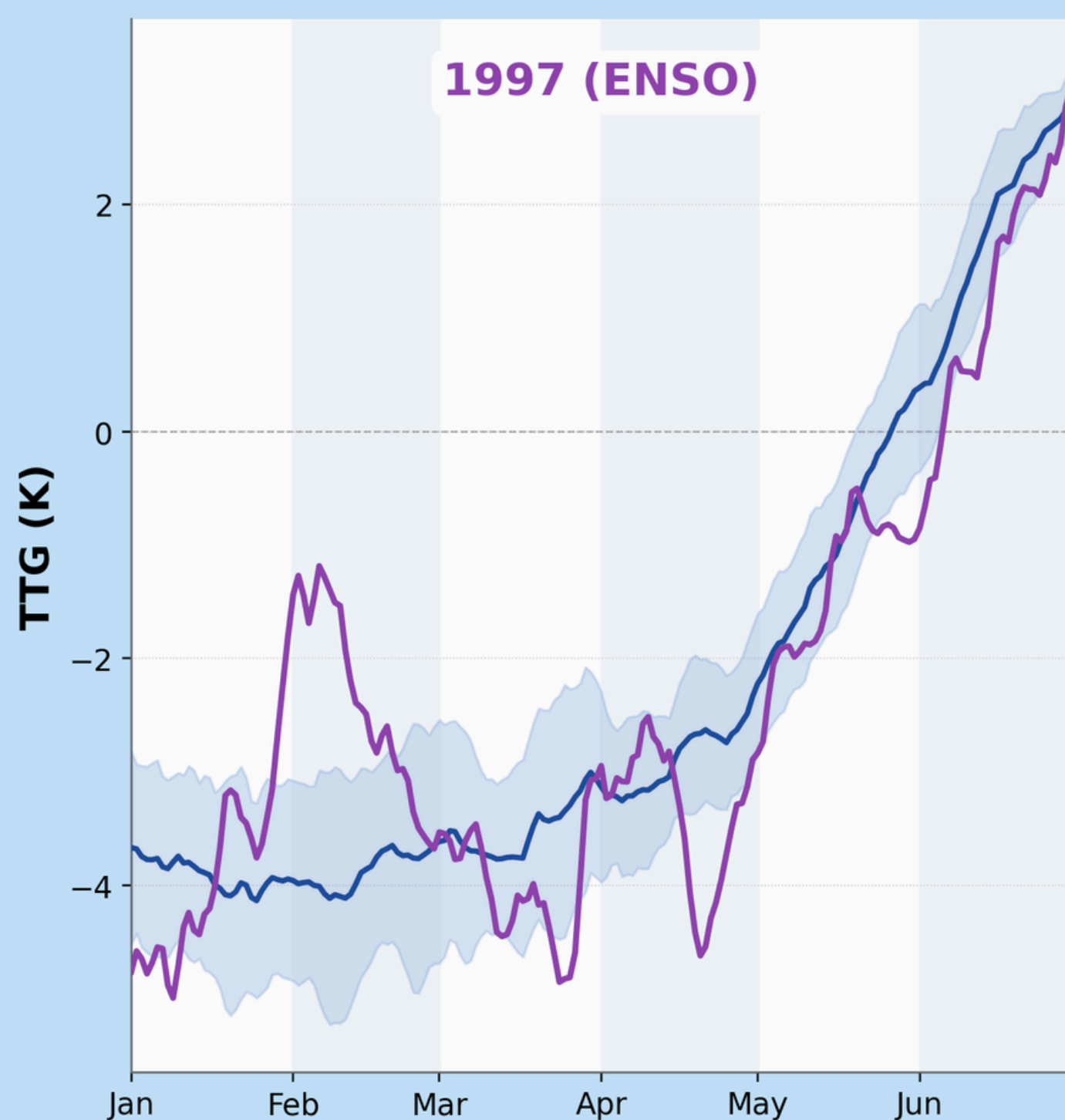


OCEAN DIGEST



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— Climatological mean	— 1997 (ENSO)	— 2015 (ENSO)
— Climatology $\pm 1\sigma$ (2005-2026)	— 2019 (+IOD)	— 2026 (ENSO evolving)

From the Editors' Desk

The second quarter issue of Ocean Digest brings together diverse strands of ocean science and climate inquiry. Our invited article introduces an innovative geoengineering approach to surface ocean carbon capture, where biodegradable “floating flakes” are being tested as nutrient carriers to stimulate phytoplankton growth. This pioneering work, led by scientists from the CSIR–National Institute of Oceanography, Goa, opens a fresh line of exploration into ocean-based carbon sequestration.

Equally significant is the newly released National Report by Centre for Marine Living resources and Ecology, Kochi which highlights India’s vast but underutilized deep-sea and distant-water fishery resources within the Exclusive Economic Zone. While coastal fisheries remain heavily exploited, the report underscores the untapped potential of deep-sea stocks such as tunas, myctophids, and demersal species, pointing to opportunities for sustainable expansion within the Blue Economy framework.

This issue also turns to the monsoon of 2026, predicted to be subdued under the influence of El Niño. June rainfall was markedly reduced, and the student article featured on our cover provides a thoughtful analysis of this behaviour. By computing the tropospheric temperature difference between South Asia and the Indian Ocean, the study offers a fresh perspective on how large-scale climate drivers shape regional monsoon dynamics. The comparison with three past El Niño years and a positive IOD year enriches the analysis, while the accompanying animation vividly illustrates the concept of the tropospheric temperature gradient. This contribution exemplifies the curiosity and rigor of young researchers, and we are delighted to showcase their work as a highlight of this issue.

