Annual Report 2021, CLIVAR/IOC-GOOS Indian Ocean Region Panel

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IORP activities during October 2020 — October 2021.

Panel overview

Given the ongoing COVID-19 restrictions no in person meetings were held. However this allowed for more regular virtual meetings amongst the panel and the co chairs. Quarterly virtual meetings were held to follow up on activities and to maintain discussions, these included scientific presentations from different panel members. In addition quarterly co-chair meetings allowed for action items to be followed up and enhanced discussions and planning. In addition we started a Slack channel for more informal communication, in particular with the ECS.

Juliet Hermes took over as co-chair with Roxy Koll. The panel remains grateful to the huge amount of effort put in by Prof Lisa Beal and her leadership during the IndOOS review period. In addition we welcome Faiza Yamani and Bernadino Malawene as new members of the panel, extending our membership into the western Indian Ocean (WIO) and marginal seas.

Key achievements for IORP during this period is the initiative towards training and ocean best practices in the WIO region, through the upcoming “western Indian Ocean and marginal seas workshop”. This is led by the new members from the WIO region. The WIO region is a key spot where we require enhanced ocean observations and capacity building, as recommended in the IndOOS-2 review. IORP is also proud to expand itself to involve early career scientists (ECS) in its activities.

A negative impact to the IORP that we would request CLIVAR to consider addressing is the shutdown of the IOC PPO in 2021 and the shrinking support from the IOC GOOS. We have found that the interactions with IOC are essential in ensuring that the IORP work receives recognition and uptake from different stakeholders, in particular with the Ocean Decade playing a major role in activities over the next 10 years.

Achievements for 2020-2021

- **Workshops**

1. 17th Session of CLIVAR/IOC-GOOS Indian Ocean Region Panel meeting, 28 April 2021, via Telecon [Report].

   The 17th Session of CLIVAR/IOC-GOOS Indian Ocean Region Panel (IORP-17) held virtually on 28 April 2021. This time, the IORP annual meeting opened up to the larger Indian Ocean community, with participation and inputs from several groups. 28 people participated in the meeting, including IORP members and representatives from IORP partners and Early Career Scientists (ECS) communities in the Indian Ocean. Besides the regular panel business discussion, the meeting gathered inputs and updates from IOC PPO, IIOE-2, IOGOOS, SIBER, SOLAS-India, WIOMSA, and INCINIDIO, with

recommendations on stronger collaborations with these partners. The meeting focused on IndOOS-2 implementation and on how to deal with the COVID-19 setback through regional partnerships. A highlight of the annual meeting was the engagement of ECS in the discussion and a kick-start of the 'Indian Ocean Youth/ECS Ambassadors' initiative. Five scientific talks were given by IORP and SIBER representatives in the last session of the meeting. More details in the report.

2. Roxy and Juliet presented at the Indian Ocean Rim Association (IORA) First Webinar on the Effects of Climate Change on the Indian Ocean Marine Environment, May 10, 2021
3. Roxy and Juliet are both active on the scientific committee for the Indian Ocean Science Symposium (IIOSC) to be hosted in 2022.

