



**16th Annual Meeting of
Indian Ocean Global Ocean Observing System (IOGOOS) &
Officer's Meeting**

**Virtual Meet on
July 16, 2020 &
February 02, 2021 (Officer's Meet)**

Introduction

The IOGOOS 16th annual meeting scheduled to be held in Goa during March 2020 was postponed due to COVID-19 pandemic situation. However, to review the progress and move forward, the 16th Annual meeting of IOGOOS was held online on July 16, 2020. IOGOOS members and leading representatives from IOGOOS allied projects viz. Indian Ocean Research Panel (IORP), Sustained Indian Ocean Biogeochemistry and Ecosystem Research (SIBER), Indian Ocean Observing System (IndOOS) Resources Forum (IRF) and International Indian Ocean Expedition (IIOE-2) have participated in this e-meeting. The representatives / focal points of the member institutions from Australia, India, IOC Perth Regional Programme Office, Maldives, Kenya, USA were present. The detailed agenda of the e-meeting is provided at **Annexure 1**.

Dr. S. S. C. Shenoi, Chair, IOGOOS welcomed the members and recollected the relevance of IOGOOS and its activities. Dr. Nick D'Adamo, in his opening remarks thanked IOGOOS secretariat and India for providing the resources required for hosting of the Secretariat as well as to carry out the secretariat activities.

Reporting to IOGOOS:

Report from Indian Ocean Regional Panel (IORP): Dr. Roxy Mathew Koll provided the update on the IORP Members panel and informed that new members from Indonesia and Germany were invited to the panel. IORP led the decadal review of Indian Ocean Observing System with SIBER and the report was finalized during December 2019. The Complete report can be accessed at <https://www.clivar.org/documents/full-report-indoos-2-roadmap-sustained-observations-indian-ocean-2020-2030>. Dr. Roxy mentioned that there is a need to enhance more regional partnership and representation from members of Western Indian Ocean Region (Eastern Africa and Small Island countries). Dr. Roxy also briefed about the China-Kenya partnership and conduct of joint investigation over the Kenyan EEZ region with R/V Mtafiti. The outcome of this cruise will also make contributions to both IndOOS and IIOE-2. Dr. Roxy iterated that IORP is closely interacting with IRF for implementing the IndOOS-2 recommendations.

Report from SIBER: Dr. Greg Cowie, Co-chair of SIBER reported on the progress of SIBER. Dr. Greg presented the updates about the SIBER Science Steering Committee (SSC) and Executive Committee (EC) membership, updates related to SIBER website, India National SIBER Program, etc. Dr. Greg informed that SIBER SSC is working to motivate review papers based on the SIBER Science plan research themes. He summarized the biogeochemical (Bio-Argo) sensor deployments made in the Indian Ocean by Australia and India in Northern Indian Ocean and Southern Indian Ocean. Dr. Greg also briefed about the SIBER and IIOE-2 activities taken up under various programmes and through various participating countries. He also briefed about the publication of three volumes in Deep-Sea Research covering the activities of IIOE-2 under the title “The 2nd International Indian Ocean Expedition (IIOE-2): Motivating New Exploration in a Poorly Understood Basin”.

Report from IndOOS Resource Forum: Dr. Sidney Thurston, Chair of IRF presented the report. Dr. Sidney recalled that prior to the meeting a report on the Indian Ocean Observing

System (IndOOS) Resources Forum (IRF) of IOGOOS was prepared. It summarized the evolution of IRF and its status and recommended actions on renewal of the IRF membership. The same was circulated to the members with revised Terms of Reference for IRF. It was informed that membership renewals were undertaken and further work will be carried out post-IRF-10 to reactivate the members. It was informed that there were suggestions for new members came from IORP and SIBER Members and Chair, IOGOOS wrote to new invitees and the latest IRF Member list (as on March, 2019) is attached herewith at **Annexure 2** along with the IRF 10 report.

IOGOOS noted the draft IRF-10 minutes at **Annexure 2** and accepted it. The ToRs for IRF membership was also revisited the amended Terms of Reference of IRF given at 5.2 (reproduced below) is accepted by IOGOOS without change.

“5.2. At the close of every other session, the IRF will elect from its members a Chair who will serve in that capacity for the next two sessions. An individual shall normally serve no more than two consecutive terms as Chair i.e. (4 years total). However, if the IRF membership believes it is in the interests of IRF to retain an effective Chair for longer than two consecutive terms then this may be done by consensus of the IRF at the close of every other session. In the event of periods for which the Chair position is not designated and vacant, the IRF Convenor will represent that role as a pending measure.”

Report on the status and progress of IIOE-2:

Dr. Nick D'Adamo presented the brief report on IIOE-2. Dr. Nick mentioned that IIOE-2 was supposed to meet formerly in full capacity at Goa, India in March 2020, which was postponed due to COVID-19 pandemic situation. The IIOE-2 Steering Committee (SC) has an executive level core group (referred as IIOE-2 SC Executive Level Core group), which is a subset of the IIOE-2 SC, which works on behalf of the IIOE-2 SC to facilitate high priority issues and discuss strategy matters, facilitate operational matters, etc. This Group Consists of three Co-chairs of IIOE-2 SC and co-chairs of three working groups, coordinators from both JPOs. This core group met, in-lieu of the face-to-face Goa meetings. The Core group is looking for a partner to co-chair the working group on Data management to replace Dr. Cyndy Chandler, who stepped-down a year ago. The group is eagerly waiting for a face-to-face meetings, which is looking forward to meet back-to-back with the International Indian Ocean Science Conference (IIOSC) and other international meetings. Intermittently, e-meetings of core group, every three months or so, will be continued to review the progress of the activities. If the situation continues and face-to-face meeting further extends, we may continue through electronic hook-up meetings. From the support point of view, both the Australian and Indian Node of JPOs are working together and seamlessly.

Report from the Modelling for Ocean Forecasting and Process Studies Project:

Chair, IOGOOS mentioned that IOGOOS had two projects initially and they were very active projects and helped many members in building capacity. In India, INCOIS had Indian Ocean forecasting system and CSIRO, Australia had Blue-Link forecasting system. Though there was interest from the member countries initially, of late, the project was not active in recent past. We need to discuss whether we need to continue this or not and requested Dr. Nick to respond. Dr. Nick D'Adamo reported that the project is on hold but we maintain the pilot project title, because in Sidney we introduced the virtue and necessity of connecting the observations with the modelling and there was an action item in IRF minutes on this. We may need to take-up this as an Indian Ocean wide project under the auspices of IIOE-2 or Indian Ocean Rim countries

Association (IORA). IORA and IOC are finalizing the Memorandum of Understanding (MoU) between the two entities to work on joint collaborations that include development of capacity of overall community in the Indian Ocean region. We may keep the project and we may rejuvenate this in next one / two years.

Chair, IOGOOS suggested that INCOIS have a good modelling group and can think of organizing a small online training program if COVID doesn't subside sooner or a tutorial for the benefit of other members on Ocean modelling. The training could be on ocean modelling aspects and how to utilize data for Ocean forecasting. Dr. Bala Director, I/c said that INCOIS has lot of experience in operational ocean modelling capabilities which can be directly beneficial to these project stakeholders. INCOIS can organize one such online training under IOGOOS. Dr. Bala also suggested that this is an important project and need to take up rigorously to harvest its capacity and benefits. We can also integrate the observations from other countries into the models for the benefit of all members. Chair, IOGOOS suggested that INCOIS can play a major role in this and thanked Director, INCOIS.

Report from the Indian Ocean Core Remote Sensing Project: Chair IOGOOS mentioned that this project provided satellite data products on various parameters. The proposal by Dr. David Antoine, which was endorsed by IOGOOS, was focussed to enhance the data availability and is closely linked to this project of IOGOOS. We may link this project with David's project for taking forward. Mr. Nagaraja Kumar informed that at present, there is no specific activity in this project. However, keeping in view of the earlier requests made by IOGOOS member countries, various remote sensing data products for various countries are still being prepared and the same is accessible from INCOIS Website.

IOGOOS 16th Annual General Body Meeting:

Dr. Sheno, Chair of IOGOOS presented his report to the annual meeting and Mr. M. Nagaraja Kumar, Secretary of IOGOOS presented the secretariat report and the accounts and financial summary of the Secretariat. The action taken report from the Secretariat is attached at **Annexure 3**.

Report of Chair IOGOOS: Dr. Sheno reported that most of the activities of IOGOOS are happening through IORP, SIBER, IRF and IIOE-2. IOGOOS has also participated in the GOOS Regional Alliance Forum (GRA) and presented the status of GRA and its success story. A letter of support, with the concurrence of IOGOOS Officers, was provided to Dr. David Antoine, Curtin University, Australia towards a proposal focused on merging of ocean colour data and produce consistent merged gridded products with improved spatial coverage and quality. This proposal is being submitted to the Australian Integrated Marine Observing System (IMOS) against a call for proposals on "New Technology Proving" concepts. In continuation to the discussions held during last IOGOOS meeting with regard to continuation of IIOE-2 beyond 2020, IOGOOS, as one of the sponsor, recommended that IIOE-2 should be continued for next 5 years i.e. 2020-2025 and the same was conveyed to other co-sponsors IOC and SCOR. Chair suggested that a presentation from Chair of IOCINDIO may be included in the IOGOOS annual meetings so as to have the information on IOCINDIO activities and to explore the areas of joint interest and take up the joint collaborative activities.

Memberships: Mr. Nagaraja Kumar, Secretary, IOGOOS informed that efforts were put in place in reactivating the membership of few non-active member institutes and few institutes were positive and re-engaged into IOGOOS. In addition, Chair, IOGOOS invited Centre for Marine and Coastal studies (CEMACS), Universiti of Sains Malaysia, Malaysia to become member. The

forum welcomed all the re-engaging institutes and CEMACS and appreciated the efforts of the Secretariat in re-engaging the members as well as appreciated CEMACS for coming forward to join the IOGOOS Family. Dr. Aileen Tan, Director of CEMACS was thanked and welcomed by Chair, IOGOOS.

Election of Officers: Mr. Kumar, Secretary, IOGOOS informed the present status of IOGOOS Officer Positions (**Annexure 4**). He also informed that the present Chair of IOGOOS, Dr. S.S.C. Shenoi retired from service and hence the post representing Central Indian Ocean will fall vacant and the election need to be made. The forum suggested that IOGOOS Secretariat to conduct the election of officer and Chair of IOGOOS out of session, due to time constraints. It was also suggested that an existing officer can act as an interim chair.

Hosting of IOGOOS Secretariat: Mr. Kumar informed that the term of IOGOOS secretariat being hosted by INCOIS, India is ending by October 2020 and need to be re-elected. As per the MoU, a prior notification (**Annexure 5**) was communicated to all the member institutes and sought the nominations to host IOGOOS Secretariat for the period November 2020- October 2026 for which no nominations were received. The forum suggested taking up this out of session.

Towards these out of session tasks and to finalize hosting of Secretariat and Officers positions, a communication was made to all IOGOOS Members seeking the nominations from member institutes. With regard to Officer Position from Central Indian Ocean, only one nomination from Dr. T. Srinivasa Kumar, Director, INCOIS was received and the same was supported by Chairs of IORP. The same was communicated to all IOGOOS Members (vide email dtd. November 10, 2020) (**Annexure 6**). As no nominations were received for hosting of IOGOOS Secretariat and to continue the IOGOOS activities, India agreed to continue hosting of IOGOOS Secretariat. All Members welcomed the offer and thanked India and Ministry of Earth Sciences (MoES) through INCOIS for agreeing to host the Secretariat. Also, all the members have concurred on the nomination of Dr. T. Srinivasa Kumar as Officer representing Central Indian Ocean and agreed to conduct a virtual meeting among the IOGOOS Officers to select the Interim-chair of IOGOOS (**Annexure 6**).

A virtual meeting with IOGOOS Officers, Secretariat and Head, IOC PRPO was conducted on February 02, 2021 with agenda points as (i) Selection of Chair, IOGOOS and Secretary, (ii) Nomination of IOGOOS representative on IIOE-2 Steering committee (iii) IOGOOS contributions towards Ocean Decade and (iv) Utilization of IOC Funds to IOGOOS during the year 2021. Elaborate discussions were made on the above agenda points and the following are the summary of discussions.

Agenda Point 1: As per IOGOOS MoU Clause 6.6, if an officer resigns the position shall remain vacant until the next annual meeting. However, if the chair is unable to serve, one of the Officers will be nominated by the Officers, to act as a Chair, till next Annual meeting. Accordingly, Dr. T. Srinivasa Kumar has been requested to act as the interim Chair of IOGOOS.