Other features include reports on World Oceans Day celebrations by OSI Delhi/NCR and Pune chapters, and coverage of the recently held workshop on Indian Ocean–Monsoon Climate: Annual to Decadal Variability, Mechanisms, and Predictability. Together, these contributions reflect the breadth of inquiry and community engagement that Ocean Digest seeks to foster—linking innovative science, national priorities, and the enthusiasm of the next generation in celebrating our oceans.

Yours faithfully,
The Editorial Team



Cover page: The figure illustrates the evolution of the Tropospheric Temperature Gradient (TTG) from January to June, highlighting its behaviour during major climate events—El Niño years (1997, 2015, and 2026) and a positive Indian Ocean Dipole (+IOD) year (2019)—in comparison with the climatological mean and variability (2005–2026). The TTG, expressed in Kelvin, represents the thermal contrast between the tropospheric region over South Asia and the adjoining Indian Ocean, serving as a sensitive indicator of large-scale convective and radiative processes.

During El Niño years, a distinct pattern of anomalous tropospheric heating emerges around February–March. The 1997 and 2015 curves exhibit strong positive departures from the climatological mean. The current year, 2026, officially declared an El Niño year, has been examined to assess whether this springtime heating follows a similar dynamical progression. The 2026 TTG profile indeed reveals pronounced warming, reaffirming the characteristic behaviour of springtime tropospheric heating associated with El Niño evolution.

In contrast, the 2019(+IOD) year displays a markedly subdued warming, with TTG values remaining close to the climatological envelope through early spring. This divergence underscores the differing atmospheric responses between Pacific and Indian Ocean modes of variability. Overall, the comparative analysis emphasizes how El Niño-induced tropospheric heating contrasts sharply with the relatively neutral TTG behaviour during positive IOD conditions, offering insights into the interplay of tropical ocean–atmosphere dynamics.

Cover design: Pranav Patil

Invited Article

Can Floating Flakes Help the Ocean Capture More Carbon?

Experiments in the eastern Arabian Sea test a biodegradable, slow-release approach to nourishing plankton—while showing why short-term surface uptake is not the same as lasting carbon sequestration.



Suhas Shetye



Siby Kurian



Damodar M. Shenoy

and colleagues at CSIR–National Institute of Oceanography

At first glance, the flakes may appear deceptively straightforward. They possess a lightness that allows them to stay near the ocean's surface and are composed of rice husk, lignin, and iron-rich red mud. However, their function addresses a key challenge in ocean fertilization: how to provide growth-limiting nutrients to microscopic marine plants without those nutrients quickly vanishing due to dilution, scavenging, or sinking.

The ocean currently absorbs approximately a quarter of the carbon dioxide emitted by human activities. This uptake is partly facilitated by phytoplankton, which utilize sunlight and dissolved carbon dioxide to create organic matter. Some of this carbon may eventually descend into deeper waters via the biological carbon pump. This has sparked interest in ocean-based carbon dioxide removal strategies, including the introduction of nutrients that promote plankton growth. However, traditional fertilization methods typically deliver nutrients in a brief surge, leading to rapid dispersion, uneven biological responses, and unpredictable outcomes.

The buoyant-flake concept adopts a different strategy. Rather than releasing nutrients all at once, the flakes are engineered to remain in the sunlit surface layer, gradually providing bioavailable iron and silicate. Iron is essential for photosynthesis and various cellular functions, while silicate is crucial for diatoms to construct their glass-like cell walls. The eastern Arabian Sea serves as a suitable testing site due to its nutrient-poor surface waters outside the monsoon season.

Testing slow-release nutrient delivery at sea

Researchers commenced their evaluation of the flakes in shipboard microcosms, employing surface seawater collected from four distinct locations in the eastern Arabian Sea (Figure 1). They monitored bottles containing varying amounts of flakes for a span of five to seven days. Following this, the team transitioned to a larger mesocosm experiment that lasted eight days at station G17. The floating enclosures contained approximately 4,100 litres of natural seawater, which facilitated the observation of an intact plankton community's response under semi-controlled conditions. Five of these enclosures were treated with flakes, while one was not subjected to any treatment. The team conducted a comprehensive analysis during the experiment, measuring nutrients, dissolved ferrous iron, chlorophyll a, diagnostic pigments, plankton abundance, bacterial community composition, total organic carbon, and carbonate chemistry. This wide array of measurements allowed for the observation of nutrient release as well as the biological and chemical changes that ensued.

The experiments show that controlled nutrient release can alter surface-ocean biology and carbon chemistry. They do not yet demonstrate long-term carbon removal.

