



(A basin-wide research program co-sponsored by IOC-UNESCO, SCOR and IOGOOS)

To advance our understanding of interactions between geologic, oceanic and atmospheric processes that give rise to the complex physical dynamics of the Indian Ocean region, and to determine how those dynamics affect climate, extreme events, marine biogeochemical cycles, ecosystems and human populations.

Exploring the marine biodiversity of the submarine Cape Range Canyon, north western Australia

Biodiversity loss is now recognized as a major threat to human livelihood. However, in many under-explored areas biodiversity is not well characterized, even though it is expected to be high. Nowhere is this more apparent than in the ocean. Although the Pacific Ocean has received reasonable amounts of scientific attention, less effort has been given to the Indian Ocean. Worldwide we know much less about the deep sea than shallow coastal areas and our understanding of larger animals is much better than smaller animals. With support from Schmidt Ocean Institute aboard the RV Falkor, using the Remotely Operated Vehicle (ROV) SuBastian, we seek to better characterize biodiversity in the deep sea to begin to improve our knowledge of submarine canyons in the East Indian Ocean. The figure below shows proposed sample sites for Cape Range Canyon (left). Four additional sites are outlined (grey) in Cloates Canyon. Existing high-resolution mapping is shown from RV Sonne survey (2008-2009) (right), with polygons marking new mapping areas (red).

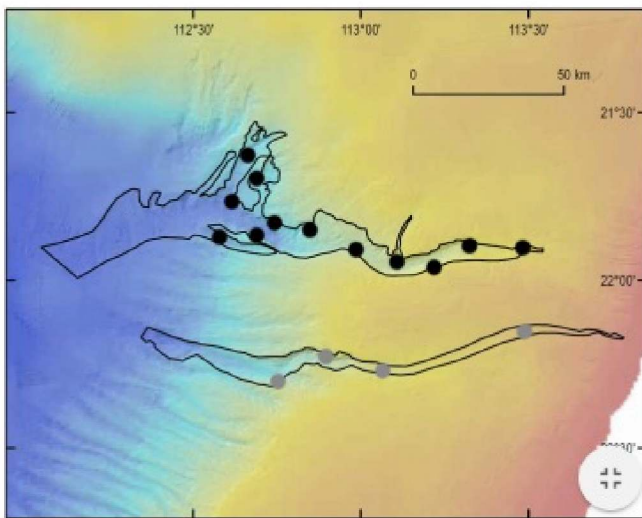


Fig-1. Proposed sample sites for Cape Range Canyon. Four additional sites are outlined (grey) in Cloates Canyon

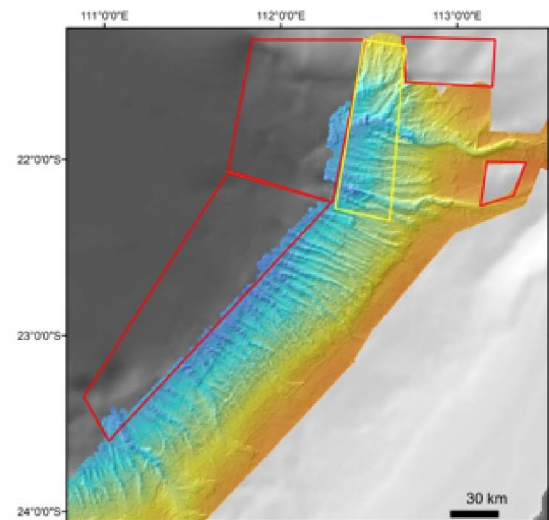


Fig-2. Existing high-resolution mapping is shown from RV Sonne survey (2008-2009), with polygons marking new mapping areas (red)

This comprehensive taxon survey scheduled for March/April 2020 will characterise marine biodiversity adjacent to the world heritage listed Ningaloo reef. To extend the comprehensiveness of our biodiversity estimates, we will also collect water samples for a companion eDNA survey through a partnership at Curtin University. We will use ROV sampling to understand the benthic community and deploy Autonomous Reef Monitoring Structures in the deep sea for the first time to enable long-term collection and assessment of cryptic biodiversity. The timing of this work is significant given that the lower reaches of the Cape Range Canyon are close to a proposed mining lease. The WA Museum leads this ambitious initiative with a team of experts able to collect, document and identify new species as well as maintain collections at their new facilities into the future. The WA Museum is also well placed to share the results widely through well-established data

portals such as Atlas of Living Australia and public exhibition at the New Museum opening in late 2020. We are excited to link with the Ningaloo Research Centre and involve students in this important work. Our research team aims to be a part of the larger Indian Ocean community and share intentions and opportunities through this project. We are excited to be advancing research specifically on the understudied biological components of the region and we intend to communicate work in a supportive research framework. By becoming part of the IIOE-2 community we hope to identify relevant partnerships we might not have otherwise found with groups conducting complementary work in the IO.