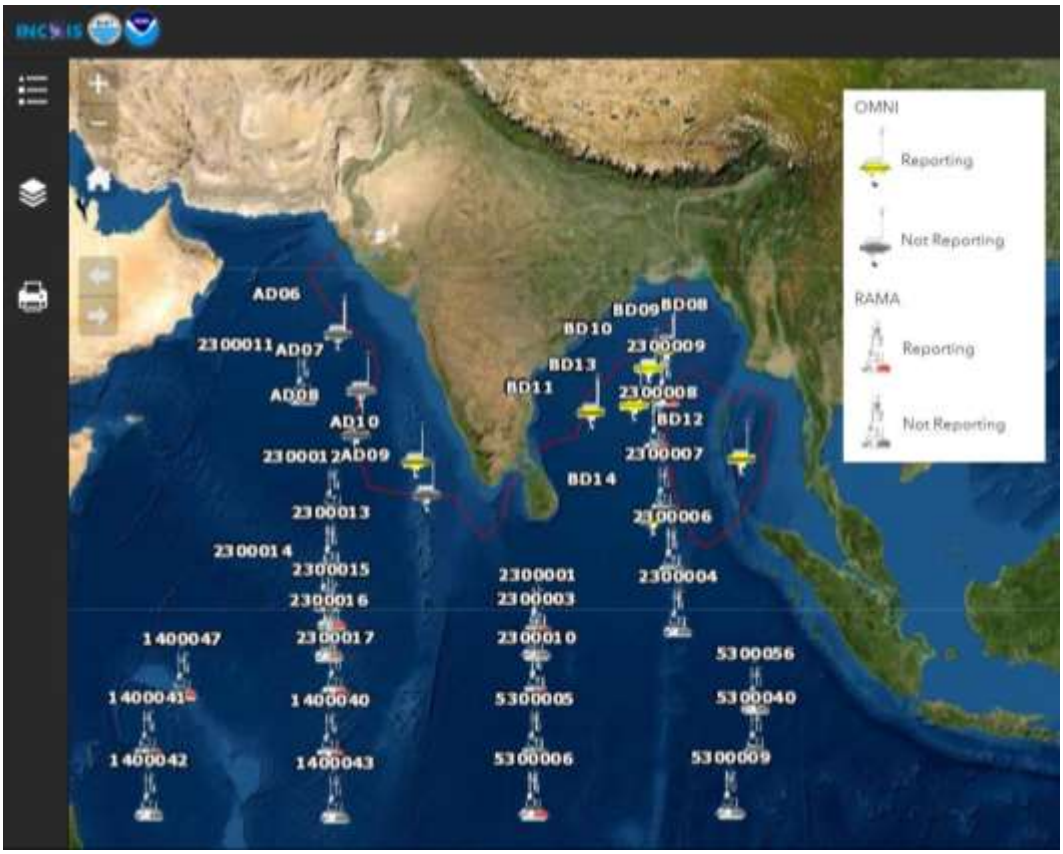
- **Implementation of IndOOS-2**

(1) NOAA-MoES partnership expanded and RAMA-OMNI dataserver launched

In August 2021, representatives from NOAA and the Ministry of Earth Sciences (MoES) of India signed an updated 5-year partnership agreement to advance ocean and atmospheric observations in the Indian Ocean for improved weather and climate prediction. The virtual signing ceremony included a live demonstration of a new joint oceanographic data portal (https://incois.gov.in/portal/datainfo/buoys.jsp) that makes data from the RAMA and OMNI moored buoy arrays in the Indian Ocean publicly available for the benefit of research and forecasting. The renewed partnership also includes additional MoES ship time support for RAMA and a commitment to more closely coordinate the RAMA and OMNI moored buoy programs scientifically and operationally. The new agreement builds on a more than decade-long partnership between NOAA and MoES for Indian Ocean studies and is backed by a broad 10-year NOAA-MoES Science and Technology MOU signed in India in October 2020.

The Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA) was designed to provide observations in the historically data-sparse Indian Ocean for improved understanding of the Indian Ocean's role in monsoons. The first RAMA buoys were deployed by NOAA PMEL in 2004, with the most recent moorings deployed in the Arabian Sea in 2019 in collaboration with MoES. The Ocean Moored Buoy

Network in the Northern Indian Ocean (OMNI) array was initially deployed in 2012 and in 2018 MoES announced that data from OMNI buoys outside the Indian EEZ would be open access and shared freely among researchers to help improve the accuracy of monsoon forecasts.



(2) Update on ocean and atmospheric observation network in Sri Lanka

Since 2012, the South China Sea Institute Of Oceanology (SCSIO), Chinese Academy of Sciences, has established an ocean and atmospheric observation network in Sri Lanka in succession, including the real-time transmission Automatic Weather Station (AWS), the flux tower, wind profiler, wave and tide gauge. In 2021, a new AWS was updated in the Southernmost point of Sri Lanka. The obtained data includes wind speed and direction, air pressure, air temperature, humidity, rainfall. In August 2021, the work was funded by the Ministry of Science and Technology, China as “China – Sri Lanka Belt and Road Joint Laboratory on tropical marine environment”.