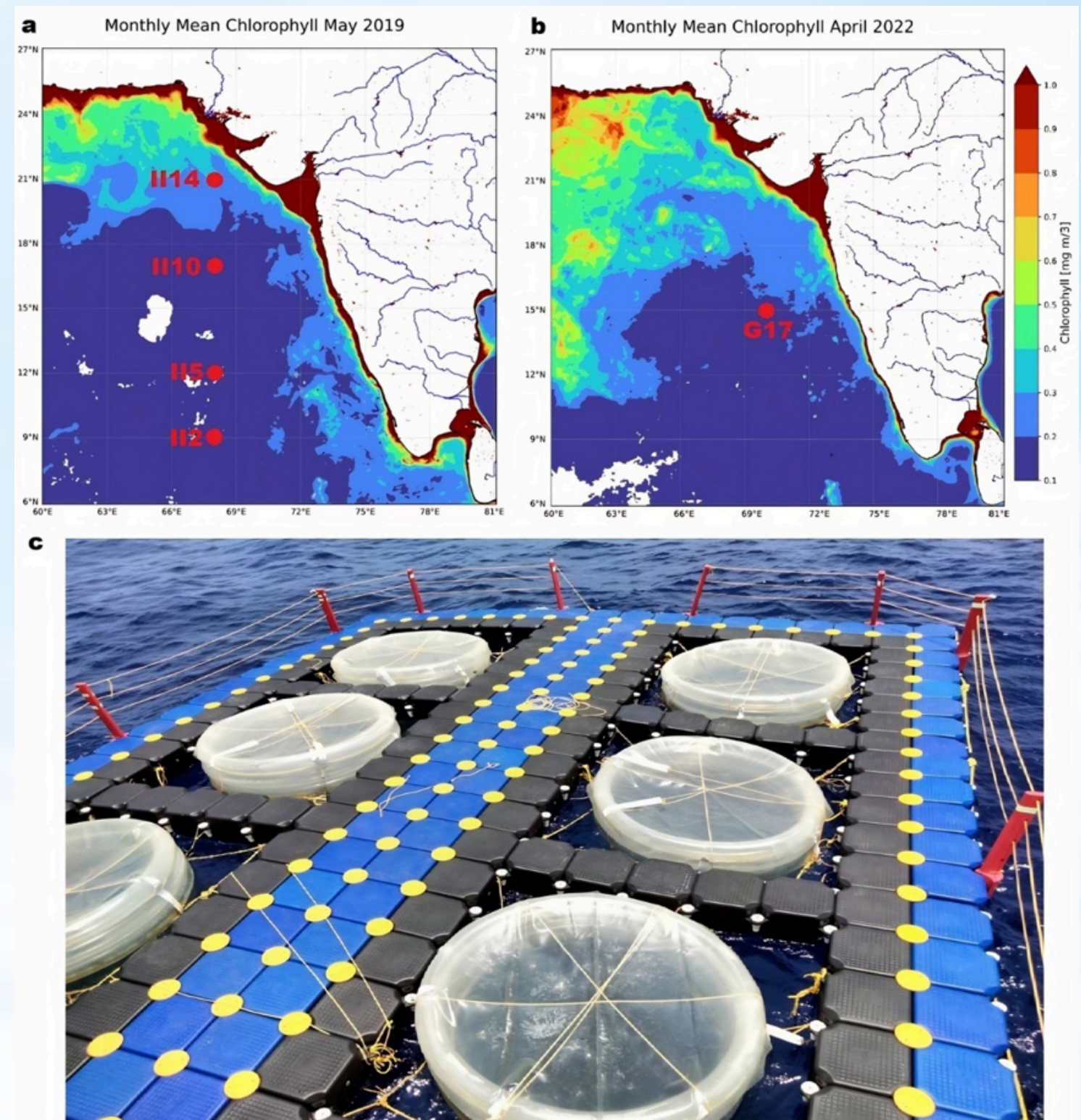


Figure 1. The study combined shipboard incubations (a) in the eastern Arabian Sea with a floating mesocosm experiment at station G17 (b). The enclosures contained approximately 4,100 litres of ambient seawater.

A measurable response—but not a dramatic bloom

The flakes performed their intended function by gradually providing nutrients. Dissolved iron experienced a temporary increase, while silicate levels remained elevated for a longer duration. In the smaller bottle experiments, a higher density of flakes correlated with increased levels of silicate, phosphate, and ammonium. This response demonstrated that a buoyant material can serve as a long-term nutrient-delivery system in oligotrophic seawater.

The biological changes observed were genuine, albeit modest. There was a slight increase in chlorophyll a, and fucoxanthin—a pigment typically linked to diatoms—also showed an increase in the treated enclosures. Although dinoflagellates continued to be the predominant phytoplankton group, diatoms such as *Chaetoceros*, *Nitzschia*, and *Navicula* became more prevalent in areas where flakes were introduced. Additionally, bacterial communities underwent shifts, suggesting that the added nutrients influenced multiple components of the surface-ocean food web.

Simultaneously, the carbon chemistry of the water underwent changes. Total organic carbon and pH levels rose, while surface-water pCO_2 decreased by approximately 18 μatm after about 100 hours. Collectively, these findings align with an enhanced short-term biological uptake of carbon dioxide in the treated water.

Why surface carbon uptake is not yet sequestration

The differentiation is essential. Merely removing carbon dioxide from the surface for a few days does not ensure that the carbon will be sequestered away from the atmosphere. For it to be classified as effective carbon dioxide removal, the newly generated organic matter must exit the surface mixed layer, descend to a depth where it remains isolated for a significant duration, and prevent rapid reversion to carbon dioxide.

This research did not assess particle export beneath the mixed layer or the long-term storage of carbon. The experiments were also of short duration, and each mesocosm treatment was represented by a single enclosure. The scarcity of nitrogen and grazing pressure limited phytoplankton growth, indicating that the addition of iron and silicate alone cannot surpass the numerous interacting factors that influence ocean productivity. Furthermore, environmental safety, nutrient release behavior over extended periods, and unintended alterations in food-web structure must be investigated before considering any large-scale implementation.

A platform for the next generation of field experiments

The importance of this work is not primarily in asserting a new carbon-removal technology, but rather in showcasing a potentially beneficial experimental platform. A material that remains close to the surface and gradually releases nutrients could enable researchers to manage the timing and intensity of enrichment more effectively than a single nutrient application. Additionally, it may facilitate the examination of how various plankton communities react to a continuous, low-level nutrient supply.