Mr. Nagaraja Kumar, Secretary, IOGOOS has mentioned that he has been serving as Secretary since 2008 and willing to step down due to his official engagements at INCOIS. Dr. T. Srinivasa Kumar in the capacity of Director, INCOIS (the host institute) has nominated Dr. Satya Prakash, Scientist at INCOIS to the position. Keeping in view of the activities being undertaken by Dr. Satya Prakash, per se, through SIBER IPO, IIOE-2 JPO and Ocean Decade activities, the Officers supported the nomination. However, in order to make the smooth transition of the secretariat activities, the forum requested Mr. Nagaraja Kumar and Dr. Satya Prakash to continue

as Co-Secretaries for next 6 months and then Dr. Satya Prakash to take over as Secretary. This proposition was supported and accepted.

Agenda Point 2: The forum requested Secretariat to communicate with Dr. Shenoi, Former Chair, IOGOOS and Director, INCOIS, who has been nominated from IOGOOS to act as Co-Chair of IIOE-2 Steering committee. The forum may be updated with the response of Dr. Shenoi to further decide on the point.

Agenda Point 3: The officers felt that IOGOOS should contribute to the Ocean Decade activities and a planning meeting may need to be conducted. The Secretariat was tasked to send out a communication to all IOGOOS Members to seek the ideas / interests towards the same.

Agenda Point 4: With regard to utilisation of IOC Sponsored funds of US\$20000 within the year 2021 towards IOGOOS activities, the forum recollected that every year the funds are being utilised towards travel of the members and experts to attend the integrated meetings of IOGOOS, which is not feasible due to the present COVID-19 pandemic situation. Keeping in view of this, it is proposed to check with IOC, during forthcoming IOC Assembly sessions, about the possibility of carrying forward the funds to year 2022 for using during IIOSC meetings scheduled in March 2022. In case the feasibility is ruled out by IOC, as an alternative mechanism for fruitful utilization of the funds, the officers agreed upon and proposed to conduct workshop cum training and planning meetings that are required towards (i) Reviving the Modelling and ocean forecasting project of IOGOOS, (ii) to build capacity in enhancing biological observations in the region (through eDNA, etc.) and to (iii) plan the Ocean Decade initiatives. The Secretariat was tasked to consult with the IOGOOS Members to seek the areas of interest for capacity building as well as the initiatives to be taken up under Ocean Decade. IOGOOS Secretariat was requested to also prepare a proposal with all these activities to seek the funding from IOC.

Membership fees: Mr. Nagaraja Kumar informed that requests along with Invoices have been sent to IOGOOS member countries for remittance of the Annual Membership fee for the period 2019-20. Nine Member institutes are in the process of paying the fees whereas contacts are to be established for few member countries as the original signed dignitaries are not available. Keeping in view of the discussions in GOOS regional Alliance (GRA)-9 Forum in Tokyo (Aug 2019), it was felt that the membership of IOGOOS needs to be renewed to enhance IOGOOS visibility and role, through inclusion of members from relevant bodies / institutes / agencies. A briefing paper prepared by Dr. Nick and Dr. Shenoi, Chair, IOGOOS on the same is attached at **Annexure 7**.

The briefing paper is accepted with one clarification on the Membership fees. The members may no longer need to pay the membership fees as a mandatory requirement for both existing and new members, but rather a voluntary contribution that members may be sought to do financial contribution towards IOGOOS projects, per se up to USD 500 per year, or more. Furthermore, members in general would be urged to seek /provide higher levels of sponsorship to IOGOOS for its projects.

Also, there was a recommendation to increase the focus on Western Indian Ocean (WIO) and the membership from the institutes in WIO. Also agreed by all members to increase the collaboration with the GRA collegiate, GOOS Africa. Effort may now be required within IOGOOS to develop a way to achieve the WIO objective.

IOGOOS Secretariat was tasked to continue pursuing with potential members inviting them to join as members. Similarly, if any institutes willing to join, IOGOOS may welcome them to join the family.

Accounts and Financial Summary of IOGOOS by Secretariat: Mr. Nagaraja Kumar has presented the accounts and financial summary of the IOGOOS accounts. He briefed the details of expenditures made and the income for the past one year. He requested Chair to nominate an officer for verification of the accounts and approve it. Chair suggested to send statement of expenditure soft copy to all members, if any corrections are needed then they will intimate to secretariat, if suggestions not received regarding financial statement, then treated as approved of the accounts and statement of expenditures. The statement of accounts and financial summary in USD currency is attached at **Annexure 8**.

Next meeting: As a general practice, the next meeting may be co-located with other meetings of IORP, SIBER, IRF, IIOE-2 and IIOSC. This may be dealt with by Secretariat in consultation with Officers out of session.

Acknowledgements: The IOGOOS Secretariat greatly acknowledges IOC/UNESCO for providing the necessary support through IOC Perth RPO for the meetings of IOGOOS. We also would like to place on record the great support extended by IOC Perth Programme Office. The IOGOOS Secretariat also thanks and appreciates each and every officer and member institutes for their support in taking forward the IOGOOS Activities.

Annexure-1

16th Annual Meeting of Indian Ocean Global Ocean Observing System (IOGOOS)

Provisional Agenda(Online)

July 16,2020 in between 1400 Hrs - 1700 Hrs

GOTO Webinar @ <https://global.gotomeeting.com/join/881024229>

<p>14:00 Hrs to 14:30 Hrs</p>	<ul style="list-style-type: none"> ✚ Opening : <ul style="list-style-type: none"> ➤ Welcome Address by Dr S. S. C. Shenoi, Chair IOGOOS (5 min) ➤ Opening Remarks by Dr. Dr. Brett Molony, IOGOOS Officer (5 min) ➤ Opening Remarks by Dr. Faiza Al Yamani , IOGOOS Officer (5 min)- Unable to Join ➤ Opening Remarks by Dr. Dr. Jenny Huggett, IOGOOS Officer (5 min) ➤ Opening Remarks by Dr. Dr. Elaine McDonagh, IOGOOS Associate Officer (5 min) ➤ Opening Remarks by Dr. Nick D’Adamo, Officer in Charge, IOC-Perth Regional Programme Office (5 min) ✚ Organization of the Meeting (including confirmation of agenda and additional agenda items) by Dr. S. S. C. Shenoi, Chair, IOGOOS
<p>14:30 Hrs to 15:30 Hrs</p>	<p>Reports from Panels [IOGOOS, IRF, SIBER, IORP, IIOE-2]</p> <ul style="list-style-type: none"> ✚ Report from the Indian Ocean Region Panel (IORP Chair) - Dr. Lisa Beal ✚ Report from Sustained Indian Ocean Biogeochemistry and Ecosystem Research (SIBER Chair) – Dr. Gregory Cowie ✚ Report from IndoOOS Resource Forum (IRF Chari) – Dr. Sidney Thurston ✚ Report on the status and progress of IIOE-2 (JPO office/s) – Dr. Nick / Dr. Satya Prakash ✚ Discussions on the following projects way forward <ul style="list-style-type: none"> ▪ Modeling for Ocean Forecasting and Process Studies Project (Project Leader) ▪ IOGOOS Pilot Project: Indian Ocean Core Remote Sensing Project IOGOOS (Project Leader)
<p>15:30 Hrs to 17:00 Hrs</p>	<ul style="list-style-type: none"> ✚ IOGOOS Annual Meeting. Chair, Dr. S. S. C. Shenoi, IOGOOS Chair <ul style="list-style-type: none"> ➤ Report by Chairman, IOGOOS ➤ Presentation of Secretariat Report and Accounts and Financial Summary of IOGOOS by Secretariat ➤ Confirmation of new memberships, if any and proposal by IOGOOS Chair: ➤ Making IOGOOS membership appropriate for its current constituency - proposal for having standing members drawn from leadership/rep/patrons (to be discussed) from IOGOOS, IIOE-2, IORP, SIBER, IRF, IOCINDIO and IORA in response to the emergence of this integrated group of alliances and their intrinsic relationship and alignment ➤ Elections of Chair IOGOOS, Officers if any ➤ Notification for Hosting of IOGOOS Secretariat from Nov 2020 onwards ➤ Discussion on the membership fees ➤ Discussions on taking up of new projects of Interest to the region ➤ Next meeting date , venue and hosting - to be considered with joint input from IOGOOS, IOP, SIBER and IRF Chairs ➤ Any other final items

**Tenth Indian Ocean Observing System (IndOOS) Resource Forum
IRF-10**

Part 1 held Wednesday 25 March 2020, UTC 01:00-04:15

Part 2 held Thursday 30 April 2020, UTC 0100-0300

CONSOLIDATED MINUTES OF IRF-10 PARTS 1 AND 2

DRAFT as at 25 May 2020

(ref: to Convener, nick.dadamo@bom.gov.au)

Meeting Title	Tenth Annual Meeting of the Indian Ocean Observing System Resource Forum (IRF-10) -held as Parts 1 and 2
Dates & Times	Part 1 held Wednesday 25 March 2020, UTC 01:00-04:15 Part 2 held Thursday 30 April 2020, UTC 0100-0300
Location	Remote Access Via GoToMeeting , hosted by NOAA
Chair	Sidney Thurston
Convener	Nick D'Adamo
Rapporteurs	Sarah Gardner IOC PPO (Part 1); Kaitlyn Lowder NOAA (Part 2)
	IRF members and ex-officios (with observer attendance welcomed by request to Chair)
Host	<p>IRF-10 was held in lieu of the cancelled in-situ meeting that was to have been held in Goa 25 March 2020, to have been hosted by the Indian National Center for Polar and Ocean Research (NCPOR). That in-person meeting was cancelled due to the COVID-19 situation.</p> <p>The IRF-10 was held as Parts 1 & 2 – both as e-meetings hosted by the US National Oceanic and Atmospheric Administration (NOAA), through IRF-10 Chair Sidney Thurston.</p>

IndOOS Resource Forum IRF-10 Parts 1 & 2 City Start Times

Meeting Date/Time	Location	Local Time	Time Zone
	Tokyo	Thursday, 30 April, 10:00 A.M.	JST
	Beijing	Thursday, 30 April, 9:00 A.M.	CST
	Jakarta	Thursday, 30 April, 8:00 A.M.	WIB
	Perth	Thursday, 30 April, 9:00 A.M.	AWST
	New Delhi	Thursday, 30 April, 6:30 A.M.	IST
	Washington DC	Wednesday, 29 April, 9:00 P.M.	EDT
	Seattle	Wednesday, 29 April, 6:00 P.M.	PDT
	Corresponding UTC	Thursday, 30 April, 01:00UTC	

These minutes are according to the Agenda of the Tenth Annual Meeting of the Indian Ocean Observing System Resource Forum (IRF-10)

Note: Agenda Items 1, 4, 5, 6 & 14 were covered during IRF-10 Part 1; Agenda Items 2, 3, 7, 8, 9, 10, 11, 12 & 13 were covered during IRF-10 Part 2.

1. Chair's Brief Welcome & Objectives, self-introductions, confirmation of agenda, and identification of 'any other business' for the agenda (IRF Chair, All – 10 minutes)

- Sidney Thurston kindly welcomed everyone to IRF-10 and expressed his honor to act as Chair of IRF.
- IRF-10 was one of the integrated set of e-meetings held or planned to be held during March-May 2020, involving, in addition to IRF-10, the meetings of IIOE-2 SC4, IOGOOS-16, IORP-16, SIBER-10.
- Sidney overviewed the IRF-10 agenda which was circulated ahead of the meeting.
- The IRF-9 minutes, as edited after review by members following IRF-9, is at Appendix 1.
- Appendix 2 includes the state of IRF membership, as it stood immediately after the IRF-9 meeting (~ March 2019), taking account of the then recent retirements and inclusions.
- Sidney highlighted the importance of Indian Ocean marine and climate science and that this meeting would enable the group to create momentum for IRF, considering the postponement of the meetings that were to have been held in-situ in Goa India, due to the COVID-19 situation.

