

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.

The equatorial Indian Ocean upper water-column influenced by the Arabian Sea-Bay of Bengal water exchange: A paleo-perspective

The central equatorial Indian Ocean (CEIO) is influenced by both summer and winter monsoon and is known for cross-basin exchange of water between the Arabian Sea (AS) and the Bay of Bengal (BoB). Planktic foraminiferal assemblage record from a sediment core (SSD-044/GC-01, 5°N; 77°E) recovered from the CEIO (Fig. 1.), which is in the pathway of this cross-basin water exchange was utilised to decipher the variation in the upper water-column structure during the last 43 ka. The Variation in individual species abundance (ecologically sensitive species), ratio of relative abundance of mixed layer (eutrophic and oligotrophic) species, thermocline species and organic carbon (Corg) content were studied in terms of changes in the productivity conditions in the study region. Faunal proxy and Corg content reveal that productivity was high during Marine Isotope Stage (MIS) 3 and 2, especially during the Last Glacial Maximum (Fig. 2.). The large increase in productivity during the Last Glacial Maximum was probably due to enhanced vertical mixing and entrainment of nutrient from the nutricline into the mixed layer. The nutrient injection to the photic zone maybe a result of increased vertical/ convective mixing due to increased flow of cooler/high-salinity BoB water probably caused by decreased freshening of the BoB during the glacials. Furthermore, the data suggests a warm, stratified upper water column and low surface nutrient (oligotrophic) conditions during the last deglaciation and the Holocene.

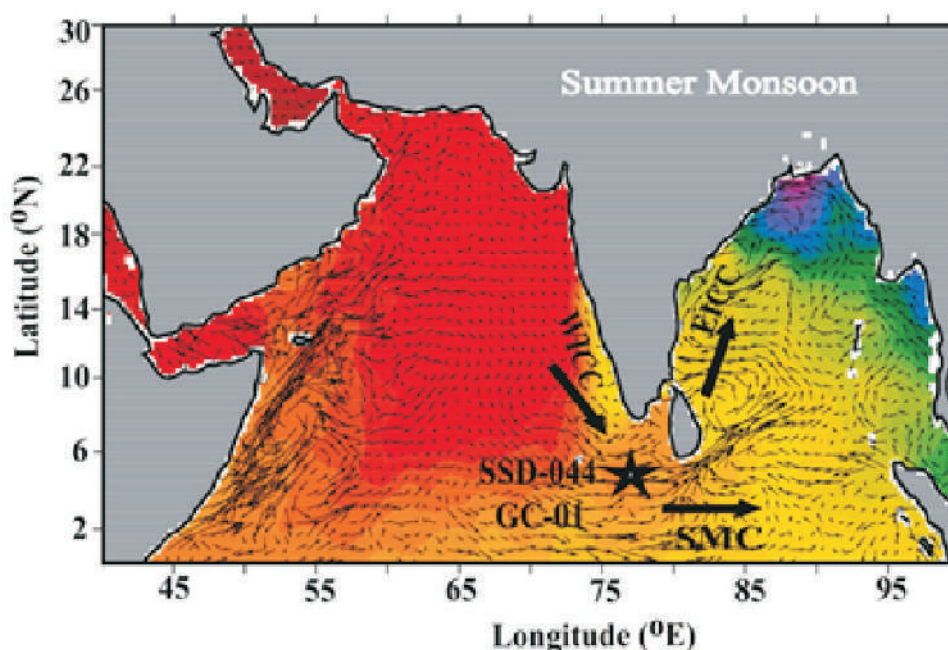


Fig. 1. Map showing the location of core SSD-044/GC-01 in the central equatorial Indian Ocean against the background of summer sea surface salinity overlain with geostrophic current velocity (WICC: West Indian Coastal Current; EICC: East Indian Coastal Current; SMC: Southwest Monsoon Current; NMC: Northeast Monsoon Current).