The subsequent phase involves transitioning from proof of concept to thorough field validation. Extended and fully replicated studies are necessary to quantify nutrient-release rates, assess the potential for carbon export beneath the mixed layer, identify where that carbon is remineralized, and analyze ecological impacts across plankton, microbes, and grazers. Only after these steps can we determine whether buoyant flakes can play a role in responsible ocean-based carbon dioxide removal, or if their primary utility lies in serving as a controlled instrument for investigating the biological carbon pump.

Currently, the experiments conducted in the eastern Arabian Sea provide a cautious yet promising outcome: eco-engineered flakes are capable of maintaining the delivery of iron and silicate, altering segments of the plankton community, and generating observable short-term variations in surface carbon chemistry. They also emphasize an equally crucial insight for ocean-climate research—enhanced carbon uptake at the surface is merely the initial phase of the sequestration narrative.

Read the full paper;
Eco-Engineered Buoyant Flakes as a Controlled Nutrient-Delivery Platform: Mesocosm Evidence for Nutrient Release and Short-Term Surface Carbon Responses,” Frontiers in Climate (2026).

Full author team: Suhas Shetye, Damodar M. Shenoy, Anil Pratihary, Siby Kurian, Samir Damare, Mangesh Gauns, Sidhesh Borker, Adnan Shaikh, Bhagyashri Naik, Kuniyil Nandakumar, Sethu Lakshmi, Supriya G. Karapurkar, Anand Methar, Natasha Barnes and Uthara Nambiar. Correspondence: dmsHENoy.nio@csir.res.in

Unlocking the potential of India's Deep Ocean: CMLRE releases the National Report on Deep-Sea and Distant-Water Fishery Resources of the Indian EEZ



Sahina Akter¹



Purbali Saha¹



Meera KM¹



Davood Nihal¹

¹ Centre for Marine Living Resources and Ecology (CMLRE), Ministry of Earth Sciences (MoES), Government of India, Kochi, Kerala, India

India's Exclusive Economic Zone (EEZ), spanning over 2.37 million km², encompasses a remarkable diversity of marine ecosystems ranging from productive continental shelves to vast deep-ocean habitats that remain among the least explored regions of the Indian Ocean. While coastal fisheries have long supported food security and livelihoods, growing pressures on nearshore resources and increasing demand for marine protein have renewed scientific interest in understanding the ecological significance, resource potential, and sustainable management of deep-sea ecosystems. Recognizing this emerging potential, the Centre for Marine Living Resources & Ecology (CMLRE), Ministry of Earth Sciences (MoES), Government of India, released the “National Report on Deep-Sea and Distant-Water Fishery Resources of the Indian EEZ” during the institute's Silver Jubilee celebrations, marking 25 years of dedicated contributions to marine science and ocean research.

The report brings together nearly four decades of multidisciplinary investigations conducted under the Marine Living Resources Programme (MLRP), drawing extensively from exploration onboard the Fishery and Oceanographic Research Vessel- FORV Sagar Sampada. She served as India's premier platform for marine living resource investigations, undertaking fisheries surveys, biodiversity assessments, oceanographic observations, and ecosystem studies across the Arabian Sea, Bay of Bengal, Andaman waters, and adjacent oceanic regions. The resulting datasets constitute one of the most comprehensive long-term records of deep-sea living resources available from the Indian Ocean and provide an invaluable foundation for understanding ecosystem variability, environmental change, and marine resource dynamics.

A major scientific focus of the report is the assessment of mesopelagic ecosystems, often referred to as the ocean's twilight zone, which extends between approximately 200-1000 m in depth. These ecosystems have dense biological communities known as Deep Scattering Layers (DSLs), composed of fish, shrimps, cephalopods, and zooplankton that undertake extensive daily vertical migrations. These migrations represent one of the largest synchronized biological movements on Earth and play a critical role in transferring carbon from surface waters to the deep ocean through the biological carbon pump. One of the dominant organisms in these ecosystems is the myctophid (lanternfish), which constitutes a substantial fraction of global fish biomass and serves as an important link between lower trophic levels and higher predators. Long-term investigations have improved understanding of their distribution, abundance, ecological significance, and potential contribution to future fisheries resources.

The report also highlights a significant understanding of India's deep-sea biodiversity and unique marine habitats. Surveys conducted through FORV Sagar Sampada have documented diverse faunal communities associated with continental slope ecosystems, mesopelagic habitats, and ecologically significant regions such as the Terrace off Trivandrum (ToT). The report also emphasizes the importance of vulnerable marine ecosystems and the need to continue exploring biodiversity-rich deep-sea habitats that remain poorly understood. The report also provides insights into the Oxygen Minimum Zones (OMZs) in the northern Indian Ocean, which have revealed how low-oxygen environments influence species distribution, ecosystem functioning, nutrient cycling, and fishery productivity under changing climatic conditions.

The report underscores the importance of adopting Ecosystem-Based Management (EBM) approaches that balance resource utilization with biodiversity conservation and ecosystem resilience. It also highlights the growing role of emerging technologies, such as environmental DNA (eDNA), advanced acoustics, artificial intelligence, autonomous platforms, and ecosystem modeling, in improving our understanding of marine ecosystems and supporting science-based management decisions. The significance of this report extends beyond fisheries science. It integrates long-term biological, ecological, and oceanographic observations and contributes to a broader understanding of Indian Ocean ecosystem processes and their responses to environmental variability and climate change. The objective of this report aligns closely with India's Vision 2047, which seeks to strengthen the Blue Economy through innovation, scientific leadership, and sustainable resource utilization, while also supporting international commitments under Sustainable Development Goal 14 (Life Below Water) and the UN Decade of Ocean Science for Sustainable Development.



Release of the National Report on Deep-Sea and Distant-Water Fishery Resources of the Indian EEZ during the Silver Jubilee celebrations of CMLRE.