- Sidney provided all participants (see below) an opportunity to introduce themselves and highlight their respective agency/area of Indian Ocean focus and research.
- Participants (across both IRF-10 Parts 1 & 2) were as follows:

IRF Full Members:

- **Chair.** Sidney Thurston (NOAA, USA); and as proxy for IRF Member David Legler (NOAA, USA) (Parts 1 & 2)
- **Australia.** Michelle Heupel (IMOS, Australia) (Parts 1 & 2)
- **Australia** (Alternate), Indi Hodgson-Johnson (IMOS, Australia) (Part 1)
- **India.** Satheesh Shenoi (INCOIS, India) as IOGOOS Chair, and also as proxy for IRF Member M N Rajeevan (Ministry of Earth Sciences, Indian Government) (Parts 1 & 2)
- **Japan.** Kentaro Ando (JAMSTEC, Japan) (Parts 1 & 2)
- **Indonesia.** Nelly Florida (BKMG, Indonesia) (Part 1); Apology Part 2)
- **France.** Jean-Marie Flaud (Member) and Gerard Eldin (alternate). (Both apologies Parts 1 & 2).
- **China.** Chen Zhi (Member) (Apologies Parts 1 & 2)
- **Iran.** Berhooz Abtahi (Apologies Parts 1 & 2)
- **South Korea.** Membership yet to be resolved.
- **South Africa.** Dismore Gilbert Siko (Apologies Parts 1 & 2)

IRF Members – International Organizations:

- **ICPO.** Jose Santos (ICPO, China) (Parts 1 & 2)
- **ICPO.** Alternate. Jing Li (ICPO, China) (Parts 1 & 2)
- **UNESCO IOC.** Vladimir Ryabinin (UNESCO IOC, France) (Apology Part 1; Attended Part 2)
- **IRF Convener.** Nick D'Adamo (IOC PPO) (Parts 1 & 2) (and as proxy for Vladimir Ryabinin (UNESCO-IOC, France) in Part 1)

Rapporteur:

- Sarah Gardner IOC PPO (Part 1)
- Kaitlyn Lowder NOAA (Part 2)

IRF Ex-Officio Members:

- **IORP.** Co-Chair Roxy Koll (IITM, India) (Parts 1 & 2). Co-Chair Lisa Beal (University of Miami, USA). (Apology Part 1; Attended Part 2).
- **SIBER.** Chair Greg Cowie (University of Edinburgh, UK) (Attended Part 1; Apology Part 2). Co-Chair Raleigh Hood (University of Maryland, USA) (Parts 1 & 2). Secretary. Satya Prakash (INCOIS, India) (Apologies Parts 1 & 2).
- **IOGOOS**
 - Chair. Satheesh Shenoi(Parts 1 & 2)
 - Secretary. N Kumar(Apologies Parts 1 & 2)
 - Officer – East Indian Ocean. Brett Molony (Apologies Parts 1 & 2)
 - Officer – West Indian Ocean. Faiza Al Yamani (Apologies Parts 1 & 2)
 - Officer – Project Representative. Jenny Huggett (Apologies Parts 1 & 2)
 - Officer – Project Representative. Elaine McDonough (Apologies Parts 1 & 2).

Observers:

- Luca Centurioni (Scripps, USA) (Parts 1 & 2)
 - Chaojiao Sun (CSIRO, Australia) (Parts 1 & 2)
 - Arnold Gordon (Columbia University, USA) (Part 1)
 - Mark Ward (Ocean X, USA) (Parts 1 & 2)
 - Theresa Paluszkiwicz (Oceanography Society, USA) (Parts 1 & 2)
 - David Allen (NOAA, USA) (Part 1)
 - Sivaji Patra (SASP/SACEP, Sri Lanka) (Part 1)
 - Jim Costopulos (Global Oceans, USA) (Parts 1 & 2)
 - Amit Tandon (University of Massachusetts, USA) (Parts 1 & 2)
 - R. Venkatsen (NIOT, India, and representing GOOS Regional Alliance Council) (Parts 1 & 2)
 - Mike McPhaden (NOAA, USA). (Part 2).
 - Kaitlyn Lowder (NOAA, USA) (Parts 1 & 2)
 - Verena Hormann (Scripps, USA) (Parts 1 & 2)
 - Weidong Yu (SYSU, China) (Parts 1 & 2)
 - Mohammed Muslem Uddin (Chittagong University, Bangladesh) (Parts 1 & 2).
 - Ken Connell (PMEL, USA, RAMA Array) (Part 2)
 - Joshua Lustig (US Embassy, Jakarta) (Part 2).
- Sidney mentioned that this meeting (IRF-10) would focus on informational objectives, and that he intended that the IRF would hold quarterly e-meetings and with the next meeting in three months to be more details focused.
 - Sidney reiterated the main goal of IRF-10 was to overlay the recommendations of the Indian Ocean Observing System (IndOOS) Decadal Review with what activities participants are currently undertaking in the Indian Ocean, and plan to implement a more unified approach with the most effective output. He gave the UN Decade and the need for ship time as other examples that may guide IRF's priorities from here on.
 - Sidney reassured all that a repository will be established to make all IRF-10 presentations available as PDFs. To be further advised via the Convener.
 - The Agenda was formally adopted by the meeting participants.

Action Item 10.1. IOC PPO (through Convener) to establish and advise of a repository for access to IRF-10 presentations.

Presentations can be accessed here:

https://drive.google.com/open?id=1fazgli1S6945LvQXf-GKSYJ2P5i_CUCM

2. Convener's Brief report. (IRF Convener – up to 20 minutes).

Report on key issues, including:

- Ratify Minutes of IRF-9(*Please See Appendix 1*).
 - This was done in IRF-10 Part 1. No further changes. Minutes IRF-9 accepted.
- Revisit Action items from IRF-9.

- Reference was made to the outstanding task that IORP and SIBER had in respect to submitting their ‘resources requests’, in written form, to IRF.

Action Item 10.2 (being an update and replacement of the previous similar action item). IORP and SIBER leaderships to submit their annual resources request to IRF.

- IRF’s **membership renewal** (Please see Appendix 2)
Review current membership and identify prospective members, with strategies to be identified on how to liaise with and encourage future members.
 - It was agreed to act on the need to advise any current Members that were inactive that they are thanked for their service and rotated off IRF, as per the protocol in the ToR for member rotations.
 - It was agreed that all may suggest new Members for the Chair to consider and invite onto IRF, again referring to their capacities to provide or harness ‘resources’ for IRF in the context of advancing IndOOS (now IndOOS-2), as per the ToR.
 - Sidney Thurston indicated that he is strongly committed to having IRF evolve to be a forum that not only focuses on *resources for just ‘observations’* per se but also on providing facilitation and support for the use of ocean observational information, in the context of the role of IRF in the realm of ‘*ocean information services*’ (that is to facilitate users of the data across those needing data, information, modelling etc.). This could be achieved by including appropriate carefully selected members of IRF.
 - Notwithstanding support for Sidney’s submission, especially by identifying relevant potential Members that can represent beneficiary/user spheres that have a clear ‘stake’ in the data, it was also agreed that there needs to be an emphasis on maintaining a Membership complement that is not overly large and overly difficult to manage – with the emphasis on having Members that are active and truly able to support IRF as per the ToR.
 - Sidney added that given WMO’s new role in supporting GOOS via its revised framework, consideration should be given to engaging WMO in IRF via Membership.

Action Item 10.3. All. Identify prospective new Members that they wish to see on IRF, referring to the ToR for such, and forward to the Chair IRF to coordinate consideration of new memberships by the IOGOOS Chair.

- Examination of its **Terms of Reference** (ToR) The current ToR remain as they stood in 2017 and are copied to **Appendix 3**.
 - Reference was made to the historical Action Item for IRF to review IRF’s current ToR (they were last revised on 31 March 2017).
 - It was discussed and agreed that the only change to be made was to ToR 5.2, in order to allow for an effective Chair to sit as Chair for longer than 4 years, subject to IRF endorsement. This was discussed and actioned as follows.

Action Item 10.4. Convener to edit ToR 5.2 to read:

“5.2 At the close of every other session, the IRF will elect from its members a Chair who will serve in that capacity for the next two sessions. An individual shall normally

serve no more than two consecutive terms as Chair i.e. (4 years total). However, if the IRF membership believes it is in the interests of IRF to retain an effective Chair for longer than two consecutive terms then this may be done by consensus of the IRF at the close of every other session. In the event of periods for which the Chair position is not designated and vacant, the IRF Convener will represent that role as a pending measure.”

The revised ToR as at IRF-10 are to be disseminated to members along with the IRF-10 minutes, and brought to IRF-11 for ratification by IRF and then to IOGOOS Chair for acceptance.

3. Status of IRF secretariat support. (Convener – up to 5 minutes). Report by Convener.

- IOC PPO will continue to support IRF in Secretariat mode, including the Convener.

4. SIBER Annual submission to IRF on Resources Needs for their Respective and Collaborative programs. (SIBER Chair – up to 10 minutes each).

- SIBER to present summaries of key resource requirements (operational and/or strategic) to IRF - Professor Raleigh Hood, UMCES

Title: SIBER: Sustained Indian Ocean Biogeochemistry and Ecosystem Research. Report to IRF

- Raleigh Hood (Co-Chair SIBER) provided an overview of the SIBER program. SIBER is focused on biogeochemistry in the Indian Ocean and is sponsored by the Scientific Committee on Oceanic Research (SCOR) and Integrated Marine Biosphere Research project (IMBeR) and supported by the IOC PPO and IOGOOS. SIBER works in close association with IORP/CLIVAR, IIOE-2, IOC PPO, IOGOOS and was involved in the recent IndoOS review process. Greg Cowie is the new chair of SIBER Scientific Committee. SIBER also has an Executive Committee. More information can be found through the website via INCOIS (<https://www.incois.gov.in/portal/siber/index.jsp>).
- Raleigh reported that SIBER is involved in:
 - The Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAIC) program
 - RAMA – sensor deployments, particularly in the Bay of Bengal which is poorly sampled in terms of CO₂ fluxes
 - Bio-Argo deployments
 - IIOE-2, which is a major focus of SIBER now. Raleigh provided an update on IIOE-2 cruises under the umbrella of SIBER
 - Development of the USA IIOE-2 National Committee’s Science Plan
 - Raleigh also referred to numerous SIBER/IIOE-2 Review Papers, Special Issues and Books, recent meetings and upcoming special sessions.
- Raleigh outlined SIBER's request to IRF. SIBER'S funding is used to support annual Steering Committee and Executive Committee meetings (which are virtual). SIBER's initial support previously was around \$20K which is down to \$8K this year and likely to reduce to \$3K next year, putting SIBER at risk of collapse. Greg Cowie added that

IMBeR is proposing further cuts to SIBER funding which will mean SIBER will be at risk of not being able to hold even one meeting per year.

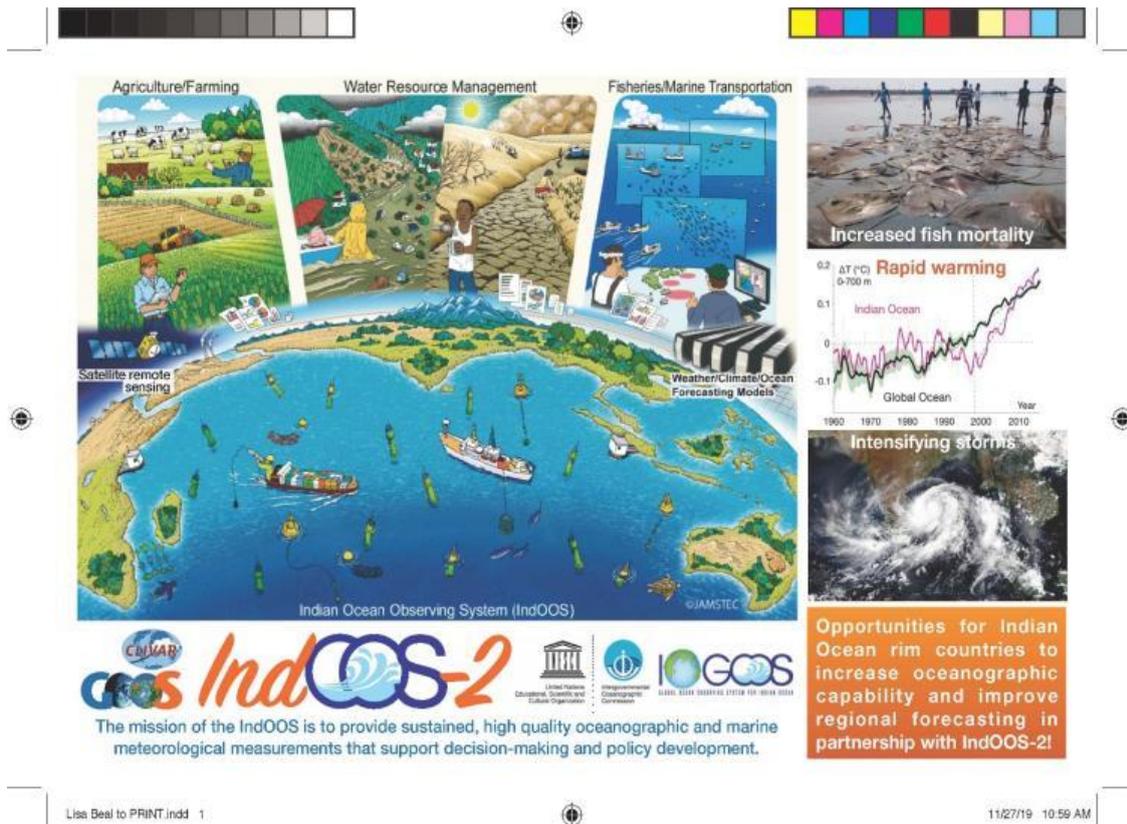
- Here is the list of SIBER's recommendations to be Resourced and Implemented:
 1. Sustain SIBER's Annual Meeting Support at \$15K,
 2. Purchase and deploy MAPCO2 systems at RAMA Flux Reference Sites,
 3. Increase the number of SOOP-CO2 measurements, particularly in the southern central Indian Ocean and also in the northern Arabian Sea and Bay of Bengal,
 4. Additional BGC-Argo float deployments should be motivated, particularly in the Arabian Sea and the Bay of Bengal,
 5. Leverage ship-based sampling opportunities (GO-SHIP, GEOTRACES) to obtain the full suite of geochemical EOVs (NO2, NH4, PO4, and 15N),
 6. Implement a ship of opportunity Continuous Plankton Recorder survey in the Indian Ocean.