- **<u>Indian Ocean Ambassadors for networking and dissemination</u>**

In October 2021, the IORP organized a session with representatives from various Early Career Researchers (ECR) groups working on the Indian Ocean. The ECRs were from Young Earth System Scientists (YESS), International Indian Ocean Expedition (IIOE2-ECSN), and Western Indian Ocean Marine Science Association (WIOMSA-ECSN). Representatives from these ECR groups will function as Indian Ocean Ambassadors, who

will support IORP in networking and disseminating Indian Ocean research activities and events. [link]

The first activity of Indian Ocean Ambassadors (Priyanka Yadav, YESS and Feba Francis, IIOE2-ECSN) started with organizing the First WCRP Climate Research Forum in the Southern Asia Region. The Indian Ocean ECRs are participating in the forum as moderators and rapporteurs.

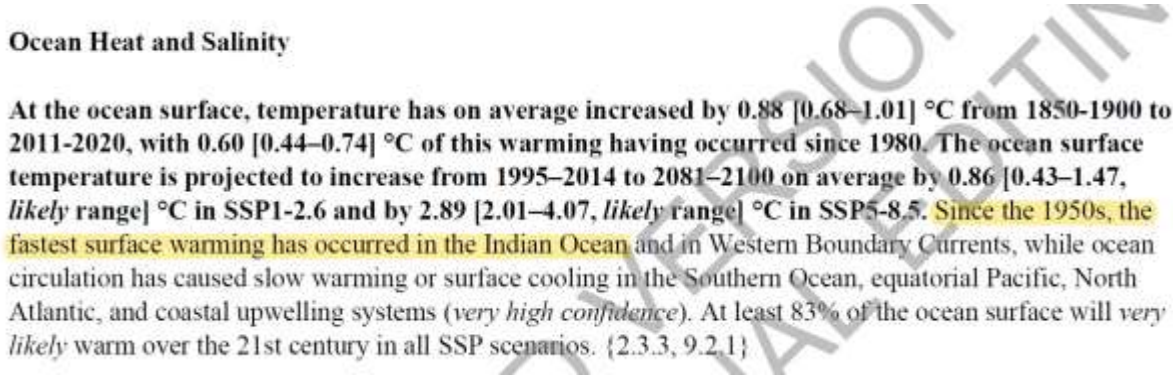
- **Update on Year of Maritime Continent (YMC)**

Due to the long lasting COVID-19 pandemic, all campaigns for the CLIVAR endorsed Year of Maritime Continent (YMC) programme planned to take place in the year 2021 have been postponed to the 2022-2023 timeframe. They include UK's TerraMaris, US/UK/Poland ELO (Equatorial Line Observations), US NOAA's Banda Sea cruise, and US MINTIE (Measuring and Modeling Indonesian Throughflow International Experiment) cruise. In addition, the 5th workshop, which was originally planned to be held in 2020 then postponed to 2021 in Taipei, was arranged as a half-day online session in the Climate Hotpot in Action Forum on September 1-3, 2021. This session was dedicated to review the current status and introduce the latest knowledge obtained through the YMC campaign by three invited speakers. Opportunity for organising another in-person workshop is being sought. In spite of such constraints, YMC researchers have actively advanced their study using data obtained in the past several campaigns. Those articles have been published from 21 journals of the seven societies as Cross-Organization Special Collection, and a master list of all papers is available in an ancillary YMC website, currently hosted by BMKG in Indonesia (https://www.bmkg.go.id/ymc/). Finally, The 2nd International Conference on Tropical Meteorology and Atmospheric Sciences (ICTMAS) was held online in March 2021, hosted by Indonesian agencies and universities. ICTMAS was commenced since 2018 and was partially intended to offer the opportunity for young scientists in Indonesia to exchange their ideas and knowledge with international scientists. This is one of the good examples of the YMC's capacity building activities. After the conference, 70 articles have been selected based on the review process, and those will be published in the IOP conference series "Earth and Environmental Science" soon.