More than a scientific assessment, this report reflects the collective efforts and dedication of generations of scientists, researchers, technical personnel, vessel crews, and collaborating institutions who have spent decades exploring India's deep ocean. As global interest in deep-sea resources, ecosystem services, biodiversity conservation, and climate resilience continues to grow, the report provides a valuable scientific foundation for future research, evidence-based policymaking, marine spatial planning, and responsible stewardship of marine living resources in the Indian Ocean. It also serves as a reminder that sustained ocean observations remain essential for revealing the complexities of deep-sea ecosystems and guiding their sustainable use for generations to come.

Read the full report:

Hashim, M., Smitha, B. R., Rajeeshkumar, M. P., Meera, K. M., Saha, P., Akter, S., Kar, C., & Nihal, D. (2025). National Report on Deep-Sea and Distant-Water Fishery Resources of Indian EEZ. Edited by V. N. Sanjeevan and B. Ingole. Centre for Marine Living Resources & Ecology (CMLRE), Ministry of Earth Sciences, Government of India, Kochi, India, 191 pp.

Authors: Dr. Hashim Manjebrayakath, Dr. Smitha B. R., Dr. Rajeeshkumar M. P., Dr. Meera K. M., Dr. Purbali Saha, Dr. Sahina Akter, Dr. Chinmay Kar, and Dr. Davood Nihal.

Editors: Dr. V. N. Sanjeevan and Dr. Baban Ingole

Tropospheric Temperature and the Indian Monsoon: Across the Scales

Student Article

Pranav Patil¹Diyan Maner²

¹ Department of Atmospheric and Space Sciences, Savitribai Phule Pune University, Pune;
² Vishwakarma Institute of Technology, Pune

During the boreal summer, the atmosphere over South Asia warms mainly because of the heat released when water vapour condenses to form rain. This process continues throughout the summer monsoon season (June to September), supporting widespread rainfall across the Indian subcontinent. During the boreal winter, the situation reverses: the atmosphere over South Asia cools while the Southern Hemisphere warms, leading to extensive rainfall over regions stretching from South Africa to Australia. These seasonal changes in atmospheric temperature are a fundamental part of Earth's climate system and play an important role in sustaining the Indian summer monsoon.

For many years, the Indian monsoon was explained mainly by the land–sea thermal contrast. According to this idea, the land heats up faster than the surrounding oceans during summer, creating a pressure difference that draws moist oceanic winds over the subcontinent. While this explanation captures the broad picture, it has an important limitation. During the peak monsoon months, the land often becomes cooler because of persistent cloud cover and rainfall, yet the monsoon circulation remains active.

To explain this apparent contradiction, Xavier et al. (2007) proposed the Tropospheric Temperature Gradient (TTG) concept. They argued that the temperature difference in the middle and upper atmosphere—rather than the surface temperature difference between land and sea—is a more reliable driver of the monsoon. TTG is defined as the difference in average tropospheric temperature between a northern region (covering much of South Asia) and a southern region (covering the equatorial Indian Ocean). Their study demonstrated that TTG correlates much better with monsoon strength and variability than conventional surface temperature or pressure-based indices, making it a valuable tool for understanding and monitoring the Indian summer monsoon.

The usefulness of TTG extends far beyond present-day weather. It has been successfully applied to understand monsoon variability over timescales ranging from centuries to thousands of years. For example, Kumar et al. (2021) used TTG to study the transition from the last glacial period to the present warm period. By combining climate simulations with observational datasets, they showed that temperature changes originating in the Southern Ocean could influence the tropical Indian Ocean, alter TTG, and ultimately affect Indian monsoon rainfall. Their work established TTG as an important physical link connecting Southern Ocean climate variability with the strength of the Indian summer monsoon over millennial timescales.

On shorter, centennial timescales, Chakraborty et al. (2012) reconstructed monsoon variability using oxygen isotope records preserved in Pacific corals. Their study showed that long-term changes in tropical Pacific sea surface temperatures influenced TTG, which in turn affected Indian monsoon rainfall. By combining coral-derived climate records with TTG, they demonstrated how distant oceanic changes can leave a clear imprint on the Indian monsoon.

In a recent study, Kumari et al. (2026) showed that TTG is also useful for understanding monsoon behaviour on much shorter, seasonal timescales. Using rainfall isotope measurements collected from the Andaman Islands, they estimated the dates of monsoon withdrawal during 2020 and 2021. These independently estimated dates agreed remarkably well with those obtained using the TTG method.

The study also revealed an interesting feature of the atmosphere. During mid-October 2021, the amount of water vapour over the region increased sharply for a short period. This temporary surge delayed the withdrawal of the monsoon by several days. Both the rainfall isotope record and the TTG captured this event clearly, demonstrating their sensitivity to subtle changes in atmospheric moisture. Such observations highlight the ability of precipitation isotopes to record changes in the moisture supply and monsoon circulation—information that can also be preserved in long-lived natural archives such as cave formations and corals.

Taken together, these studies demonstrate the remarkable versatility of TTG. On millennial timescales, it reflects the influence of Southern Ocean climate variability. On centennial timescales, it captures the effects of changes in the tropical Pacific. On seasonal timescales, it helps explain the onset, evolution and withdrawal of the monsoon. By providing a physically meaningful measure of the atmospheric thermal contrast, TTG offers a common framework for linking modern observations, climate models and paleoclimate records.