5. Indian Ocean Observing System Decadal Review (IndOOS-2). (IndOOS-2 leadership – up to 15 minutes).

- IORP Summary of outcomes and Actionable recommendations of IndOOS-2-Dr. Roxy Koll IITM

Title: IndOOS-2 A Roadmap to Sustained Observations of the Indian Ocean for 2020-2030

- Roxy Koll provided an overview of the Indian Ocean Regional Panel (IORP) and the IndOOS Decadal Review. IORP is co-sponsored by Climate and Ocean-Variability, Predictability and Change (CLIVAR), a major project of the World Climate Research Program (WCRP). It is also supported and co-sponsored as possible by IOC and IOGOOS.
-



IndOOS-2: A Roadmap to Sustained Observations of the Indian Ocean for 2020-2030

- Roxy emphasised IORP is particularly focused on the need for sustaining an observing system in the Indian Ocean. IORP in conjunction with SIBER undertook the major IndOOS Decadal Review which resulted in IndOOS-2, a roadmap for the next decade 2020-2030. This report is available online, and is also the subject of a CLIVAR Special Issue: (<http://www.clivar.org/documents/exchanges-78>). The Review resulted in 136 actionable recommendations which has been shared with all IRF members and observers. The actionable recommendations have been prioritised by scientific and societal importance into Tiers 1, 2 & 3.
- Roxy highlighted that IORP will require assistance from all members of IRF in order to sustain an Indian Ocean Observing System, and that existing programs, resources etc. will need to align to achieve these IndOOS-2 Recommendations.
- Roxy outlined the **Tier 1 & 2 Recommendations** which are to maintain and extend:
 - Argo Floats – add BGC-Argo at Bay of Bengal (BoB) and AS and Deep Argo floats
 - RAMA – consolidate to RAMA-2 – 33 sites, including new site off North WA – increase resolution of upper-ocean measurements, and add MAPCO₂, BGC, direct flux measurements to certain sites
 - XBT Lines – Maintain IX01 (ITF) and IX21 lines.
 - Tide Gauges – include land motion, add sites in South-west Indian Ocean and on islands
 - Surface Drifters

- Boundary Current Arrays – Agulhas and Leeuwin Currents to look at heat budgets and measure T, S, O₂, and nutrients
 - GO-SHIP – commitments particularly for the Line I01 in the northern Indian Ocean to look at chlorophyll a and plankton
 - Satellites – maintain, increase resolution of SSH.

- Roxy outlined that overall, there was a need for: new partnerships among IORA countries; a commitment to regional capacity building; best practices in data sharing; new investment and increased investment by governments; and scientific leadership through WCRP, IORP, IOGOOS, and IOC.

- Roxy then provided an overview of the recent IORP-16 Meeting held as an e-meeting on March 24, 2020. Recommendations from this meeting included:
 - Invite more Indian Ocean rim countries into IndoOS-2, including EEZ agreements i.e. use Kenya/South Africa working with China in the Western Indian Ocean as an example. South Africa is comfortable with researchers working in their EEZ and sharing data.
 - Capacity building in Eastern Africa and Western Indian Ocean.
 - Development of Agulhas Current array.
 - Encourage Northern Indian Ocean nations to open EEZs for scientific data sharing
 - Build strategies for interacting with stakeholders to provide more fit to purpose observations, products and services.
 - RAMA report – regional cooperation needed to maintain RAMA despite COVID-19, a spike in vandalism, flattening funds, and rising operational costs.
 - A lack of ship time and funds is making it difficult to complete and maintain observing infrastructures of RAMA. One suggestion was that [Global Fishing Watch](#) could be used as a platform to monitor MPAs and observing infrastructure sites, in light of increasing vandalism, e.g. buoys at 90°E (0°, 4°N and 8°N especially) and Bai-long Buoy jointly deployed by Indonesia and China at 100°E.
 - As part of the UN Decade there needs to be a focus on: capacity development in the Western Indian Ocean, Eastern Africa and Small Island Developing States (SIDS); the Agulhas Current array; assisting South Africa in developing climate quality CTD Program and bringing on new research vessel; development of new sustained absolute sea level sites on small islands in the Western and South-western Indian Ocean.

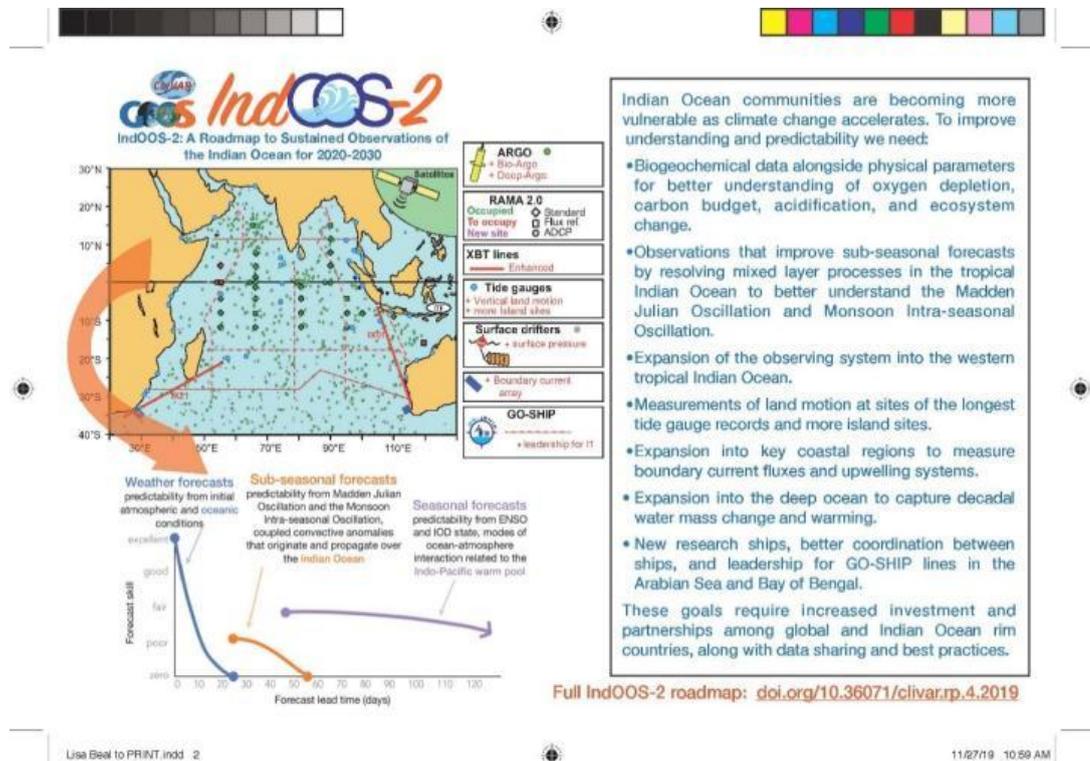
- Luca Centurioni highlighted that moving forward prediction and forecasting would be the main concerns, and that there was a strong case to deploy drifter buoys with barometers to improve Numerical Weather Predictions (NWP). Luca also raised the issue of no mention of surface waves in Roxy's presentation. Roxy noted that enhanced barometric measurements are listed as a Tier 1 recommendation in the IndoOS Review, and that while there was not an extensive discussion on surface waves in the report, there were associated recommendations.

- R Venkatsen (Venkat) also raised the issue of the need for a focus on surface waves and tsunami buoys. Roxy responded that there are actionable recommendations for

tsunami buoys in the Review Report. Roxy acknowledged that all 136 recommendations were not covered in his presentation and offered to address particular parameters or recommendations with individual IRF members or agencies.

- o Sateesh Shenoi (INCOIS) suggested IRF prepare an inventory table with a "wish list" of recommendations, a list of what observing infrastructure/systems currently exist in the Indian Ocean (i.e. IOGOOS etc.) and a status column. He recommended each agency complete the table and continue to review and build on it over the next 5 years to track progress. Roxy responded that a live document of actionable recommendations to track progress was also suggested at IORP-16 and that there was a Task Team in IORP to do this, and that he would include IRF as well.

Action Item 10.5: IRF to prepare an inventory table of IndoOOS recommendations, current infrastructure/systems in existence and status progress in respect to the recommendations.



List of High-Priority IndoOOS-2 Recommendations for Urgent Resourcing and Implementation

6. **Organizational Reports on Implementing, Sustaining and Advancing the Indian Ocean Observing System (IndoOOS): Past, Present and Future Projects in the Indian Ocean (10 minutes each Presenter).**
 - For each of the presentations given below only key comments and questions have been captured. Please refer to the individual presentations for content. **Presentations can be accessed here:** https://drive.google.com/open?id=1fazgLi1S6945LvQXf-GKSYJ2P5i_CUCM

1. *Japan Agency for Marine-Earth Science and Technology (JAMSTEC) - Kentaro Ando*

Title: In-Situ Observations in the Indian Ocean

- Ken mentioned it is currently more difficult to get ship time for oceanography, even for seismology and geology researchers. However, the intent is to try to maintain RAMA and other oceanographic elements.

2. *Global Oceans – Jim Costopulos*

Title: Modular Adaptive Research Vessels (MARVs)

- Jim Costopulos presented a model for mobilizing chartered offshore service vessels (OSVs) as regionally deployed research platforms, functionally equivalent to dedicated research vessels, with modular laboratories, workshops, power systems and other on-deck facilities. This approach expands ocean science capacity on a demand basis, without new major capital expenditures and on-going overhead normally required to acquire and sustain dedicated research vessels.
- Strategic partnerships with research institutions and national ministries throughout the Indian Ocean and Indo-Pacific region, to mobilize MARVs on a cost-sharing basis, will help enable world class deep-sea research and capacity development that can focus more exclusively on emerging national and regional scientific priorities. This approach will in turn support the achievement of critical ocean science objectives put forth by the UN Ocean Decade, the IIOE-2 initiative, and other regional programs over the next decade and beyond.
- Several projects currently in development by Global Oceans were also presented, including a new Atmospheric Instrumentation Suite (AIS) atmospheric observatory being developed in partnership with Argonne National Laboratories in the US as a privately funded non-profit facility, to enable an accelerated and more data intensive monsoon modeling effort in the Indo-Pacific; and the 5-year Global Seamounts Project (GSP), designed to couple extensive intercalibrated datasets from surveys of seamounts with a new ecosystem modeling project for seamounts that will integrate multiple existing and emerging models. The globally focused GSP will also work to train the next generation of seamount scientists and ecosystem modelers worldwide.
- Sidney Thurston noted that he has attended two of the UN Decade workshops in Chennai and Nairobi which has highlighted ship time access is going to be critical to the success of the Decade.
- Roxy Koll asked if Global Oceans has had any interactions with the GO-SHIP Program and noted there are existing transect lines in the Indian Ocean, as outlined in the IndOOS Decadal Review Report. Jim reported he was aware of the GO-SHIP Program and with respect to Global Ocean's proposed transect he indicated it may be similar to the Atlantic Meridional Transect. Jim referred to the abstracts he provided as part of the meeting for further details on proposed capacity to capture monsoonal information.

3. *NOAA's Contributions to the Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA) – Mike McPhaden*

- Sidney Thurston presented on behalf of Mike McPhaden who was unable to attend the meeting.
- Raleigh Hood raised the need for better communication between what ocean research activities are going on and the needs for RAMA for servicing. Several Indian Ocean cruises are likely to occur in the next 12 months. Raleigh recommended IRF be used as a forum for ensuring all relevant groups are informed.
- Sidney Thurston agreed and highlighted he would facilitate IRF to take on this coordination role to maximize the use of existing resources and see the IRF perhaps also become an IndoOS Coordination Forum (ICF).
- Nick D'Adamo suggested the IIOE-2 as an alternative solution. He indicated that as a collective community IRF members could work towards projects becoming 'endorsed IIOE-2' projects as most would likely have some relevance to the IIOE-2 Science Plan. Project leaders could provide a 1-2 page summary of projects, which the IIOE-2 Secretariat could communicate via the IIOE-2 website.