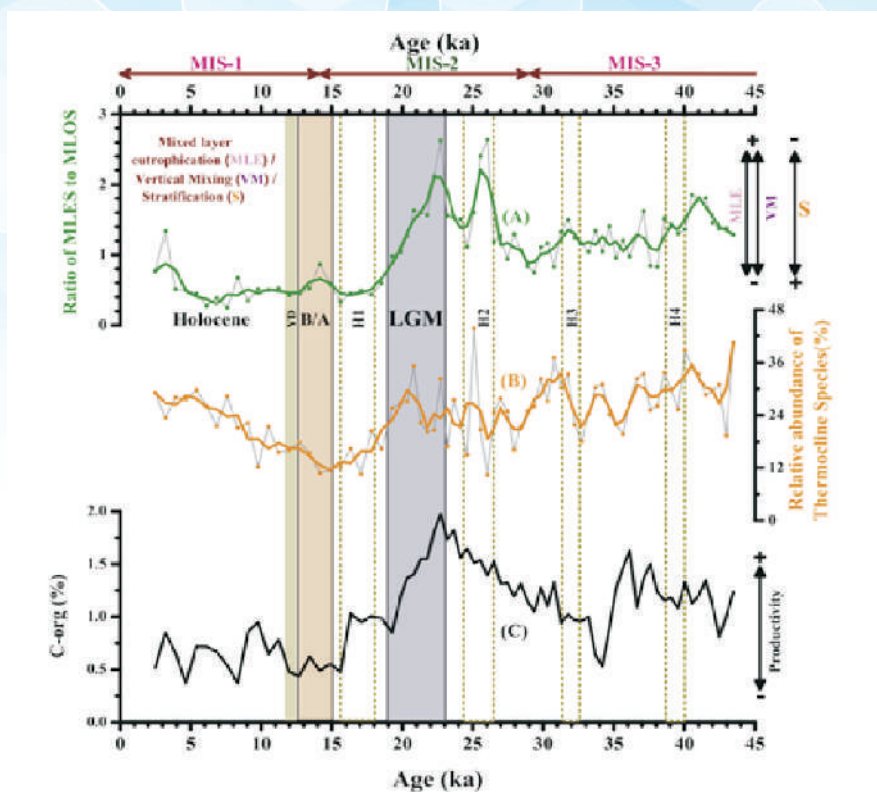


Fig. 2. A. Ratio of mixed layer eutrophic species (MLES = *G. bulloides* and *G. glutinata*) to mixed layer oligotrophic species (MLOS = *G. ruber*, *G. sacculifer*, *G. quadrilobatus* and *G. triloba*) for the last 43 ka. B. relative abundance of thermocline foraminifera (*P. obliquiloculata*, *N. dutertrei*, *G. menardii* and *G. tumida*) species C. Organic carbon content in sediment (Bold lines in A and B show 3 point running averages).

Citation: Yadav, R., Naik, S.S., and Narvekar, J. 2021. The equatorial Indian Ocean upper water-column structure influenced by cross-basinal water exchange over the last ~ 40000 years. Quaternary International, In Press,

<https://doi.org/10.1016/j.quaint.2021.04.002>

[Report Courtesy : Dr. Naik Sushant Suresh, CSIR NIO, Goa, India. E-mail: sushant@nio.org]

Effect of a tropical cyclone on algal pigment composition in coastal water of the Bay of Bengal

Extreme events, for instance tropical cyclones, cause a sudden increase in nutrient concentrations in the marine euphotic zone, which drives phytoplankton growth and, in some cases, results in a bloom. Coastal phytoplankton community composition also undergoes change as an effect of cyclone-induced alteration in levels of growth-promoting nutrients. Although previous research has found a substantial effect of tropical cyclones on the abundance and biomass of phytoplankton assemblages, very few studies have looked at the pigment composition. On 3 May 2019, the tropical cyclonic storm 'Fani,' which was generated in the Bay of Bengal, made landfall near Puri on India's east coast. The coastal water off Gopalpur, one of the northwestern Bay of Bengal's ecological important ecosystems, was in close proximity to the landfall location of the cyclone. To unravel the effect of cyclone Fani on the phytoplankton assemblages in the coastal waters, a team of researchers from INCOIS analyzed the phytoplankton pigment composition before and after the passage of the cyclone. Chromatographic analysis revealed a high pigment diversity and an increase in individual pigment concentration after the passage of the cyclone. The study also reports an 18- and 14-fold increase in concentrations of chlorophyll-a and fucoxanthin respectively during the post-cyclone period, signifying a diatom bloom. Microscopic studies complementing the chromatographic observations indicate a predominance of diatom species *Pseudo-nitzschia pungens* after the passage of Fani. The results thus suggest a cyclone-induced nutrient recharge of the ambient medium that fueled phytoplankton growth with a preponderance of diatoms. As another important outcome, this study also reports chromatographic evidence for small-sized Prymnesiophyta and Cryptophyta, which are not revealed from microscopy.