The accompanying [animation](#) illustrates how TTG evolves during a normal monsoon year and during an El Niño year. In a typical monsoon season, TTG values are generally around 3–4 K. During a strong El Niño, however, the gradient weakens considerably, often falling to about 2 K. The cover page of this newsletter presents the evolution of TTG up to 30 June for selected years, including 2015 (a strong El Niño year), 2019 (a positive Indian Ocean Dipole year) and the current year, 2026, which has also been influenced by a strong El Niño.

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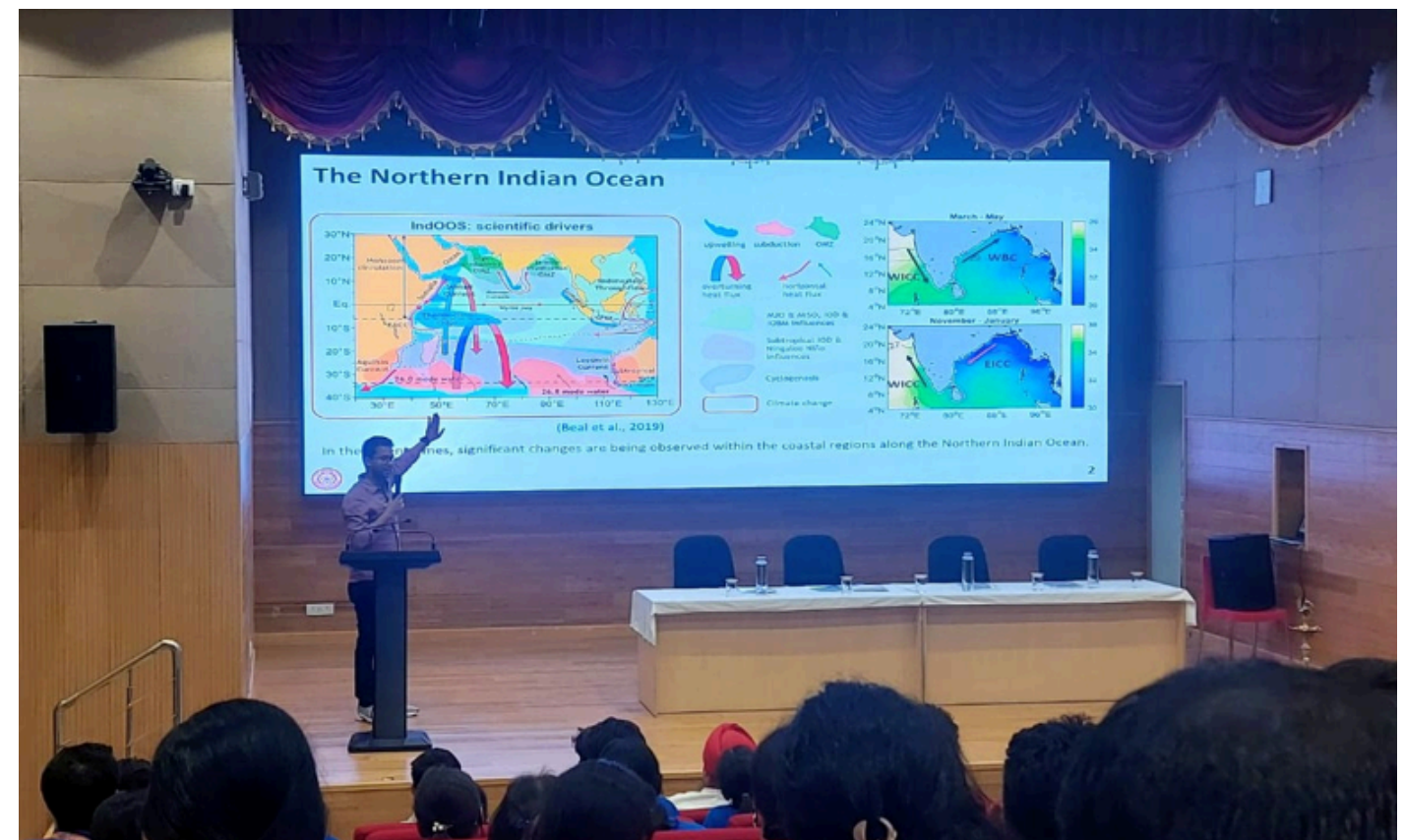
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Report on World Oceans Day 2026 Celebration: OSI Delhi-NCR Chapter

The World Oceans Day 2026 celebration was successfully organized on 8 June 2026 by the Ocean Society of India (OSI), Delhi-NCR Chapter, at the National Centre for Medium Range Weather Forecasting (NCMRWF), Noida. The event was conducted under the global theme "Strong Marine Protected Areas for Our Blue Planet", highlighting the urgent need to conserve marine ecosystems, strengthen ocean governance, and promote sustainable utilization of ocean resources.

The programme commenced at 10:00 AM with a warm welcome address by Dr. V. S. Prasad, Director of NCMRWF and Chairman of the OSI Delhi-NCR Chapter. He emphasized the importance of collective efforts to advance ocean science, improve public awareness, and strengthen collaborations among scientific institutions, policymakers, and society. The inaugural session also included the felicitation of the Chief Guest and Guest of Honor, followed by an inspiring address from Shri Sreenivasa Rao Gangi Reddy, Joint Secretary, Ministry of Earth Sciences. He highlighted India's growing role in ocean research, marine conservation, and the development of the Blue Economy. Prof. A. D. Rao, the Guest of Honor, further stressed the importance of scientific innovation and capacity-building in addressing emerging marine challenges.