Action Item 10.6: IRF Members to note their own constituents' project activities, and where they clearly link to the IIOE-2 Science Plan encourage project leaders to provide summary descriptions of their projects for the awareness and synergies that may arise, and that a convenient, efficient and unencumbering way to do this is to submit their projects for IIOE-2 Endorsement via the brief IIOE-2 project endorsement form, through Dr Satya Prakash, Director of the IIOE-2 Joint Project Office India Node, at satyap@incois.gov.in.

4. Indonesia Meteorology, Climatology, and Geophysical Agency (Badan Meteorologi, Klimatologi, dan Geofisika BMKG) - Nelly Florida

Title: Indonesia BMKG current and future activities in Indian Ocean

- Indonesia seas play an important role and a strategic position between the Indian Ocean and the Pacific Ocean and between Asia and Australia continents.
- Raw data collected during INAPrima cruise is substantial in validating the Ocean Forecast System model developed by BMKG
- Primary efforts currently underway at BMKG include:
 - Indonesia Prima,
 - Equatorial Line Observation (ELO)
 - Years of Maritime Continent(YMC) Banda Sea cruise
 - Monitoring ITF International Experiment (MINTIE)
- YMC observations have two major targets: diurnal cycle and air-sea interaction in Indonesia.
- The objective of the YMC Banda Sea cruise: to observe the upper ocean, atmosphere, and their interface for the study of the role of land-sea breezes in the diurnal variability of the ocean and atmosphere during different phases of the Madden-Julian Oscillation

- Roxy Koll noted that the Indonesian Through Flow (ITF) is a key transport driver highlighted in the IndOOS Review and is looking forward to working with BMKG on this issue.
- Sidney Thurston mentioned NOAA is currently working with Indonesia to formulate the agenda for the Lake Toba Sumatra 15-year Partnership Workshop later in 2020. Sidney will advise IRF members of the workshop details which will likely again include an ITF Session.

Action Item 10.7: Sidney Thurston to advise IRF on the NOAA-Indonesia Lake Toba Sumatra 15th Annual Partnership Workshop, currently scheduled for late 2020 and advise on a possible IRF Session at the workshop.

5. *India Ministry of Earth Sciences (MoES) - Satheesh Sheno*

Title: Ocean Observing Systems Contributions to IndOOS from India (INCOIS, MoES)

- Roxy Koll noted he was happy to see the large amount of activity out of INCOIS and NIOT. Roxy noted one of the key recommendations from the IndOOS Review is for more Argo floats, in particular BGC-Argo and Deep-Argo floats.
- Satheesh referred to a current funding proposal for a deep ocean mission including climate sensors and a sizeable number of Deep Argo floats. However due to the current economic downturn resulting from Covid-19 he was unsure how soon or well the proposal will be received. It may be either next or the following year.
- Sidney Thurston queried about the schedule for data from the OMNI buoys to be made accessible. Sateesh replied that 'Digital Ocean' is due to be released soon which will address this issue, noting there may be a delay due to Covid-19. Roxy Koll complimented the MoES for opening up data sharing for OMNI moorings in the open seas and bringing it under the RAMA-OMNI framework. He noted that the same process should be continued to bring in access to the moorings in the EEZ.

6. *Sun Yat-Sen University (SYSU) - Weidong Yu*

Title: EIOURI Review

- Weidong highlighted the IIOE-2 Endorsed Project *Eastern Indian Ocean Upwelling Research Initiative* (EIOURI) and the China-Australia Pilot study on Madden-Julian Oscillation (MJO).
- Weidong encouraged more coordination which was supported widely by the group.

7. *NOAA Global Drifter Program (GDP) – Luca Centurioni*

Title: The Global Drifter Program Past Current and Future Efforts for the Indian Ocean

- Luca shared that new drifter technology, Directional Wave Spectra Drifters (DWSD), can measure waves in the open ocean, which is critical for the validation of wave forecasts, navigation, wave propagation science, wave-current interactions, improving climate models, storm surge forecasts, and calibration of satellites. He raised the need to discuss in the IRF how more resources can be generated for 100% barometer drifters to improve Numerical Weather Prediction (NWP), including for Tropical Cyclones.
- Roxy Koll mentioned the IndOOS Decadal Review Report recommends an update on the resolution of drifters for barometric pressure i.e. re-evaluate the 5°x5° degrees requirement.
- Luca responded that for other observations such as pressure or currents it is probably possible to increase the resolution of drifters and focus deployment in boundary currents and other areas of interest, but not with the current resources.

8. *South Asia Co-operative Environment Programme (SACEP), South Asia Seas Programme (SASP) - Sivaji Patra*

Title: Regional Plans for South Asian Seas

- Roxy Koll highlighted that there were clear alignments between the SASP and the UN Decade and that both require access to EEZ and data sharing over the northern Indian Ocean and suggested perhaps SASP could push for this access as a priority.
- Dr Patra agreed to contact Roxy Koll directly to discuss this issue further.

9. *Nansen Environmental Research Centre India (NERCI) – K. Ajith Joseph*

- Not in attendance.

10. *Past and Current Process experiments in the Bay of Bengal: ASIRI-OMM-MISOBOB - Professor Amit Tandon, University of Massachusetts Dartmouth*

- Amit Tandon provided an overview of these other projects in the Bay of Bengal since 2011. These collaborations have addressed high resolution ocean observations and modeling in support of eventual parametrization and inclusion of such processes in ocean and monsoon forecast models. They have involved collaborations between a team of Indian scientists (academia, National labs and graduate students) , who have been supported by the Indian Ministry of Earth Sciences, and a science team from USA (Academic faculty and national labs, graduate students and postdocs) supported by the Office of Naval Research and NOAA.
- Several UNOLS global vessels have made port calls to India (MoES-NOAA MOU). These vessels and India R/V Sagar Nidhi have worked together on these projects. A highly instrumented air-sea flux mooring was procured from WHOI by INCOIS, and deployed for a year, as part of this collaboration, which is expected to be retrieved later this year.
- The field phases are now done, last part of this collaboration is now in its analysis phase. These projects have resulted in many collaborative joint workshops, scientific

meetings, training and publications including a book on “Observing the Oceans in Real Time” and multiple special issues of journals. NOAA vessel R/V Ron Brown deployed moorings in the Arabian Sea in 2018, and an ONR supported program NASCar in the Arabian Sea region (2015-2018) investigated the dynamics and space-time variability of the mixed layer and major boundary currents in the northern and western Arabian Sea using *only* autonomous instruments.

- Following these recent programs, there is emerging India and USA interest to collaborate in this region using in-situ observations in the future including ships, moorings and other observational tools.

11. Others TBD

- No other presentations were given.

7. Enhanced Alignment of Future IndOOS Investments and Innovative Technology with (i) IndOOS Review Recommendations and (ii) Objectives of IIOE-2, UN Ocean Decade. (All Participants, Chair to Lead – 20 minutes).

- Lisa provided a high order priority list for initial IRF focus in respect to responding to IndOOS-2's recommendations, as follows:

1. Argo Floats – complete BGC-Argo array and build Deep Argo array
2. RAMA – consolidate to RAMA-2 – 33 sites, including new site off North Western Australia– increase resolution of upper-ocean measurements, and add MAPCO₂, BGC, direct flux measurements to Flux Reference Sites
3. XBT Lines – Maintain IX01 (ITF) and IX21 lines.
4. Tide Gauges – include land motion, add sites in small island nations of South-west Indian Ocean
5. Surface Drifters - evaluate benefits of additional surface pressure measurements
6. Boundary Current Arrays – Agulhas and Leeuwin Currents to constrain heat budget and measure T, S, O₂, and nutrients
7. GO-SHIP – leadership needed for Line I01 in the northern Indian Ocean
8. Increase the number of SOOP-CO₂ measurements, particularly in the southern central Indian Ocean and also in Arabian Sea and Bay of Bengal,
9. Leverage ship-based sampling opportunities (GO-SHIP, GEOTRACES) to obtain the full suite of geochemical EOVs (NO₂, NH₄, PO₄, and 15N),
10. Implement a ship of opportunity Continuous Plankton Recorder survey in the Indian Ocean.

- And at implementation level:

1. Encourage EEZ access and data sharing
2. Develop strategies to improve interactions with stakeholders
3. Build cooperation and capacity for participation of WIO nations in IndOOS, particularly BGCargo, RAMA, sea level sites, and Agulhas array.

- This catalysed a general discussion amongst participants, as summarized herewith:

- Sidney Thurston referred to 1600 drifters, ramping up wave spectra to build up to large scale. Noted that many go to the Indian Ocean, but more surface drifters will be directed there to better achieve IndOOS recommendations.
- LucaCenturioni referred to the need to improve infrastructure, maintaining the array by establishing new partnerships and the need to place drifters in key areas from Africa all the way to Indonesia. Strongest contribution in this sphere will be new wave spectra, which will be useful for wave forecasting, and in turn which will be particularly helpful for Indian coastal villages. They will provide measurable improvements in respect to problems that affect human lives. Air pressure measurements are impactful, but there are still technical questions in respect to the right size of this drifter array, so the drifter community need to work with forecasters and modelers to resolve that issue.
- Sidney Thurston advised that NOAA has garnered extra money for hurricane drifters to improve hurricane forecasting, some of which will go to Indian Ocean. Feels significant contributions may be possible to meet this IndOOS recommendation.
- Weidong Yu mentioned the decadal review recommendation for a new buoy location between NW Australia and SW Indonesia (i.e. for a new flux mooring). This location has been discussed for more than 10 years. Happy to see this idea is continuing to be discussed. Weidong worked with CSIRO to deploy a pilot buoy in this location (duration ~ 1 year). They recovered and analyzed data and published a paper in BAMS. More coordination between China and Australia to maintain this buoy would be ideal. He noted that China has set up a southern hemisphere research center, so there is the opportunity to work within this center to maintain this location.
- R Venkatsen (Venkat) complimented the IRF as doing wonderful work and noted that its mission is aligned with the work of GOOS. He requests IRF linkage and alignment to the GOOS 2030 Strategy and encouraged IRF attention to asset mapping and modeling for high priority regions. Venkat made a series of focused points, as follows:
 - On technology, it will be hard to get support for programs that have high costs, especially after COVID-19, so focus should be on low-cost.
 - Low-cost especially important for coastal observations.
 - Commends PMEL and Sid on RAMA.
 - Discussed data sharing in coastal systems--needs to make it a point that this is important.
 - Challenges on getting ship time to reach new locations and sustain them.
 - Continuous wave data in Bay of Bengal and Arabian Sea.
 - Challenge on long waves coming from the south around April; working on better predictions for this.
 - Has a plan on drifters.
 - Emphasize BCG, deep, biological Argo, and flux data; oceanographic mooring in Bay of Bengal that does flux. Requires intercalibration for this type of observation.
 - Calls for more in RAMA 2 (or RAMA 3!).
 - Working with PMEL to do calibration on board.
 - Challenges with biofouling.
 - Develop best practices for flux observations?

- Sidney Thurston commended India for sharing OMNI moorings to join RAMA-OMNI. A good example of what we're looking for via IRF in terms of contributions such as platforms, sensors.
- Amit reminded the Forum that in IRF-10 Part 1 he referred to shared ONR and MoES funded work between India, US. Right now, he is working on the MISO-BOB data (Monsoon IntraSeasonal Oscillation in the Bay of Bengal). He is keen to facilitate and develop enhanced collaborations with India in that same context.
- Michelle Heupel reported that IMOS is involved in Argo, Ships of Opportunity - that others also contribute to. Newer activities include an NSF funded project to measure and model the Indonesian Throughflow (with Susan Wieffels). IMOS obtained Western Australian Government funds for a new mooring off Ningaloo Reef, which will allow deployment of gliders in this area too. In respect to proving of new observational technology: IMOS has three projects underway: low cost wave buoys off Southwest Australia); examining performance and trialing profiling moorings in various environments (Western Australia); and producing new wave data with scatterometry data to improve wave information.
- Lisa Beal asked if the two gliders were intercepting/capturing the dynamics of the Leeuwin current? Michelle Heupel advised that they are quarterly deployments, 2-4 transects down to 1000 m alongshore. Not sure about what currents they are actually monitoring.
- Weidong Yu expressed an interest in discussing coordination with IMOS for the flux buoy in the area where mooring/gliders are operating Will talk to Michelle offline.
- Chaojiao Sun reported that she is in communication with Dr. Wooden in Bangladesh (Ref: Oceanography Research Institute). They are keen to develop and use new technology. Will guide them to refer to and follow the IndOOS review and develop new technology, align with sustainable development, blue economy goals.
- Jim Costopulos of Global Oceans (GO) referred to GO's mission to mobilize commercial platforms. Notes that this is done on demand and that GO has substantial capability to provide significant resources/tools at different times and locations. Notes that they still need to be able to meet specific needs in the future, so it is useful for IRF members to share ship-time needs. Notes that there is room for subsidies or very low cost. Right now, looking for someone to use a vessel that is coming into Singapore from a Palau expedition to go into the Indian Ocean. Less costly because the vessel will already be mobilized. Has talked to Raleigh Hood about a SIBER expedition in that context.
- Sidney Thurston reported on the clear need shown at UN Decade regional workshops for ship time, and that institutions promoting this need cannot always afford their own vessel. Being able to charter or lease at a cost-effective rate will help level the playing field.
- Luca Centurioni asked if Global Oceans vessels could deploy drifters. Jim Costopulos says yes. Luca will talk to him offline.
- Raleigh Hood referred to the need to raise awareness of a major infrastructure proposal by Lynne Talley and others to NSF to deploy BCG Argo to Indian Ocean. Proposal still pending, as far as he knows.