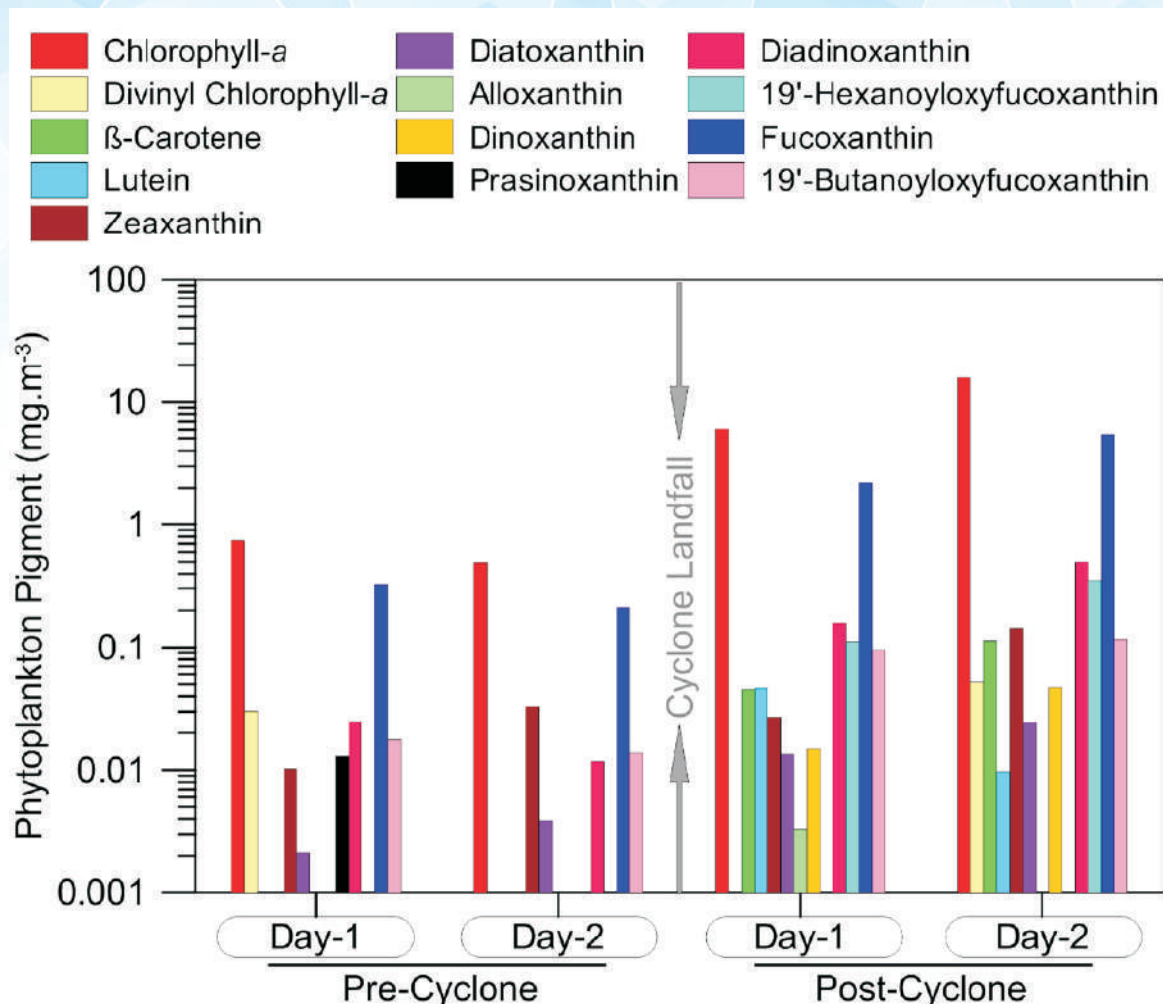


Figure showing phytoplankton pigment composition before and after the passage of cyclone Fani in the coastal waters. (Image reprinted with permission from Elsevier, *Marine Pollution Bulletin*, Baliarsingh et al. 2021).

Source: Baliarsingh, S.K., Lotliker, A.A., Srichandan, S., Parida, C., Roy, R., Naik, R.C., Nair, T.M.B., Barik, K.K. (2021). Response of coastal phytoplankton pigment composition to tropical cyclone Fani. *Marine Pollution Bulletin*, 173, 113038. <https://doi.org/10.1016/j.marpolbul.2021.113038>

[Report Courtesy: Sanjiba K. Baliarsingh and Aneesh A. Lotliker, INCOIS, Hyderabad, E-mail: baliarsingh.s@incois.gov.in]

Ocean and Coastal Management Special Issue - East African Coastal Current ecosystems: at the frontier of climate change and food security

A special issue of the scientific journal "Ocean and Coastal Management" (OCMA) highlights observation and modelling studies addressing research challenges of the East African Coastal Current (EACC) region in 13 open access articles, seven of which were led by researchers from Africa.