- **Scientific results from activities**

(3) Contributing to the IPCC AR6 WG1 Report

The IPCC Sixth Assessment Report (Working Group I) specifically points out the rapid changes in the Indian Ocean. The report highlights that the warming of the Indian Ocean is the fastest among all other oceans. The research mentioned in the IPCC report includes contributions from the IIOE2/IORP community, with participation from the IORP co-chair (Dr Roxy Koll) as a Contributing Author (Chapter 9: Ocean, cryosphere, and sea level change) to this report.



Ocean Heat and Salinity

At the ocean surface, temperature has on average increased by 0.88 [0.68–1.01] °C from 1850-1900 to 2011-2020, with 0.60 [0.44–0.74] °C of this warming having occurred since 1980. The ocean surface temperature is projected to increase from 1995–2014 to 2081–2100 on average by 0.86 [0.43–1.47, *likely* range] °C in SSP1-2.6 and by 2.89 [2.01–4.07, *likely* range] °C in SSP5-8.5. Since the 1950s, the fastest surface warming has occurred in the Indian Ocean and in Western Boundary Currents, while ocean circulation has caused slow warming or surface cooling in the Southern Ocean, equatorial Pacific, North Atlantic, and coastal upwelling systems (*very high confidence*). At least 83% of the ocean surface will *very likely* warm over the 21st century in all SSP scenarios. {2.3.3, 9.2.1}

(4) Emerging Pattern of Wind Change over the Eurasian Marginal Seas

A study led by Dr. Lisan Yu, member of IORP, provides the first full characterization of decadal changes (1988-2018) of surface winds over 10 marginal seas along the Eurasian continent using a newly merged satellite vector wind data record. It is found that surface winds have strengthened over the marginal seas in the subtropical latitudes but slackened over the seas influenced by the Asian monsoon circulation. The varying relationship between the wind and ocean-temperature suggests that the response of the marginal seas to global warming may result from complex interactions between the atmosphere, ocean, and land; and this complexity demonstrates the importance of long-term satellite data records in identifying and understanding climate change and impacts at a regional scale.

- **Scientific capacity building and career support**

1. Plans were initiated for a western Indian Ocean and marginal seas workshop to be held in 2022. Funding was received from CLIVAR (although this will have to be remotivated for as the workshop will happen after April 2022). We were also successful in our request to POGO for funding. Through this funding the workshop will be enhanced by collaborating with an additional BGC Argo workshop.
2. ECS were invited to the 17th IORP meeting to facilitate enhanced promotion of IORP activities and to encourage engagement with ECS. The IORP panel had a follow up meeting with the various ECS networks who represent
3. Juliet and Roxy attended the CLIVAR SSG-26 and feedback was given around the possible interactions between IORP and the WCRP Lighthouse Activities (LHAs). In particular a number of discussions were held with the lead of the WCRP academy LHA.
4. **First WCRP Climate Research Forum in the Southern Asia Region**: Roxy and the Indian Ocean Ambassadors (Priyanka Yadav, YESS and Feba Francis,

IIOE2-ECSN) are organizing the First WCRP Climate Research Forum in the Southern Asia Region on 30 Nov 2021. This is one in a series of regional forums, where the participants will exchange ideas, discuss new activities and opportunities being developed by WCRP through its lighthouse activities (LHAs), and explore ways that our community of scientists, partner programs, funders, and end-users of our climate science can engage to meet the complex climate challenges of the future.

- **Knowledge exchange**

1. The Commonwealth prepared a Case Study paper based on the IndOOS Review.
2. The co-chairs gave input around the Indian Ocean to a planned new ocean documentary.
3. Juliet is an associate member of the **SCOR WG** "Developing an Observing Air-Sea Interactions Strategy (OASIS)" representing Indian Ocean work
4. A seminal paper led by Helen Philips and Amit Tandon was accepted for publication in *Ocean Sciences* - Progress in understanding of Indian Ocean circulation, variability, air-sea exchange and impacts on biogeochemistry (Philips et al., 2021). This paper reviews new understanding of the ocean-atmosphere system in the Indian Ocean, describing Indian Ocean circulation patterns, air-sea interactions and climate variability. It was contributed to by many past and current members of the IORP.
5. Juliet led a Policy brief the IPCC Special Report on Ocean and Cryosphere in a Changing Climate, highlighting 3 case studies in the Indian Ocean

Plans for 2022 and beyond

During 2022 we plan to hold the WIO and marginal seas hybrid workshop. We will be working towards an understanding of the current contributions to IndOOS and plan a report/summary paper on this. With the addition of ECS as part of the panel we hope to increase the social media profile of work being done on the Indian Ocean and hence encourage broader dissemination of the importance of the Indian Ocean.