The technical sessions featured distinguished experts who shared valuable insights into contemporary oceanographic issues. The first lecture on the Blue Economy, delivered by Dr. (Cdr.) Prashant Kumar Srivastava focused on the sustainable utilization of ocean resources for economic growth while ensuring environmental protection. This was followed by an engaging presentation by Dr. M. R. Ramesh Kumar on the role of oceans in monsoon variability, which explained how ocean-atmosphere interactions significantly influence the Indian monsoon and climate variability.

Following the tea break and group photograph, the afternoon technical session resumed with a lecture on Ocean Observation Systems delivered by Prof. Samiran Mandal. The talk highlighted the importance of modern ocean observing platforms, including satellites, moored buoys, Argo floats, high-frequency radars, and autonomous vehicles, in monitoring the changing ocean and improving weather and climate predictions. Subsequently, Dr. Pawan Tiwari delivered an informative presentation on Coastal Hazards and Storm Surges, discussing recent advances in forecasting extreme coastal events and strategies to enhance disaster preparedness and coastal resilience.

A major highlight of the event was the panel discussion on the theme "Strong Marine Protected Areas for Our Blue Planet." The panel, comprising Dr. V. S. Prasad, Prof. A. D. Rao, Dr. Anitha Gera, and Dr. M.R. Ramesh Kumar, moderated by Dr. Suraj, deliberated on the scientific, ecological, and policy dimensions of Marine Protected Areas (MPAs). The discussion emphasized that strengthening MPAs is essential to conserve marine biodiversity, restore fish stocks, protect vulnerable ecosystems, and enhance resilience to climate change. The interactive session encouraged active participation from researchers, students, and professionals, fostering meaningful dialogue on future conservation strategies.

The post-lunch programme included an introduction to NCMRWF's coupled modelling systems and their operational applications, followed by a visit to the High-Performance Computing (HPC) facility. 120+ participants from schools and colleges also enjoyed the unique exhibition titled "Ocean Exploration – A Philatelic Expedition," which creatively showcased the history of ocean exploration through postage stamps, offering an engaging perspective on marine science communication. The programme concluded with a Vote of Thanks delivered by Prof. Samiran Mandal, Secretary of the OSI Delhi-NCR Chapter, who expressed sincere appreciation to the speakers, organizers, participants, and supporting institutions for making the event a grand success.

Overall, the World Oceans Day 2026 celebration served as an excellent platform for promoting ocean literacy, disseminating recent advances in ocean sciences, and reinforcing the collective commitment toward protecting our oceans. The event successfully brought together scientists, policymakers, students, and ocean enthusiasts, inspiring greater awareness and collaborative action to safeguard our blue planet for future generations.

World Oceans Day Celebrations by Cochin Chapter: National Seminar on OCEAN SCIENCE FOR A SUSTAINABLE TOMORROW

The Cochin Chapter of the Ocean Society of India (OSI), in collaboration with the Department of Marine Biology, Microbiology and Biochemistry at CUSAT and the CUSAT-NCPOR Centre for Polar Sciences, organized a national seminar on Ocean Science for a Sustainable Tomorrow on 23 July 2026 at the School of Marine Sciences Auditorium, Kochi. The event was part of World Oceans Day celebrations and brought together 138 participants from diverse institutions including CUSAT, KUFOS, St. Albert's College, St. Xavier's College for Women, St. Teresa's College, Maharaja's College, MIT Manipal, and SDPY KPM High School. The seminar provided a platform for students, scholars, and scientists to exchange knowledge and perspectives on ocean science and sustainability.

Inaugural Session

The seminar opened with a welcome address by Dr. Priyaja P, Secretary of OSI Kochi Chapter. The session was presided over by Prof. (Dr.) Sajeevan T. P, Head of Marine Biology, Microbiology and Biochemistry, CUSAT, and formally inaugurated by Prof. (Dr.) Arun A. U., Registrar, CUSAT. The inaugural ceremony emphasized the importance of scientific approaches to sustainable marine resource management. Felicitations were delivered by eminent figures including Prof. (Dr.) K. V. Jayachandran, Vice-President of OSI, Prof. Dr. K. Satheeshan, Director, School of Marine Sciences, and Prof. (Dr.) A. A. Mohamed Hatha, Director of CUSAT-NCPOR Centre for Polar Sciences and Chairman of OSI Kochi Chapter. Students were encouraged to join OSI and contribute to its initiatives.

A highlight of the session was the presentation of the Dr. K. P. Krishnan Memorial Endowment Award, instituted by the M.Sc. Marine Biology (2021–2023) batch, to the best outgoing postgraduate student in Marine Biology (2024–2026). Special recognition was also given to students who secured Ph.D. admissions abroad.

Keynote Sessions

The seminar featured two major keynote addresses:

Morning Session – Shri Robert Panippilla Founder of Friends of Marine Life (FML), Panippilla is a citizen scientist and environmental activist known for documenting seabed ecosystems and artisanal fishing traditions along Kerala's coast. Using underwater videos from his fieldwork, he showcased diverse seabed terrains and their rich biodiversity. His presentation highlighted the ecological importance of these habitats and the threats posed by pollution, dredging, and coastal construction. His conservation-oriented perspective reinforced the seminar's theme, stressing the need to connect scientific knowledge with community awareness, responsible resource use, and public participation.

Afternoon Session – Dr. V. N. Sanjeevan Former Director of the Centre for Marine Living Resources and Ecology (CMLRE), delivered a comprehensive overview of marine ecosystems, their biodiversity, and the services they provide to society. He discussed pressing challenges such as overexploitation, habitat degradation, and climate change, while advocating for balanced economic growth and sustainable ocean development. His talk emphasized responsible resource management, conservation measures, sustainable fisheries, marine spatial planning, and environmentally sound policies to ensure resilience of marine ecosystems.