The EACC flows along the coastlines of Tanzania and Kenya encompassing a largely oligotrophic environment, which is nonetheless characterised by rich and diverse marine ecosystems and habitats. More than 16 million people currently live along the EACC coastline, a number expected to double by 2030. Some EACC coastal communities experience the highest rates of poverty in the world. These communities are highly dependent on the ocean for economic stability, food security, and social cohesion.

Strong fluctuations in key fisheries occur in the region, due to the combined effects of climate change, natural ecosystem variability and overfishing. Understanding and managing fisheries under the growing threat of climate change impacts and food insecurity in the region requires good understanding of the marine

environment, key environmental controls on local ecosystems and economic and social factors affecting the dependence of the coastal population on marine resources. However, the EACC region is one of the most poorly sampled and analysed marine domains in the world, due to both restricted regional marine research capacity and, in recent years, the challenges of marine security (piracy) impeding international research expeditions.

The OCMA special issue is an international and interdisciplinary collaboration of 79 co-authors (40 from countries listed as least developed by the OECD). The National Oceanography Centre's (NOC) Dr Stuart Painter, lead editor for the special issue said, "The SOLSTICE-WIO project presented many opportunities for collaborative research with researchers in Tanzania and Kenya. This proved fruitful in several ways but the opportunity to work in poorly understood marine waters on inter-disciplinary problems with immediate societal implications has been hugely rewarding"

The special issue is an output from the SOLSTICE-WIO project, a four-year collaborative project, funded by the Global Challenges Research Fund (GCRF) and led by the NOC, with partners from the UK, South Africa, Kenya and Tanzania. SOLSTICE-WIO, which commenced in October 2017, has brought together advances in marine technologies, local knowledge and research expertise to address challenges facing the Western Indian Ocean through technology transfer, collaborative environmental and socio-economic research and training.



Figure 1: Deploying a glider



Figure 2: Retrieving the CTD on Angra Pequena



Figure 3: Offloading the catch at Ngomeni, Kenya

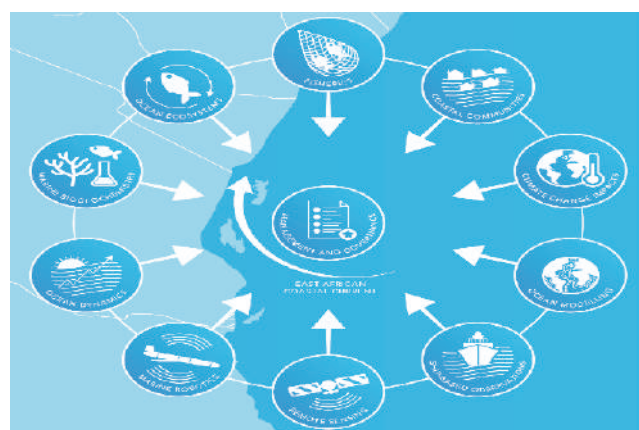


Figure 4: How marine management and governance challenges in the East African region are supported by interdisciplinary research efforts utilising advanced observing technologies

Read the special issue <https://www.sciencedirect.com/journal/ocean-and-coastal-management/special-issue/105MPZM3QHN>

Learn more about the SOLSTICE-WIO project <https://solstice-wio.org/>

[Report Courtesy : Amani Becker, National Oceanography Centre (NOC), UK E-mail: abeck@noc.ac.uk]

Launch of the "Status of Coral Reefs of the World: 2020" report

The launch of the Sixth Edition of the Global Coral Reef Monitoring Network (GCRMN) Status of Coral Reefs of the World Report: 2020 (<https://gcrmn.net/2020-report/>) was held on the 5th October 2021.

This flagship product of the GCRMN describes the status and trends of coral reefs worldwide including areas of the Indian Ocean. This sixth edition is the first since 2008, and the first based on the quantitative analysis of a global dataset compiled from raw monitoring data contributed by more than 300 members of the network. The global dataset span more than 40 years from 1978 to 2019, and consist of almost 2 million observations from more than 12,000 sites in 73 reef-bearing countries around the world.