- Nick D'Adamo referred to the EEZ access issue (in Lisa's list) that impedes work in examining cross boundary phenomena (e.g. boundary currents that cross borders). This has been an issue for 10-15 years. UNCLOS refers here - which IOC is engaged in. Advised that members could raise this at IOC level—bring the issue to the awareness and consideration of relevant governments. IRF Members who are also IOC national delegates or who are connected to IOC delegations that have formal observer status at the IOC Assembly level can arrange interjections on such matters at the IOC Intergovernmental forums level. They could ask IOC delegations to raise as a formal issue and raise/insist on a serious discussion on the matter via a formal issue. As context, it is noteworthy that ioc-unesco.org website refers to IOC and UNCLOS: “UNESCO, through its Intergovernmental Oceanographic Commission (IOC) is the recognized competent International Organization in the fields of Marine Scientific Research (Part XIII) and Transfer of Marine Technology (Part XIV) of the United Nations Convention on the Law of the Sea **UNCLOS** (10 December 1982). UNCLOS is also referred to as “*the Constitution of the Oceans*”.

Action Item 10.8: IndOOS-2 stakeholders who wish to encourage high level consideration and solutions in respect to EEZ related impediments to scientific collaborations that require cross-jurisdictional (ie cross-EEZ') harmonisation of international effort, are urged to consider, as one possible course of action at inter-governmental level, seeking out their own national IOC focal points (ie within their IOC 'Delegations') and raise the issue with them with a view to those delegations bringing the matter(s) to the attention of the intergovernmental forum of IOC.

8. Coordinating Future Ship Time Opportunities. (All Participants, IRF Chair to lead – 15 minutes).

- Maximizing efficiency of coordinating the existing pool of Indian Ocean Research Vessels and exploring innovative sources of new ship time.
- This item involved a general discussion, with the following key points resulting:
 - Weidong Yu advised that a new research vessel is coming to his university in China. He invited the IRF to motivate/facilitate partnerships involving shiptime, and which would involve interested external institutions to cost share for the vessel activity.
 - Sidney Thurston took this as a segue to indicate that an inventory of all research vessels that could provide platforms for collaborative work in the Indian Ocean would be a good informational source to develop and maintain. This would provide better ship coordination across the IRF
 - Raleigh Hood responded by saying that this should be a major central component of a coordinating body (such as IRF or other?) and that IRF could provide the function to deliver a better job of knowing what ships are going into the Indian ocean and help deploy instruments, maintain moorings. Notes that this is not necessarily a monetary problem, but an information problem.
 - In this context Sidney suggested the formation of a Task Team that will determine what ships are available, how these ships identify their availability, etc. Sid would be interested in joining this team and asked for members to contact him with interest. Raleigh noted in the meeting chat that he is interested as well.

Action Item 10.9: Members agreed that a Research Vessel Inventory Task Team is to be established under the auspices of IRF, and Members are requested to advise the Convener of their interest in leading and/or participating on the TT.

9. Explore Partnerships and Synergies with Modelers and other Stakeholders. (All Participants, IRF Chair to lead – up to 25 minutes).

- Discuss how to maximize Return on Investments in the Indian Ocean Observing System by better alignment with Stakeholder Requirements to realize a **full end-to-end Indian Ocean Information Service**. **Please be Prepared to Identify Relevant Modelling Communities** and other Stakeholder Communities such as the Indian Ocean Tuna Commission (IOTC), et al.
- It was suggested that this agenda item had to a large degree been the subject of previous agenda item discussions. Some salient additional points to come out of the general discussion were as follows:
 - Sidney Thurston recognized NOAA and India partnerships and that NOAA has been working with MoES since its inception in 2006. Furthermore, NOAA works with Indonesia's BMKG, and referred to, for example, the 15th annual capacity building workshop in Sumatra in September 2020. Sidney urged members to explore partnerships for resource sharing, capacity building, adding new contributors. Potential partners could include, as an example, the IO Tuna Commission.
 - Nick D'Adamo suggested that in terms of 'modelling' OceanPredict' would be a good program to create an IRF collaboration with. Sidney Thurston noted that NOAA partners with them as well.

Action Item 10.10: Chair and Convenor to coordinate and contact OceanPredict (formerly GODAE OceanView), with the aim of establishing a collegiate association between OceanPredict and IRF in order to improve mutual awareness and collaboration between the modelling community, IndOOS-2 and complementary research and applications programs.

Action Item 10.11: Members to reach out to modelling community leaders that they believe are or can be associated with their own interests and encourage modellers to make IRF (via the Convener) aware of their activities as they may relate to IndOOS-2.

- Luca Centurioni suggested that IRF invite east Africa members, such as someone from Kenya or Tanzania. May not be able to provide resources but can help with logistics.
- Sidney Thurston recalled the Nairobi regional workshop for UN Decade planning, and that it involved a keen desire amongst the African / W IO constituency to forge to bridge across W, Central and E IO stakeholders.
- Raleigh Hood noted that from a BGC perspective, global biogeochemical models do not get simulation of the Indian Ocean correct at all. He posed the critical question of how to better connect with modeling community in this context?

- Sidney Thurston referred also to the Nairobi regional workshop as identifying the need for downscaling (in terms of modelling to meet their needs).
- Terri Paluszkiwicz indicated that a cooperative agreement with NWS and Pune for monsoon modeling would be ideal? Can it be expanded to forecast modeling or biogeochemical modeling? Would be useful to have it as a framework?
- Jim Costopulos asked if the IRF connects with the UN Decade, in the context of knowing that the UN Decade calls for calls for collaboration centers, partnerships.
- Jing Li referred to an IORP workshop on this generic issue of modeling for societal benefit, and that the effort includes other oceans as well, which can be used as exemplars.

10. Membership of IRF. (All Participants, Chair to lead – up to 10 minutes).

- Review current membership and identify prospective members, with strategies to be identified on how to liaise with and encourage future members.
 - This was addressed above.

Action Item 10.12: As per IRF ToR, Chair IRF to coordinate with Chair IOGOOS in respect to advising of automatic rotation off of Members and in respect to any new proposed Members, and Convener to track this work and update the IRF Membership list and disseminate to members for consideration at IRF-11,

11. Identify Action Items for Quarterly IRF Remote Access Meetings. (IRF Convener –10 minutes)

- It was agreed that IRF would continue to hold e-meetings at a quarterly frequency.

Action Item 10.13. Convener/IOC PPO to run doodle polls and arrange meeting materials for future quarterly meetings.

12. Confirmation of IRF-10 reporting to IOGOOS-16. (IRF Convener – 5 minutes).

- This was not specifically discussed at the meetings it is standard for IRF to report to IOGOOS at the end of each year's integrated package of meetings. In this vein, we will keep a watching brief on when IOGOOS-16 is to be held and contribute accordingly via the Chair and Convener of IRF.

Action Item 10.14. Convener and Chair to note planning for and respond to the next IOGOOS-16 meeting agenda in terms of IRF-10 reporting to IOGOOS.

13. Any other business. (All Participants, IRF Chair to lead – time remaining).

Note that this Item incorporates the original 'Agenda Item 14: Next IRF Teleconference where remaining agenda items will be addressed' that was covered during IRF-10 Part 1.

- Sidney Thurston concluded both Parts 1 and 2 meetings by thanking everyone for staying on despite the late hour for some.
- He reported the meetings were very successful in demonstrating the amazing amount of work going on in the Indian Ocean and the need to identify ways to collaborate and resource moving forward for the benefits of all Participants.
- All members agreed to adjourn the Part 1 meeting on completion of Agenda Item 6. Nick D'Adamo suggested that the progress on the agenda made at that meeting be regarded as IRF-10 Part 1, with an IRF-10 Part 2 to be scheduled sometime soon (in the next few weeks) to complete the agenda. All agreed.
- An IRF-10 Part 2 was scheduled.
- On the Chair's suggestion it was agreed that: (i) whilst waiting for the next face-to-face meeting of IRF to be possible, e-meetings would continue on an approximately quarterly basis; and (ii) that IRF would remain committed to holding a face-to-face meeting at a frequency of once per year, and that the next would be held in conjunction with IIOSC 2020 and complementary meetings of IIOE-2, IOGOOS, IORP, SIBER and IOCINDIO (as per past practice).
- IOC PPO will run a doodle poll for the next e-meeting (~July/August 2020). See Action Item 10.13, above.

End

Background Material

APPENDIX 1

IRF-9 MINUTES Final, as accepted at IRF-10, 30 April 2020.	
Meeting Title	Ninth Annual Meeting of the Indian Ocean Observing System Resource Forum (IRF-9)
Date	Thursday 14 March 2019
Time	15:30-17:00
Location	Nelson Mandela University, as part of the International Indian Ocean Science Conference 2019 (http://www.iioe-2.incois.gov.in/IIOE-2/IIOESC2019.jsp)
Agenda status	Circulated pre-meeting as an annotated draft – adopted as final as no additional items were added at the meeting.
Acting Chair	Nick D’Adamo
Invited participants	<p>IRF members and ex-officios (with observer attendance considered by request to Acting Chair at nick.dadamo@bom.gov.au)</p> <p>IRF (members and ex-officios): Satheesh Sheno, Sidney Thurston, Indi Hodgson-Johnston, Gilbert Siko, Jose Santos (by GoToMeeting), Jing Li, Nick D’Adamo, Lisa Beal, Roxy Koll, Raleigh Hood, Greg Cowie, Satya Prakash, Nagaraja Kumar.</p> <p>Observers: Nick Hardman-Mountford, Justin Avanzano, M Atmanand</p>

1 Welcome, introductions, confirmation of agenda. (Convener) 5 mins.

2 Final check of IRF-8 Draft Report for finalization and submission to IOGOOS. (Convener) 10 mins.

- *The draft IRF-8 report was circulated prior to meeting. That version was accepted as final and is attached herewith as **Appendix 2**.*

3 Status of IRF-8 Action Items and Convener’s comments. (Convener) 10 mins.

IORP and SIBER identified several new members, with actions undertaken (Jan/Feb 2019) by Convener on behalf of the IOGOOS Chair, as follows:

- *Dr Ken Ando confirmed that Prof Shirayama has stepped down as member (having retired from JAMSTEC), with Dr Ando replacing Prof Shirayama as member.*
- *Dr Qu Tanzhou, China has stepped down as member (having retired as Director General, Department of Marine Forecast and Disaster Mitigation, SOA). Letter of thanks written.*
- *Dr Chen Zhi, China – invited as new member. Response pending.*
- *Dr Gilbert Siko, South Africa – invited as new member. Accepted. Letter of thanks written.*
- *Dr M Rajeevan, India – invited as new member. Response pending.*
 - *Satheesh Shenoi advised that he would follow up on the status of this invitation.*

General discussion then ensued that resulted in several suggestions for potential membership, which the Convener asked to follow up in due course, as follows:

- *Dr TaeKeun Rho (KIOST, Korea) – and Sidney Thurston advised that he was in the process of liaising with Dr Rho on the matter.*
- *Kenya (noting that Kenya has the Mtafiti Research vessel undertaken and able to do more in the IO.*
- *POGO, ROPME, foundations/organizations (e.g. Schmitt, WOC, FAO-Nansen, World Ocean Council, REV – Norway, Mindaroo – Western Australia), Global Oceans,*
- *BKMG, LIPI – Indonesia*
- *For Germany a suggestion was made that Hermann Bange (Co-Chair IIOE-2 Science and Research Working Group) be consulted for potential name(s) of members.*
- *Nick D’Adamo suggested that the ROPME organization would be a good focal point for the NW Indian Ocean – Gulf region.*

Action 9.1 (Convener). Follow up IRF-9 current invited new members and on IRF-9’s suggestions for potential new IRF members, with the aim of finalizing the Member list having no outstanding uncertainties in individual member status.

Action 8.2 (IORP and SIBER Co-Chairs): Provide IORP and SIBER resources requests for IRF-9, in light of needs that will relate to the revised IndOOS, forthcoming as a result of the IndOOS Decadal Review process.