The International Indian Ocean Science Conference (IIOSC) 2020 has been postponed to March 2022 and will be held as a hybrid meeting in Goa. IORP members are active in the planning committee and as session conveners. There will be ample presentations of IORP members. We

also hope to have the IORP annual meeting and a joint IORP/IRF/SIBER/IO-GOOS/IIOE2 meeting following the IIOSC.

Articles published in 2020/21 as part of panel activities (if any)

Philips et al., (2021). Progress in understanding of Indian Ocean circulation, variability, air-sea exchange and impacts on biogeochemistry. Ocean Sciences

Rapolaki, R., Blamey, R. Hermes, J. C. and Reason, C. J. C., (2021). Moisture sources and transport during an extreme rainfall event over the Limpopo River Basin, southern Africa, Atmospheric Research

Mawren, D., Hermes, J. & Reason, C.J.C., (2021). Marine heatwaves in the Mozambique Channel. Climate Dynamics. https://doi.org/10.1007/s00382-021-05909-3

Fatida, Y., Malan, N., Cronin, M. F., Hermes, J. (2021) Deep-Sea Research Part I, 175. Trends in the Agulhas Return Current. https://doi.org/10.1016/j.dsr.2021.103573

Pealman et al., **(**2021). Evolving and Sustaining Ocean Best Practices to Enable Interoperability in the UN Decade of Ocean Science for Sustainable Development", Frontiers in Marine Science, DOI: 10.3389/fmars.2021.619685

Nagura, M., (2021). Spiciness anomalies of Subantarctic mode water in the south Indian Ocean. *Journal of Climate*, Vol. 34, No. 10, pp. 3927-3953, DOI: 10.1175/JCLI-D-20-0482.1.

Nagura, M. and M. J. McPhaden, (2021). Interannual variability in sea surface height at southern mid-latitudes of the Indian Ocean. *Journal of Physical Oceanography*, Vol. 51, No. 5, pp. 1595-1609, DOI: 10.1175/JPO-D-20-0279.1.

Li, Z., H. Aiki, M. Nagura and T. Ogata, (2021). The vertical structure of annual wave energy flux in the tropical Indian Ocean. *Progress in Earth and Planetary Science*, 8, 43, https://doi.org/10.1186/s40645-021-00432-9.

Nagura, M. and M. J. McPhaden, (2021),. Predicting interannual variability in sea surface height along the west coast of Australia using a simple ocean model. *Geophysical Research Letters*, 48, e2021GL094592. https://doi.org/10.1029/2021GL094592.

Mariana C. Nieva Tamasiunas, Toshiaki Shinoda, R. Dwi Susanto, Luis Zamudio, E.Joseph Metzger, (2021). Intraseasonal variability of the Indonesian Throughflow associated with the Madden-Julian Oscillation, *Deep-Sea Research Part II*,In press.

Ningsih, N. S., S. L. Sakina, R. Dwi Susanto, F. Hanifah, (2021). Zonal Current Characteristics in the Southeastern Tropical Indian Ocean (SETIO), *Ocean Science*, Ocean Sci., 17, 1115–1140, 2, https://doi.org/10.5194/os-17-1115-2021

Mandal, S., N. Behera, P. C. Pandey, (2021). A. Gangopadhyay, and R. Dwi Susanto, Evidence of a Chlorophyll “Tongue” in the Malacca Strait from Satellite Observations, *J. Marine Research*, https://doi.org/10.1016/j.jmarsys.2021.103610

Pujiana, K., and M.J. McPhaden, (2021). Biweekly mixed Rossby-gravity waves in the equatorial Indian Ocean. *J. Geophys. Res., 126*, e2020JO016840. https://doi.org/10.1029/2020JC016840.

