

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.

Contribution of Carbon Fixation Toward Carbon Sink in the Ocean Twilight Zone

While various carbon dioxide (CO_2) removal mechanisms have been proposed to remove ~ 1000 billion tons of atmospheric CO_2 by 2100 by increasing ocean C uptake, the prerequisite estimate of C sources and sinks is imprecise. One such area of investigation for C budget is the ocean twilight zone (~ 100 -1000 m depth). There is a discrepancy between the demand of C for heterotrophy in the twilight zone and the supply of organic matter from the euphotic zone. This discrepancy may arise from the unaccounted autochthonously produced organic C via chemoautotrophic inorganic C assimilation in the twilight zone (hereafter, dark C fixation), where the oxygen minimum zones (OMZs) within the twilight zone possess abundant and diversified chemoautotrophs, such as anammox and nitrifying organisms. Yet, the potential of dark C fixation toward CO_2 sequestration has not been tested sufficiently in experiments.

We examined the Arabian Sea, which possesses one of the most intense and largest OMZs of the global ocean, for its dark C fixation potential and the effect of OMZ's oxygen (O_2) concentrations on dark C fixation. We additionally measured primary production in the euphotic zone of the Arabian Sea. Our results hint toward a decrease in primary productivity in the Arabian Sea within the last two decades. We observed that average dark C fixation rates in the suboxic (OMZ) waters (having $[\text{O}_2] \leq 20 \mu\text{mol kg}^{-1}$) were higher than that in the hypoxic OMZ waters (having $20 < [\text{O}_2] \leq 60 \mu\text{mol kg}^{-1}$) (Figure -1), which we attributed to the preferential existence of chemoautotrophic ammonium oxidisers and anammox bacteria owing to nitrite (NO_2^-) maxima in the suboxic OMZ waters. The contribution of C fixation by anammox bacteria to the total dark C fixation in the suboxic OMZ waters of the Arabian Sea ranged between 1 and 47%. This supports a previous hypothesis of significant contribution of dark C fixation to sinking C fluxes in the OMZ of the Arabian Sea. Extrapolation of the measured dark C fixation rates to the global ocean ranged up to 7.4 Pg C y^{-1} , that amounts to $\sim 15\%$ of the global ocean primary production. Our study provides quantitative evidence to include dark C fixation rates in the marine C budget estimates.

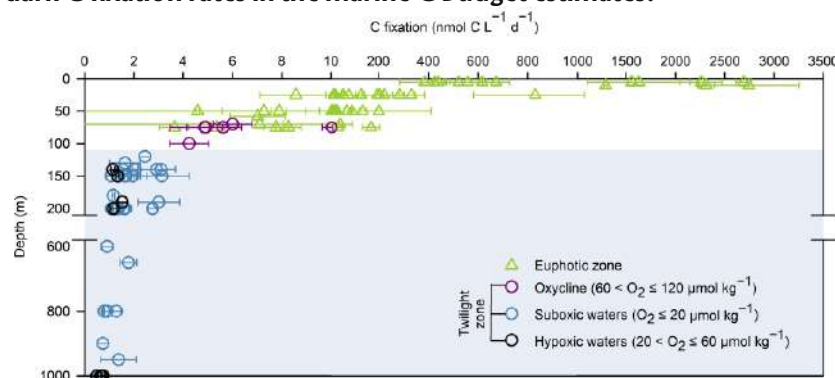


Figure-1: Vertical profile of C fixation rates in the euphotic and twilight zones. Shaded background indicates the oxygen minimum zone within the twilight zone.

Citation: Saxena, H., Sahoo, D., Nazirahmed, S., Rai, D. K., Khan, M. A., Sharma, N., et al. (2022). Contribution of carbon fixation toward carbon sink in the ocean twilight zone. *Geophysical Research Letters*, 49, e2022GL099044.]

<https://doi.org/10.1029/2022GL099044>

[Report Courtesy: Himanshu Saxena, Physical Research Laboratory (PRL), Ahmedabad, Gujarat, India;
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Ocean colour remote sensing of algal blooms in coastal waters of the northwestern Bay of Bengal