4. Update on IndOOS Status. (IORP and SIBER Co-Chairs) 10 mins.

5. IndOOS Decadal Review status. IORP Co-Chairs. (Lisa Beal and/or Roxy Koll) 15 mins.

6. Summary of IORP and SIBER respective resources needs. (IORP and SIBER Co-Chairs) 20 mins.

7. Suggestions for a new Chair and other prospective new members for IRF. (IORP and SIBER reps) 10 mins.

- *Dr Sidney Thurston was proposed by Dr Satheesh Shenoi (Chair IOGOOS), Dr Thurston accepted the nomination and was selected unopposed and unanimously as the new Chair of IRF. He was roundly thanked.*

- Nick D'Adamo, as Convener and on behalf of IOC PPO, confirmed his support to the Chair.

3. Any other business. (All) 10 mins.

Nick Hardman-Mountford suggested Ocean Obs 19 (Hawaii, Sep 2019) to be an opportune forum for any IRF members/constituents present to get together to take stock of IRF issues (e.g. membership, ocean obs related issues for the IO etc.).

End

APPENDIX 2

IRF Membership as at IRF-9, 14 March 2019

IndOOS Resource Forum (IRF) List – Members / Ex-Officio

For reference of IRF-10 meeting

IRF Members (and alternates, where provided)		
IRF Members – National links		Alternate
Chair	Dr Sidney Thurston Overseas Program Development, Climate Observations Division Climate Program Office 1315 East West Highway Silver Spring, MD 20910-5603, USA Sidney.Thurston@noaa.gov	Dr Sidney Thurston was elected as Chair at IRF-9, 14 March 2019.
Australia	Mr. Tim Moltmann IMOS Director University of Tasmania Private Bag 110 Hobart TAS 7001, Australia Email: Tim.Moltmann@imos.org.au	Dr Indi Hodgson-Johnston, Assistant Director, IMOS Australia, University of Tasmania Private Bag 110 Hobart TAS 7001, Australia Email: indiah.hodgsonjohnston@utas.edu. au
China	Mr. Chen Zhi Division of Marine Observation Division State Oceanic Administration, P.R. China No. 1 Fuxingmengwai Ave, Beijing 100860, China Email: chenzhi@nmefc.cn	Yet to be advised
France	Prof Jean-Marie FLAUD Directeur de recherche CNRS-INSU 3 rue Michel-Ange 75794 Paris, France Email: jean-marie.flaud@cnrs.fr (multiple communications, incl recent email to J Vialard and F Marsac – no indication as yet on membership intentions)	Gérard Eldin (alternate) Délégué scientifique CNRS-INSU Email: gerard.eldin@cnrs-dir.fr (multiple communications, incl recent email to J Vialard and F Marsac – no indication as yet on membership intentions)
India	Dr. Satheesh C. Shenoi Director, Indian National Centre for Ocean Information Services (INCOIS)	Dr M. Nagaraja Kumar (alternate) Scientist & In-Charge, Potential Fishing Zones (PFZ) Mission,

	(Ministry of Earth Sciences, Government of India) “Ocean Valley”, Pragathi Nagar, Nizampet P.O Hyderabad – 500 090, India Email: shenoi@incois.gov.in	Secretary, Indian Ocean Global Ocean Observing System (IOGOOS) Indian National Centre for Ocean Information Services (INCOIS), Ministry of Earth Sciences, Govt. of India “Ocean Valley”, PB No. 21, IDA Jeedimetla PO, Hyderabad, Andhra Pradesh-500 055, India Email: raja@incois.gov.in
India		(Note: Convener has written to Secretary, India Ministry of Earth Sciences, RE: invitation to become Member). No reply as yet.
Indonesia	Pending – Convener corresponding with Zainal Arifin, Indonesian Institute of Sciences (LIPI)	Convener to contact: invite as new member.
Iran	Professor Behrooz Abtahi Director Iranian National Institute for Oceanography and Atmospheric Science #3 Etemad Zadeh St., Fatemi Ave Tehran, Iran inioas@inio.ac.ir	
Japan	Mr. Kentaro Ando Group Leader, Research Centre for Global Change, JAMSTEC 2-15 Natsushima, Yokosuka Kanagawa, Japan Email: andouk@jamstec.go.jp	
South Korea	Pending	
South Africa	Dr Dismore Gilbert Siko Director – Marine and Polar Research, Paleosciences. Department of Science and Technology, Pretoria 11111, South Africa Gilbert.Siko@dst.gov.za	
USA	Dr David Legler Director, Climate Observations Division NOAA Climate Program Office 1315 East West Highway Silver Spring, MD 20910-5603, USA david.legler@noaa.gov	Dr Sidney Thurston (alternate) Overseas Program Development, Climate Observations Division Climate Program Office 1315 East West Highway Silver Spring, MD 20910-5603,

		USA Sidney.Thurston@noaa.gov
IRF Members – International Organisations		
IOC	Dr. Vladimir Ryabinin Executive Secretary, UNESCO IOC, 1 rue Miollis, 75732 Paris, Cedex 15, France Email: v.ryabinin@unesco.org	
ICPO	Dr Jose Luis Santos Davila Executive Director International CLIVAR Project Office (ICPO) c/- First Institute of Oceanography, SOA 6 Xianxialing Rd Laoshan District Qingdao, China, 266061 Email: jose.santos@clivar.org	Dr Jing Li Staff Scientist International CLIVAR Project Office First Institute of Oceanography, SOA Qingdao, China 266061 Tel: +86-532-88891090 Email: jing.li@clivar.org (Jing Li advised by email to Convener prior to 22 Feb 2019 that Jose Santos was ICPO's replacement Member and that Jing Li was ICPO's alternate member). Subsequently formalized by a recent exchange of letters (Santos 4/Feb/19 – Convener 23/Feb/19)
IOC Perth Program me Office	Dr Nick D'ADAMO, IRF Convener Head – Perth Programme Office of the Intergovernmental Oceanographic Commission (IOC), UNESCO c/- Commonwealth Bureau of Meteorology, Australia, 3 rd floor, 1 Ord Street West Perth 6005, Western Australia, Australia Email: nick.dadamo@bom.gov.au	
IRF – Ex-Officio		
IORP	Dr Roxy Mathew Koll, IORP Co-Chair Centre for Climate Change Research, Indian Institute of Tropical Meteorology, Pashan, Pune – 411 008, India. http://www.climate.rocksea.org/ Email: roxy@tropmet.res.in	
IORP	Dr Lisa Beal, IORP Co-Chair Associate Dean of Research Professor of Ocean Sciences Rosenstiel School of Marine and Atmospheric Science University of Miami	

	4600 Rickenbacker Causeway Miami, FL 33149-1098 Email: lbeal@rsmas.miami.edu https://people.miami.edu/profile/l.beal@miami.edu	
SIBER	Prof Raleigh R. Hood, SIBER Co-Chair Horn Point Laboratory University of Maryland Centre for Environmental Science P.O. Box 775 Cambridge, MD 21613 email: rhood@umces.edu	(Raleigh Hood's position as Co-Chair SIBER was due for formalization at SIBER-9)
SIBER	Dr Greg Cowie, SIBER Chair University of Edinburgh Centre for Earth System Dynamics School of Geosciences, Global Change / Oceans and Past Climate Email: Dr.Greg.Cowie@ed.ac.uk	(Greg Cowie's position as Chair SIBER was due for formalization at SIBER-9)
SIBER	Dr. Satya Prakash, SIBER Secretary Indian National Centre for Ocean Information Services (INCOIS), Ministry of Earth Sciences (MoES), Govt. of India "Ocean Valley", Pragathi Nagar (BO), Nizampet (SO), Hyderabad, Andhra Pradesh-500 090, India Email: satya29prakash@gmail.com	
IOGOOS	Prof Michael McPhaden NOAA Senior Scientist. NOAAPMEL Division: Ocean Climate Michael.J.Mcphaden@noaa.gov	
IOGOOS	Mr. M. Nagaraja Kumar, Secretary, Indian Ocean Global Ocean Observing System (IOGOOS), Scientist In-charge, PFZ Mission, Indian National Centre for Ocean Information Services (INCOIS), 'Ocean Valley', Pragathi Nagar BO, Nizampet SO, Hyderabad-500054, Andhra Pradesh, India Email: raja@incois.gov.in ; raja.masuluri@gmail.com	
IOGOOS	Vacant (IOC Officer, to be advised).	
IOGOOS	Dr Somkiat Khokiattiwong IOGOOS Officer; Coordinator, South East Asia GOOS (SEAGOOS); Chair IOC Sub-Commission for the Western Pacific (IOC WESTPAC);	

	Associate Officer IOGOOS Phuket Marine Biological Centre PO Box 60 Phuket 83000 Thailand Email: somkiat@e-mail.in.th ; skhokiattiwong@gmail.com	
IOGOOS	Dr. Sathesh C. Shenoi, IOGOOS Chair Director, Indian National Centre for Ocean Information Services (INCOIS) (Ministry of Earth Sciences, Government of India) “Ocean Valley”, Pragathi Nagar, Nizampet P.O Hyderabad – 500 090, India Email: shenoi@incois.gov.in	
IOGOOS	Mr. Rezah Badal IOGOOS Officer; Head, Office for Ocean Affairs and Development, Prime Minister’s Office, Port Louis, Mauritius Mob: +230 57290150 Email: mrbadal@govmu.org	

APPENDIX 3

IndOOS Resource Forum

Terms of Reference (TOR)

Version Status: revised 31 March 2017 following recommendations at IOGOOS-XIII

1. Establishment

The IndOOS Resource Forum (IRF) will be established by resolution of IOGOOS, incorporating the institutions that are currently committing resources to the IndOOS.

2. Composition

The membership of the IRF will be invited by the Chair of IOGOOS and comprised of representatives of institutions allocating or facilitating resources to accomplish the overall goals of IndOOS, with the Co-Chairs of the CLIVAR/IOC-GOOS Indian Ocean Region Panel (IORP) and the Co-Chairs of the Scientific Steering Committee of Sustained Indian Ocean Biogeochemistry and Ecosystem Research (SIBER) as Observers.

The Forum will review membership at each meeting and invite additional members as required. A member shall be deemed to be inactive if they do not attend an IRF meeting for 2+ years and they are not actively contributing to the functions of the Forum. In these circumstances, the Secretariat (see below) will advise the Forum and write to that member notifying them that they will be rotated off the Forum.

3. Functions

The main function of the IRF is to provide a multi-institutional Forum to facilitate the alignment of resources for implementation of the IndOOS, including the following:

- 3.1 To review the requirements for the implementation of IndOOS;
- 3.2 To facilitate and coordinate resources that may be applied to the system, especially ship time for the Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA);
- 3.3 To encourage scientific and technological initiatives, in the participating countries, to meet the objectives of IndOOS; and
- 3.4 To report on its activities to the Heads of the institutions providing resources.

4. Scientific and Technical Advisory Bodies

In discharging its tasks, the IRF should be guided by the scientific objectives and research strategy formulated by the IORP and the SIBER Scientific Coordinating Committee, which are regarded as the main scientific bodies to advise the IRF.

5. Organization of Sessions

5.1 The IRF will hold sessions at dates and places to be decided at the previous session. The Secretariat (see below) will be responsible for arranging meetings and will send invitations to attend to:

- All IRF members;
- Experts invited as Observers by the Chair of the IRF, including firstly the Chair(s) of the IORP, SIBER and Chairs and Officers of IOGOOS, as necessary for the deliberations in that specific session of the IRF.

5.2 At the close of every other session, the IRF will elect from its members a Chair who will serve in that capacity for the next two sessions. An individual shall serve no more than two consecutive terms as Chair. In the event of periods for which a Chair is not designated, the IRF Convenor will represent that role as a pending measure.

5.3 Sessions will be conducted in English and reports published in that language.

5.4 IOGOOS will seek Secretariat support for the Forum from the UNESCO IOC Perth Programme Office. This role will be referred to as the IRF Convenor.