Xu, Tengfei, Zexun Wei, Shujiang Li, R. Dwi Susanto, Nyoman Radiarta, Chao Yuan, Agus Setiawan, Anastasia Kuswardani, Teguh Agustiadi, and Mukti Trenggono.=, (2021). Satellite-Observed Multi-Scale Variability of Sea Surface Chlorophyll-a Concentration along the South

Coast of the Sumatra-Java Islands. *Remote Sensing* 13, no. 14: 2817. https://doi.org/10.3390/rs13142817

Shroyer, E., et al., (2021). Bay of Bengal Intraseasonal Oscillations and the 2018 Monsoon Onset. *Bull. Am. Meteorol. Soc.*, https://doi.org/10.1175/BAMS-D-20-0113.1.

Susanto, R.D., J. M. Waworuntu, W. Prayogo, and A. Setianto, (2021). Moored Observations of Current and Temperature in the Alas Strait, Indonesia, Collected for Submarine Tailing Placement Used for Calculating the Indonesian Throughflow, *Oceanography*, 34(1), https://doi.org/10.5670/oceanog.2021.103.

Xu, T., Z. Wei, R. D. Susanto, S. Li., Y. Wang, Y. Wang, X. Xu, T. Agustiadi, M. Trenggono, B. Sulistyo, A. Setiawan, A. Kuswardani, G. Fang, (2021). Observed water exchange between the South China Sea and Java Sea through Karimata Strait, *J. Geophys. Res*.,10.1029/2020JC016608.

Wirasatriya A., R. Dwi Susanto, Kunarso, A. R. Jalil, F. Ramdani, A. D. Puryajati, (2021). Northwest Monsoon Upwelling Within the Indonesian Seas. *International Journal of Remote Sensing*, 42:14, 5437-5458, DOI: 10.1080/01431161.2021.1918790

Girishkumar, M.S., J. Joseph, M.J. McPhaden, and E. Pattabhi Rama Rao, (2021). Atmospheric Cold Pools and Their Influence on Sea Surface Temperature in the Bay of Bengal. *J. Geophys. Res.*, 126, e2021JC017297. https://doi.org/10.1029/2021JC017297

Zeng L., G. Chen, K. Huang, J. Chen, Y. He, F. Zhou, Y. Yang, Z. Liang, Q. Peng, R. Shi, T.P. Gamage, R. Chen, J. Li, Z. Zhang, Z. Wu, Li. Yu and D. Wang. (2021). A Decade of Eastern Tropical Indian Ocean Observation Network (TIOON). *Bulletin of the American Meteorological Society*. 102, 10; 10.1175/BAMS-D-19-0234.1

Yu, L., (2021). Emerging Pattern of Wind Change over the Eurasian Marginal Seas Revealed by Three Decades of Satellite Ocean-Surface Wind Observations. *Remote Sens.* **13**, 1707. https://doi.org/10.3390/rs13091707

Wickramage, C.H., **Wang, W.,** Arulananthan, K. et al. (2021). Dynamics of counter wind current along the south Sri Lanka coast during the Southwest Monsoon. Ocean Dynamics. https://doi.org/10.1007/s10236-021-01477-6

List of articles published by the YMC programme is available at https://www.bmkg.go.id/ymc/cosc.bmkg?p=cross-organization-special-collection&tag=&lang=ID

Other papers published relative to Indian Ocean work

Harms, N. C., Lahajnar, N., Gaye, B., Rixen, T., Schwarz-Schampera, U., and Emeis, K.-C., (2021). Sediment trap-derived particulate matter fluxes in the oligotrophic subtropical gyre of the South Indian Ocean, Deep Sea Research Part II: Topical Studies in Oceanography, 183, 104924, https://doi.org/10.1016/j.dsr2.2020.104924.

Burdanowitz, N., Rixen, T., Gaye, B., and Emeis, K. C., (2021). Signals of Holocene climate transition amplified by anthropogenic land-use changes in the westerly–Indian monsoon realm, Clim. Past, 17, 1735-1749, 10.5194/cp-17-1735-2021.