The coastal waters of the western Bay of Bengal experience algal blooms in several pockets attributed to a multitude of reasons. Some specific regions also experience episodic recurrence of blooms. More often, phytoplankton blooms cause discoloration and deterioration of coastal water quality; adversely impacting the food chain. Phytoplankton abundance and phenology can be categorized as 'ecological indicators' that can be used to assess the condition of the pelagic ecosystem. The coastal area of Gopampur is an ecologically important region of the northwestern Bay of Bengal where the coastal waters experience algal blooms caused by different varieties of phytoplankton species, even sometimes occurring as multispecies bloom. As a result of algal blooms, a decline in dissolved oxygen levels, fish evasion, phytoplankton community shift, and evolution of ciliate bloom, have been reported in the coastal waters. To unravel the long-term trend of dominant phytoplankton group of diatoms and phytoplankton biomass in the coastal waters of northwestern Bay of Bengal, a team of researchers from Berhampur University, INCOIS, Indian Institute of Remote Sensing, Centurion University, and Xavier University, carried a study using ocean colour remote sensing. Their research showed a bimodal annual pattern in the distribution of diatoms, with peaks occurring before and after the southwest monsoon. The study's noteworthy finding is a retrospective analysis of phytoplankton bloom occurrences that supported prior field observation-based reports. The observed bimodal distribution of diatoms concomitant with phytoplankton biomass, with higher concentration during the pre-southwest monsoon phase and more widespread distribution during the post-southwest monsoon phase, is another significant finding.

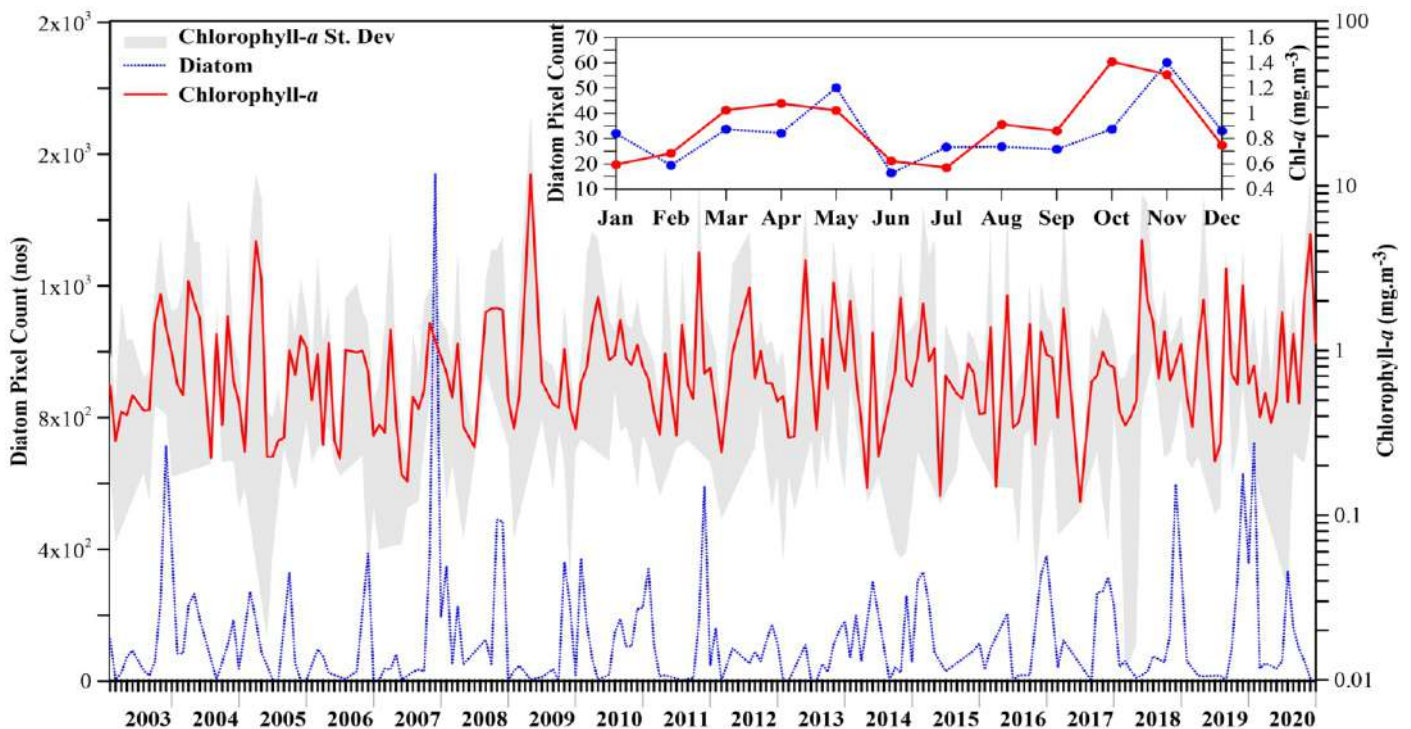


Figure: Showing the long-term temporal variation of diatom and chlorophyll-a in coastal waters of the northwestern Bay of Bengal. The minor ticks on X-axis represent months from January to December. Inset: Monthly climatology of diatom and chlorophyll-a (Image available on open access in Journal of the Indian Society of Remote Sensing, Srichandan et al. 2022).