World Oceans Day 2026 Celebration – OSI Pune Chapter

To commemorate World Oceans Day (WOD), the OSI Pune Chapter organized a field excursion on 3 July for Master's students in the natural sciences at Savitribai Phule Pune University. Although Pune is located far from the coast, the event was conceived to highlight the broader hydrological connections that ultimately link inland water systems with the world's oceans. Rather than limiting the celebration to coastal settings, the excursion encouraged students to appreciate how rivers, reservoirs, rainfall, and watersheds collectively sustain the global water cycle and influence Earth's climate and ecosystems.

Bhushi Dam was chosen as the destination because it provides an ideal natural setting for experiential learning. The visit offered students an opportunity to step beyond the classroom and observe hydrological processes in the field—the "nature's laboratory" where scientific concepts can be experienced firsthand. As they explored the dam and its surrounding landscape, students examined the movement of water through the catchment, discussed the role of reservoirs in regional hydrology, and reflected on the interconnectedness of inland water bodies with larger climatic and ecological systems. The excursion also fostered discussions on the importance of conserving freshwater resources and protecting natural ecosystems in the face of increasing environmental pressures.

The group also visited the Bhaja Caves, a complex of 22 rock-cut Buddhist monuments dating back to the second century BCE. Nestled amidst rugged hills, cascading waterfalls, and seasonal streams, the site vividly illustrates the enduring relationship between natural landscapes and human civilization. The flowing water that continues to shape the rocky terrain serves as a reminder that hydrological processes have influenced not only the physical environment but also the location, sustainability, and cultural significance of historical settlements. Experiencing this remarkable setting helped students appreciate how environmental processes and cultural heritage are deeply intertwined.

Although incessant rainfall limited the planned environmental awareness activities, the excursion successfully achieved its broader educational objectives. The field observations, discussions, and interactions with the natural landscape provided a meaningful alternative that reinforced the spirit of World Oceans Day. More importantly, the visit encouraged students to view natural environments as living classrooms, where careful observation cultivates scientific curiosity, environmental responsibility, and a deeper appreciation of Earth's interconnected systems.

The Bhushi Dam excursion thus demonstrated that meaningful environmental education need not be confined to the coast. By engaging directly with inland hydrological systems, students gained valuable insights into the continuity of the water cycle, the importance of conserving freshwater resources, and the intrinsic links between nature, climate, and human society. The experience reaffirmed the value of field-based learning in nurturing environmentally conscious citizens and future scientists who recognize that every stream, river, and reservoir ultimately contributes to the health of the global ocean.

The seminar concluded with a vote of thanks by Dr. Vishnu K. Venugopal, Inspire Faculty at CUSAT and GC Member of OSI. E-certificates were issued to all participants.

Overall, the seminar successfully underscored the critical role of ocean science in achieving sustainability. It fostered academic collaboration, promoted awareness of conservation, and encouraged translation of scientific knowledge into practical strategies for sustainable marine resource management. By bringing together distinguished scientists, educators, and students, the event highlighted the urgent need to strengthen understanding of marine ecosystems and to integrate science with policy and community action for a sustainable tomorrow.

Indian Ocean–Monsoon Climate: Annual to Decadal Variability, Mechanisms, and Predictability Venue: Indian Institute of Tropical Meteorology, Pune Dates: May 19–22, 2026

The Indian Institute of Tropical Meteorology (IITM), Pune, hosted a major workshop on Indian Ocean–Monsoon Climate: Annual to Decadal Variability, Mechanisms, and Predictability from May 19–22, 2026. The event brought together leading experts in climate science to advance understanding of annual to decadal variability in the Indian Ocean and its profound influence on the Indian summer monsoon. The central aim was to deepen insights into physical mechanisms, ocean–atmosphere interactions, and sources of predictability on decadal timescales. Discussions highlighted both the current capabilities and limitations of decadal climate prediction systems, while also identifying pathways to enhance prediction skill.

To build capacity among young researchers, a pre-workshop training program was organized on May 19, 2026. Around sixty-two students—including master’s students in ocean, atmospheric, and climate sciences as well as PhD scholars—participated in hands-on sessions. The training focused on climate data analysis, modeling tools, and interpretation of ocean–atmosphere variability, equipping participants with practical skills and strengthening their engagement with the scientific themes of the workshop.

Scientific sessions during the workshop covered mechanisms of variability and predictability, with experts in observations, theory, and modeling examining coupled ocean–atmosphere processes. A special session was devoted to honouring Dr. C. Gnanaseelan, commemorating his superannuation in May 2026 and celebrating his significant contributions to ocean–monsoon research.

The workshop drew about 80 participants, including eminent scientists from abroad who joined virtually. A substantial number of students and early career researchers attended, ensuring strong engagement from the next generation of climate scientists. The event successfully combined scientific rigor with community-building, strengthening dialogue on Indian Ocean–monsoon variability and predictability, identifying priority areas for advancing decadal climate prediction, and enhancing capacity-building through active student participation. By engaging both established experts and emerging scholars, the workshop reinforced IITM’s role as a hub for tropical climate research and laid a strong foundation for collaborative progress in understanding and predicting Indian Ocean–monsoon climate variability on annual to decadal scales.



Dr. Gnanaseelan is being felicitated



Dr. Gnanaseelan



Training Workshop



Training Workshop

Editor: Dr. Supriyo Chakraborty

Editorial board members: Dr. Supriyo Chakraborty, Dr. K.P. Sooraj, Dr. Bhupendra B. Singh, Dr. Aditi Modi, Dr. Aditi Deshpande, Arul Muthiah

Design/Typeset/Editing: Dr. Supriyo Chakraborty

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