Budget and other needs for 2022 (in CHF)

Please keep in mind that the overall budget of CLIVAR is limited and this needs to be distributed between all activities and the SSG meeting.

5000 CHF contributions to the Training workshop on observing the coastal and marginal seas in the western Indian Ocean **(rolled over from 2021 as workshop was not possible), see Annex A.**

3000 CHF towards the annual meeting of the IORP which we hope to hold alongside the Indian Ocean Science Conference in Goa in March (hybrid), when there will also be the IO-GOOS and IRF meetings. We also plan to have a joint IORP/IRF/IO-GOOS/IIOE2 meeting during this conference. We hope this is received favourably as the money for the workshop is a roll over from 2021 and no costs were incurred in 2021 or 2020. Request is in Annex B below.

Annex A - Proposal for IORP coastal and marginal seas hybrid workshop

1. **Panel name:** CLIVAR/IOC-GOOS Indian Ocean Region Panel
2. **Title of meeting or workshop:** Training workshop on observing the coastal and marginal seas in the western Indian Ocean.
3. **Proposed venue (Or indicate if online):** Hybrid meeting with physical locations in Mozambique and Kuwait and global virtual attendance
4. **Proposed dates:** Winter 2021 or Spring 2022
5. **Proposed attendees, including likely number:** 10-15 in Mozambique and 10-15 in Kuwait; 50-75 globally
6. **Rationale, motivation and justification, including: relevance to CLIVAR science & WCRP Grand Challenges, and any cross-panel/research foci links and interactions involved:**

Expanding our reach to the marginal seas and coastal zones is one of the priorities of IORP. We have 2 new panel members who are experts and locals to the Arabian/Persian Gulf, Sea of Oman and Mozambique Gulf. We therefore propose a hybrid workshop looking at these under-observed regions of the western Indian Ocean - what is the current understanding of the regions and how we can best improve observations. We anticipate this workshop will lead to a greater interest from global observing systems and will be the seed for supporting enhanced observations in these regions.

The Mozambique ocean observing system (simple MozOOS) is in a start up phase, currently with 4 UTRs deployed by SA ACEP between 2002/03 (Blue dots in the map Xai-xai, Ponta Zavora, Arcadia reef, Zambia reef and Mozambique island). New sites will be established (Inhaca Island, Vamizi Island 1,2,3, and Pemba). There is a big gap in the Sofala Bank between Zambia reef and Mozambique island site which is the most important fishing ground in Mozambique and also have mines, oil and gas resources. There are complex shelf dynamics with rivers and sedimentation. There is a need to establish an observational system there, but the local expertise is limited. This is also the case for the marginal seas and the knowledge of these systems are limited, hence this workshop would also include discussions on topics related to climate change, the effect of extreme weather events e.g. abnormal monsoons, ENSO, and other relevant subjects that could benefit the countries of the region including the countries of the marginal sea.

For the ROPME (Regional Organization for the Protection of the Marine Environment) marginal sea that includes the Arabian/Persian Gulf, Sea of Oman and the NW Arabian Sea, several real-time environmental monitoring systems exist (oceanographic and weather stations). The ROPME Integrated Information System (RIIS) is not available online and data quality assurance needs to be checked. The data archived in the system would allow preparing information for decision and policy makers, utilization of the data by scientific and research institutes, as well as by agencies responsible for managing ROPME sea area coastal zone, and the public at large.

Although the focus is on the coastal and marginal seas of the WIO, this workshop will be of interest to all of the panels as all of them deal with similar issues. We would also anticipate this would be of strong interest to WMO.

7. **Specific objectives and key agenda items:**

Coastal and marginal sea observing instrumentation. Bring in some experts to discuss what is best - Cost effective, best practices, pros and cons, experiences and lessons learned
Climate impacts on the marginal seas and Mozambique coast in the WIO - presentations by local, regional and international experts
Opportunities - presentations by philanthropic organisations, break out groups to consider funding proposals etc

As part of this workshop we would also like to improve access to and understanding of available data such as Argo floats and build an outreach and awareness website, inclusive of "how to" information to access freely available Argo data, deployment techniques and information new users would be needing in the field. We would also look to extend the work to secondary school learners on the value of ocean science and how we study the oceans using ocean observing platforms

The workshop will link with the WCRP Academy group to ensure that it is inline with their planned activities and to get support for training the trainers as well as future generations of climate scientists. Perhaps be a pilot for an inward facing academy. The academy will also support with hosting the workshop information and ensuring it is available for other regional panels as well as supporting alumni registration. We are in discussions as to whether it will be an official WCRP academy workshop.