The Executive Summary, Global Analysis and Regional Chapters are now all available to download at

<https://gcrmn.net/2020-report/>

A short animation is available at: https://www.youtube.com/watch?v=IKxdKx_ci90

UNEP has created a dynamic data visualization that distils the report findings for non-scientists in all UN languages, plus Portuguese, Bahasa Indonesia and Swahili with an aim to: generating increased media coverage in regions; getting coverage in more mainstream media outlets; and wider interest from the public.

[Report Courtesy: Lynna Beckley, Murdoch University, Western Australia, E-mail: L.Beckley@murdoch.edu.au]

IIOSC-2020 Conference rescheduled to 14-18 March, 2022

International Indian Ocean Science Conference (IIOSC) 2020 was postponed due to COVID-19 pandemic situation. We are happy to inform that the conference is now rescheduled to March 14-18, 2022 as IIOSC-2022 conference. We are hoping to have an in-person conference in Goa, India (with an option to join online) in the hope that COVID situation eases by then. In the event that the travel situation does not improve, IIOSC-2022 will still go ahead as an online event.

Please visit the Conference web-site <https://iiosc2020.incois.gov.in/>

If you have any general queries regarding the conference, venue, registration, transport, accommodation or visa, please contact us at iiosc2020@nio.org / iiosc2020@incois.gov.in

IMPORTANT DATES

Abstract Acceptance : 22 December, 2021 **NEW!**

Registration opens on : 10 December, 2021

Early Bird Registration : 31 December, 2021

Last Date for Registration : 15 January, 2021

Conference Website: <https://iiosc2020.incois.gov.in/>





Institution of Electrical and Electronic Engineers Oceanic Engineering Society (IEEE OES) and Marine Technology Society (MTS) are organizing the world's largest Ocean conference, Oceans 2022 Chennai for the first time in India. The event is jointly organized by the pioneers of India in the field of Ocean Technology, the Indian Institute of Technology (IIT) Madras, and the National Institute of Ocean Technology (NIOT), Chennai, and is scheduled during February 21-24, 2022, both in-person and virtual. The main theme of the conference, INSPIRE-INNOVATE-SUSTAIN, is expected to attract about 1000 delegates with 500 papers being planned for presentation with a good number of plenary sessions with talks from leading personalities around the globe contributing to the field of Ocean

With Technical paper presentations, Tutorials, social and networking opportunities, professional field trips, etc. IEEE OCEANS 2022 will provide the delegates an insight on evolving technology and knowledge in the areas of:

- UN Decade of Ocean Science for Sustainable development
- Underwater Acoustics and Acoustical Oceanography
- Sonar signal/image processing and communication
- Ocean Observing Platforms; systems and instrumentation
- Remote Sensing
- Ocean Data Visualization, Modelling, and Information Management
- Marine Environment, Oceanography and Meteorology
- Optics, Imaging, Vision and EM Systems
- Marine Law, Policy, Management, and Education
- Offshore Structures and Technology
- Ocean Vehicles and Floating Structures
- Petroleum Engineering

Some of the top plenary speakers are Dr. Margaret Leinen, Director, Scripps Institute of Oceanography, Dr. Sathesh Reddy, Secretary Department of Defence R&D and Chairman DRDO, Dr. Peter Haugan, Former Chair Intergovernmental Oceanographic Commission, UNESCO; Programme Director at Institute of Marine Research, Professor at the Geophysical Institute, University of Bergen, Norway; Dr. Shailesh Nayak, Former Secretary, Ministry of Earth Sciences to name a few. A panel discussion on the current topics of interest like Global warming with leading speakers also is planned. A student poster session featuring outstanding projects from around the globe is another event. Student Hackathon competition and other student activities will also be at the conference. A plethora of exhibitors showcasing their latest innovations will be another event.

All are welcome to register and attend the conference. Now that Covid restrictions are eased out, please attend in person. All safety precautions will be in place. For complete details visit <https://chennai22.oceansconference.org/>.

[Report Courtesy: M. A. Atmanand, Visiting Professor, Indian Institute of Technology, Chennai, India, E-mail: atmanandma@hotmail.com]

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 45 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 November 2021 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 November, 2021 is available at:

<https://mailchi.mp/clivar.org/clivar-november-2021-bulletin>

Call for Contributions

Informal articles/short notes of general interest to the IIOE-2 community are invited for the next (December-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 December, 2021**



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>

Follow us:



iioe-2.incois.gov.in

The IIOE-2 Newsletter is published online by:



@IIOE2



@iioe_2



Feedback? iioe-2@incois.gov.in