[Report Courtesy: Nerida G. Wilson, WA Museum, E-mail: Nerida.Wilson@museum.wa.gov.au]

Recommendations for an integrated modelling-observational approach for estimating N₂O fluxes under the IIOE-2

The biogeochemistry of the northern Indian Ocean is vulnerable to increasing levels of anthropogenically-derived nitrogen (e.g., from fossil-fuel combustion and agriculture) which are supplied to the coastal and open ocean through atmospheric pollution outflow and riverine inputs. These external new inputs of reactive nitrogen provide an additional nutrient source to marine ecosystems and can have significant impacts on regional biological productivity and the associated generation of greenhouse gases such as nitrous oxide (N₂O). In a recent article, published in Deep Sea Research II (IIOE-2 special issue), we provide a synthesis of current estimates of these sources of new nitrogen, and discuss the implications for oceanic emissions of N₂O in the northern Indian Ocean using a combination of global and regional model analyses (Fig-1). An important aim of the article is to highlight much needed advances in regional observations and model analyses to achieve more reliable estimates of current and future N₂O emissions in this region under the ongoing IIOE-2 program.

Suntharalingam, P., L. Zamora, H. W. Bange, S. Bikkina, E. Buitenhuis, M. Kanakidou, J. F. Lamarque, A. Landolfi, L. Resplandy, M. M. Sarin, S. Seitzinger, A. Singh (2019), Anthropogenic nitrogen inputs and impacts on oceanic N₂O fluxes in the northern Indian Ocean: The need for an integrated observation and modelling approach, Deep Sea Research II; <https://doi.org/10.1016/j.dsr2.2019.03.007>

[Report Courtesy: Arvind Singh, Physical Research Laboratory (PRL), Ahmedabad, India, E-mail: arvinds@prl.res.in]

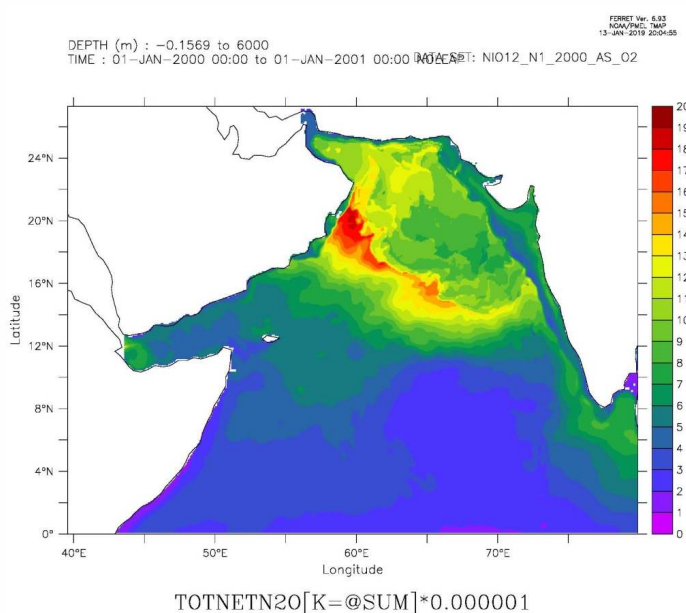


Fig-1. Net column-integrated NO production (units : Mg N m⁻² yr⁻¹) in the Arabian Sea derived from the regional high-resolution model analysis of Suntharalingam et al. (2019).

First announcement: International Indian Ocean Science Conference-2020 (IIOSC-2020)

The "International Indian Ocean Science Conference 2020 (IIOSC-2020)" sponsored by Ministry of Earth Sciences (MoES), Govt. of India, will be held during 16-20 March 2020 at Goa India co-hosted by National Institute of Oceanography (NIO) Goa, National Centre for Polar Ocean Research (NCPOR) Goa, Goa University and Indian National Centre for Ocean Information Services (INCOIS) Hyderabad, India. The conference aims at assessing the progress and scientific knowledge gained during the last 4 years of IIOE-2 (during 2016-2020). It is also an opportunity for scientists working on different facets of the Indian Ocean to present their ideas and discuss the outstanding issues, identify the knowledge gaps and plan a way forward to address such issues.

Scientists and colleagues who are interested in the Indian Ocean may kindly take note of this and freeze their dates for the conference. A detailed first announcement is made available at the below web link:

<https://iioe-2.incois.gov.in/documents/IIOE-2/IIOSC2020/FirstAnnouncement-IIOSC2020.pdf>

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

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

Some Upcoming Events

- ☞ "Ocean sustainability for the benefit of society: Understanding, challenges, and solutions", 17-21 June 2019, Brest, France. Call for Sessions and Workshops at the Second Open Science Conference of the Integrated Marine Biosphere Research (IMBeR) Project.
<http://www.imber.info/en/events/osc-imber-open-science-conference/osc-2019/2019-imber-open-science-conference>
- ☞ 14th International Conference on Copepoda (ICOC) during 14-19 June 2020, at Kruger Park, South Africa.
http://abevents.co.za/WEB_ICOC2020/index.html

CLIVAR May 2019 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 May, 2019 is available at:
<https://mailchi.mp/clivar.org/clivar-may-2019-bulletin?e=0e7979fd09>

Call for Contributions

Informal articles/short notes of general interest to the IIOE-2 community are invited for the next (June-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 June, 2019**



Access the latest issue of Indian Ocean Bubble-2
<https://www.iioe-2.incois.gov.in/IIOE-2/Bubble.jsp>



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