Citation: Srichandan, S., Baliarsingh, S.K., Samanta, A., Jena, A.K., Lotliker, A.A., Nair, T.M., Barik, K.K., & Acharyya, T. (2022). Satellite-Based Characterization of Phytoplankton Blooms in Coastal Waters of the Northwestern Bay of Bengal. *Journal of the Indian Society of Remote Sensing*, 1-8.]

<https://doi.org/10.1007/s12524-022-01597-6>

[Report Courtesy: Dr. Suchismita Srichandan, Department of Marine Sciences, Berhampur University; E-mail: suchismita.sima@gmail.com]

Indian Ocean Region Panel - call for new members

We have an open call for new members to the CLIVAR/IOC-GOOS Indian Ocean Region Panel (IORP).

IORP provides scientific and technical oversight for implementation of the sustained ocean observing system for the Indian Ocean and coordinates research on the role of the Indian Ocean on the climate system. We are looking for new panel members who can help maintain balance of expertise and diversity within the panel.

Read about IORP and its activities here:

<https://www.clivar.org/clivar-panels/indian>

Nominations for new members can be submitted here:

<https://clivar.org/news/2022-open-call-new-members-clivar-panels-and-ssg>

Deadline for nominations is **14 October 2022**. Self-nominations are welcome.

Submissions are now open for 15th PORSEC, in Malaysia (December, 2022)



3 - 6 December
2022
Tutorial Capacity
Building



7 - 8 December
2022
Conference Date



09:00 - 17:00
(GMT+8)
Time



Johor Bahru,
Malaysia & Online
Venue

Welcome to the 15th Pan Ocean Remote Sensing Conference (PORSEC). We hope to continue providing an opportunity for the scientists working on various aspects of ocean and atmosphere using remote sensing technology to come together, share and discuss the results and innovations, and provide training for the next generation of scientists.

In conjunction with the PORSEC 2022 conference, the 9th PORSEC **Capacity Building Tutorial** will be held prior to the PORSEC 2022 conference. The days tutorial offers expert training for students, and young scientists. Participants will be given theoretical lessons and practical exercises on remote sensing techniques used for monitoring the ocean-atmosphere system for research and operations.

We also would like to invite you to submit full academic papers or abstracts to the conference, related to the following themes below (but not limited to) to be addressed in the conference:

- Large and meso-scale oceanography
- Coastal impacts
- Emerging technologies for ocean and coastal applications
- Extreme events
- Operational remote sensing
- Ocean-Atmosphere interactions
- Remote sensing data for policy making
- Education and outreach
- Coastal disaster management
- Marine GIS
- Artificial intelligence and deep learning

Last Date for Conference and Tutorial Registration: **01 November 2022**

Scholarship / Travel Grants:

Tuition fee waiver will be offered depend on the number of participants. Full/Partial travel grants might be available. Go to [support funding](#) section for more info.

The abstracts submitted to PORSEC2022 can be submitted as full paper to the PORSEC special issue of journals such as Tyler & Francis International Journal of Remote Sensing. This ensures efficient paper handling and gives opportunity to publish in such high IF journal.

Please don't miss to refer to important dates below and [download our brochure](#) for more information.

Important Dates:

15 Sept - 01 Oct 2022	i. Notification of Acceptance ii. Notification of student travel supports
01 Oct - 01 Nov 2022	Conference and Tutorial Registration
01 Oct - 01 Nov 2022	Paper Camera-Ready Deadline
03 - 06 December 2022	Tutorial Capacity Building
07 - 08 December 2022	Conference Day

We are looking forward to meet all of you in the upcoming conference.

[Report Courtesy: Dr. Nurul Hazrina Idris Chairperson, PORSEC2022 LOC., E-mail: nurulhazrina@utm.my or porsec2020@gmail.com]

DEEP-SEA RESEARCH PART II



THE SUBMISSION PORTAL FOR VOL. 6 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 (rhodd@umces.edu).

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 48 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.

CLIVAR September 2022 Bulletin is available online



The International CLIVAR Project Office distributes a monthly bulletin with announcements, funding opportunities, meeting notifications relevant to the ocean/climate science community.

The latest CLIVAR Bulletin September, 2022 is available at:

<https://mailchi.mp/clivar.org/clivar-september-2022-bulletin>

Call for Contributions

Informal articles/short notes of general interest to the IIOE-2 community are invited for the next (October-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 October, 2022**



Access the latest issue of Indian Ocean Bubble-2

<https://iioe-2.incois.gov.in/IIOE-2/Bubble.jsp>



Enroll yourself with IIOE-2 Community

<https://iioe-2.incois.gov.in/IIOE-2/Signup.jsp>

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