8. Anticipated outcomes (deliverables):

(a) Capacity building in the WIO region - specifically targeted at supporting ocean observing systems and utilizing global data sets. The success of the workshop will be assessed through questionnaires and follow ups.

(b) Training manual/report/website on ocean observations that can be used by other panels and the WCRP Academy

9. Format: Hybrid meeting with physical locations in Mozambique and Kuwait and global virtual attendance

10. Science Organizing Committee (if relevant)

- **Bernardino Sérgio Malauene,** **Instituto Nacional de Investigação Pesqueira, Mozambique, IORP**
- Faiza Yousef Al- Yamani, Kuwait Institute for Scientific Research, Kuwait, IORP
- Juliet Hermes, South African Environmental Observation Network, South Africa, IORP
- Roxy Mathew Koll, IITM, India, IORP
- Gregory Cowie, University of Edinburgh, UK, SIBER
- Raleigh R. Hood, University of Maryland, USA, SIBER
- Jing Li, International CLIVAR Project Office (ICPO)

11. Local Organizing Committee (if relevant)

12. Proposed funding sources and anticipated funding requested from WCRP:

(1) WCRP - 4,000 CHF

- Cost for in person attendance and logistics in Mozambique: 4000 CHF
- This funding will allow us to do a competitive call for ECR from Africa to attend the meeting, in addition to supporting the flights of the proposed specialists. The funding secured from POGO covers the costs in Mozambique (including the travel and accommodation of the local participants). The Kuwait component will be completely virtual
- Website and publication of a training manual/report, based on the workshop: 1000 CHF

(2) POGO - 7,875 USD

Instituto Nacional de Investigação Pesqueira and Kuwait Institue for Scientific Research- support for venue and meeting facilities

An additional funding application has been made to IAPSO (awaiting outcome) which will supplement the workshop with an additional day devoted to the best practices for developing a Coastal Lab in A Box. This will enhance the CLIVAR workshop and allow further in person participation of experts.

Annex B - Proforma for CLIVAR Panel requests for SSG approval for meetings

New request:

1. **Panel name:** CLIVAR/IOC-GOOS Indian Ocean Region Panel (IORP)
2. **Title of meeting or workshop:** 18th session of the IORP meeting
3. **Proposed venue (Or indicate if online):** Goa, India
4. **Proposed dates:** March 2022
5. **Proposed attendees, including likely number:** IORP members (3 physical and the rest hybrid/self funded)
6. **Rationale, motivation and justification, including: relevance to CLIVAR science & WCRP Grand Challenges, and any cross-panel/research foci links and interactions involved:**

It is possible that if situation ease up in 2022, that the International Indian Ocean Science Conference (IIOSC) will be held in early 2022 (which was postponed from 2020 due to COVID-19 pandemics), and IORP meeting with IRF/SIBER/IOGOOS could be carried out. It will likely be a hybrid meeting.

7. **Specific objectives and key agenda items:** IndOOS-2 Implementation and Report; Linking to IIOE-2 and IOGOOS; IORP interested researches in collaboration with SIBER; preparation of the pan-CLIVAR workshop on ocean observations in 2022, Italy; contribution to UN Ocean Decade and WCRP implementation; IORP membership etc. This will also be the icebreaker session and first in-person (hybrid for some) meeting with the Indian Ocean Ambassadors.
8. **Anticipated outcomes (deliverables):** Meeting report. A consortium of Indian Ocean Ambassadors.
9. **Format: TBC**
10. **Science Organizing Committee (if relevant)**
11. **Local Organizing Committee (if relevant)**
12. **Proposed funding sources and anticipated funding requested from WCRP:**

3,000 CHF (travel expenses for 3 IORP members, if the meeting can be organised in person.)