IOGOOS Workshop and 16th Annual Meeting (IOGOOS-XVI)

July 16, 2020 (1400 Hrs - 1700 Hrs)

Agenda Item (ii) of the Annual Meeting

Action Taken report from IOGOOS Secretariat Report

Sl. No.	Item	Status / Progress
1.	IOGOOS Annual Meeting	
1.1.	IOGOOS XV Annual Report	<ul style="list-style-type: none"> Finalised and circulated the IOGOOS XV Annual Report in collaboration with Officers and IOC Perth Office. Available at IOGOOS website.
1.2.	Conduct of IOGOOS XVI	<ul style="list-style-type: none"> Notification, Invitations, Agenda circulated with IOGOOS Members. Meeting date confirmed through online doodle poll from all IOGOOS Members based on majority members chosen date.
2.	IOGOOS Projects	
2.1.	Secretariat to write to the project focal points to seek the information on the capacities of participating countries in the field of coastal / shelf in-situ observations relevant to calibration of remote sensing images.	<ul style="list-style-type: none"> Secretariat will take necessary action after the review process by incorporating the recommendations / suggestions of the review committee. A review committee yet to be formulated. Secretariat couldn't act on this.
2.2.	IOGOOS should write to IOC Capacity building section for further support (sponsorship) to take the integrated Remote Sensing / Shoreline Change / Keystone Ecosystem Monitoring Project proposals to the next level.	<ul style="list-style-type: none"> Will be initiated after the review process for the critical review of the projects by review committee is completed. A review committee yet to be formulated. Secretariat couldn't act on this.
3.	Governance	
3.1	Chair, IOGOOS to write to appropriate high level stakeholders of countries liked to IOGOOS	<ul style="list-style-type: none"> Secretariat has sent out couple of emails to the non-active member institutes and also a reminder

	<p>membership, with specific emphasis on those members that appear to have lost connection or active engagement with IOGOOS. The letter should provide background on IOGOOS, restate the case for participation through membership and active engagement and seek from the country the designation of and support for an appropriate representative IOGOOS.</p>	<p>communication subsequently. However, there is no response from the member representatives. The details of the active and non-active members are already tabled IOGOOS XVI annual meeting for discussions.</p> <ul style="list-style-type: none"> List of present members list attached as Annexure 9.
3.2	IOGOOS Officers	<ul style="list-style-type: none"> The secretariat sent out the status paper and requested nominations for the positions of IOGOOS Officer. Will be discussed as Agenda Item of the Annual Meeting. Dr. Brett Molony, CSIRO, Australia elected as Officer from Eastern Indian Ocean. Dr. Faiza Al Yamani, KISR, Kuwait elected as Officer from Western Indian Ocean. Dr. Jenny Huggett, Dept. of Environment, Forestry & Fisheries, South Africa elected as Officer from IOGOOS Project Representative (SIBER). Dr. Elaine McDonagh, National Oceanography Centre, Southampton, UK elected as Officer from IOGOOS Project Representative (IORP). Dr. Satheesh Sheno, Chair, IOGOOS representing officer from Central Indian Ocean has retired and the position will be vacant. The Present status of IOGOOS Officers is attached at Annexure 4.
3.3	IOGOOS Members	<ul style="list-style-type: none"> The Secretariat is exploring to bring more members / associate members, whenever the opportunities are seen and communicating with the interested institutions. Centre for Marine and Coastal studies (CEMACS), Universiti Sains Malaysia, Malaysia was agreed to

		<p>become the member of the association. The same is tabled for the endorsement during the IOGOOS XVI annual meeting.</p> <ul style="list-style-type: none"> • Also communicated to KIOST inviting them to join the IOGOOS Family. However we are awaiting the response. Secretariat will continue to pursue. • BOBLME has requested for withdrawal of the membership as their FAO project was closed.
3.4	Hosting of IOGOOS Secretariat for November 2020 - October 2026	<ul style="list-style-type: none"> • Several Notifications have been made since last one year seeking the interest of the member institutes to host the IOGOOS Secretariat. • No nominations / expression of interest were received from the member institutes. • The notification to host IOGOOS Secretariat is attached at Annexure 5.
4.	Finance	
4.1	Membership Fees for 2019-20	<ul style="list-style-type: none"> • Requests along with Invoices have been sent to IOGOOS member countries for remittance of the Annual Membership fee for the period 2019-20. Contacts are to be established for few member countries as the original signed dignitaries are not available. Few members have remitted the fees and are accounted in the financial auditing. • Few member institutes(09) have remitted the fees and are accounted in the financial auditing.
4.2	Audit	<ul style="list-style-type: none"> • Completed Financial Accounting and Audit for the Period April 2019 – March 2020. • Statement of Account is being submitted for verification and approval. The same is tabled as Agenda Item of the Annual Meeting. • The Statement of Accounts attached at

		Annexure 7.
5.	Other Points	
5.1	Potential Projects - IOGOOS Endorsement	<ul style="list-style-type: none"> • Coordinated for Letter to support the proposal prepared by Dr. David Antoine from Curtin University, Australia for submission to the Australian Integrated Marine Observing System (IMOS) in response to the call for proposals on "New Technology Proving".
5.2	Documentations Preparation	<ul style="list-style-type: none"> • History of IOGOOS Evolution. • History of IORP and IRF evolution. • Revised IOGOOS MoU after modification in last AGM. • Provided necessary inputs to GRA 9th Forum. • Review of IRF terms of Reference.

Notification for the position of IOGOOS Chairman and Officers

Rules for Nomination of IOGOOS Chair / Officers:

- The Officers should be broadly representative of the regions of the Indian Ocean. viz. Central Indian Ocean, East Africa, Eastern Indian Ocean, Southern Africa and Indian Ocean Islands. **Now the regions have been changed to Eastern Indian Ocean, Central Indian Ocean and Western Indian Ocean. And representatives from the IOGOOS Projects**
- Officer shall serve in an individual capacity for a period of 2 years, up to a maximum of two terms. With the unanimous agreement of all members, in exceptional cases, an Officer can be extended for a further term of 2 years.
- If an Officer does not attend two consecutive Annual Meetings, the position of that Officer will be considered vacant and an election will be conducted for the position.
- If an Officer resigns, the position shall remain vacant until the next Annual Meeting. However, if the Chair is unable to serve, one of the Officers will be nominated by the Officers, to act as a Chair, till next Annual Meeting.
- IOGOOS Secretariat shall notify to all Members about the vacancies of the posts (Chair / Officers) and request nominations from members for the position of Chair of IOGOOS and for other Officers three months prior to the Annual Meeting.
- In the event of more nominations than vacant Officer Positions, an Election Return Officer, who is not a voting Member, shall be appointed, to oversee the election. Each member shall have a number of votes equal to the number of vacancies.

IOGOOS Chair and Officers: The following is the status of the Tenure of Chair and Officers of IOGOOS:

Term	2012-14	2014-16	2016-18	November 2018- October 2020*	Representation and present Role
Chair	Dr. Andreas Schiller	Dr. Andreas Schiller Completed three terms of 2 years	Vacant	Dr. Brett Molony, CSIRO (May2019)	Eastern Indian Ocean IOGOOS Officer
Officer	Dr. Rezah Badal	Dr. Rezah Badal	Dr. Rezah Badal Completed three terms of 2 years	Dr. Faiza Al Yamini, KISR, Kuwait (July 2019)	Western Indian Ocean IOGOOS Officer
Officer	Dissolved				

Officer	T. Srinivasa Kumar	T. Srinivasa Kumar	Dr. S. S. C. Sheno	Dr. S. S. C. Sheno (Retired from Service and post will fall vacant)	Central Indian Ocean Chair, IOGOOS
Officer	Dr. Somkiat Khokiattiwong	Dr. Somkiat Khokiattiwong	Dr. Somkiat Khokiattiwong Completed three terms of 2 years	Dr. Jenny Huggett, Dept. of Environment, Forestry & Fisheries, South Africa(May2019)	SIBER Representative IOGOOS Officer
Officer	Dr. Yukio Masumoto	Dr. Mike Mcphaden	Dr. Mike Mcphaden	Dr. Elaine McDonagh, NOC, Southampton, (May 2019)	IOP representative IOGOOS Officer

*As the elections were made, out of session, in May 2019, do we need to consider the term as November 2019- October 2021.

Prior Notification for Hosting of the IOGOOS Secretariat and Selection of Secretary, IOGOOS

IOGOOS Secretariat: The status of hosting of IOGOOS Secretariat is as follows:

. Term	Nov 2002 – Oct 2008	Nov 2008 – Oct 2014	Nov 2014 – Oct 2020	Nov 2020- Oct 2026
Secretariat	INCOIS, India	INCOIS, India	INCOIS, India	Location of Office may be rotated after six years from one Member to another by agreement of Members at an Annual Meeting
Secretary	Dr. T. Srinivasa Kumar	Mr. M. Nagaraja Kumar*	Mr. M. Nagaraja Kumar	To be Nominated by IOGOOS Officers
(2008-2009: Dr. T. Srinivasa Kumar and Mr. M. Nagaraja Kumar has worked as Co-Secretaries)				

Criteria for hosting the IOGOOS Secretariat:

The host agency has to a leading oceanographic research establishment in the Indian Ocean region and is expected to provide and bear the cost of the following facilities to host the IOGOOS Secretariat:

- Nominating a Secretary for provision of administrative (communication and information exchange, travel planning, meetings, staff agenda organization, arrangements for shipping) and technical support (pursue decisions of the annual meetings and coordinate Inter-sessional activities related to IOGOOS Pilot Projects)
- Provision of Office Space for Secretariat Staff
- Provision of Computers and Communication facilities such as Telephone, Fax, and Internet
- Providing accommodation, support services, and/or professional staff
- Hosting and Management of IOGOOS Website
- Collection of Annual Membership fee, maintenance of Bank Account and issue of audited annual financial statements
- Support day-to-day functioning of the Office by following the practices of the host Agency

The nominations for hosting the Secretariat will be tabled for discussion in the IOGOOS 16th Annual Meeting.

Nagaraja Kumar M

From: IOGOOS Secretariat [iogoos@incois.gov.in]
Sent: 10 November 2020 10:50
To: Ali Shareef; Ali Shareef Gmail; Anastasia Rita Tisiana Dwi Kuswardani MMAF; Andreas Schiller; Anthony Ribbink; Arulnathan NARA; Augusto Bata INAHINA; Augy Syahailatua LIPI; Boris Kelly-Gerreyn; Chairman NARA Srilanka; Chris O'Brien BOBLME; Dan Baird; Director IHSM Madagascar; Director IMS Tanzania; Director IMSF Bangladesh; Director INCOIS; Director INIOAS Iran; Director KMFRI Gmail; Director MOI Mauritius; Director NIOT; Dr Margareth S. Kyewalyanga; Dr PURNIMA JALIHAI; Faiza Al-Yamani; Francois Gerard Mercator; Henrich Bruggemann; INAHINA Mozambique; Mervyn Lynch; Mohammad Zahedur Rahman Chowdhury IMSF; Muhammad Ilyas BPPT; Nick D'Adamo; Nkanyiso B. Mbatha; Riyanto MMAF Indonesia; Ruby Moothien Pillay; Shantanu Bhatwade ISRO; Sidney Thurston; Srinivasa Kumar T; Sunil Singh K; Thierry Lavitra IHSM
Cc: 'Nick D'Adamo'; 'Molony, Brett (O&A, IOMRC Crawley)'; faizayamani@gmail.com; 'Jenny Huggett'; 'Elaine McDonagh'; 'Nagaraja Kumar M'; 'Nagaraju R'; 'Roxy Mathew Koll'; 'Lisa Beal'; 'rhood'; COWIE Gregory
Subject: Notification for hosting of IOGOOS Secretariat and IOGOOS Officer from Central Indian Ocean

Dear IOGOOS Members and Officers,

I have sent couple of emails seeking the nominations for the post of IOGOOS Officer from Central Indian Ocean and the nomination from member institutes to host the IOGOOS Secretariat. The nominations are now closed and the following are the summary

IOGOOS Secretariat:

No nominations were received from any member institute.

The present host institute INCOIS has obtained necessary approvals from Ministry of Earth Sciences (MoES), Govt. of India to continue to host the IOGOOS Secretariat for the next term of 6 years from November 2020 – October 2026.

As a host institute, INCOIS, India will continue to offer the following.

- Nominating a Secretary for provision of administrative (communication and information exchange, travel planning, meetings, staff agenda organization, arrangements for shipping) and technical support (pursue decisions of the annual meetings and coordinate Inter-sessional activities related to IOGOOS)
- Provision of Office Space for Secretariat Staff
- Provision of Computers and Communication facilities such as Telephone, Fax, and Internet
- Providing accommodation, support services, and/or professional staff
- Hosting and Management of IOGOOS Website
- Collection of Annual Membership fee, maintenance of Bank Account and issue of audited annual financial statements
- Support day-to-day functioning of the Office by following the practices of the host Agency

IOGOOS Officer of Central Indian Ocean:

The Co-chair/s of IORP have nominated Dr. T. Srinivasa Kumar for IOGOOS officer position from central Indian Ocean. Subsequently, a nomination is received from the member institute INCOIS, India nominating Dr. T. Srinivasa Kumar for the position.

Keeping in view of the above and the fact that there is only one position that is vacant at present, we need to confirm this unanimously.

Action / Concurrence of Members Sought:

In this regard, I request all the Members to provide their concurrence on the following out-of session activities to be conducted.

- (i) Continuation of INCOIS, India to host the IOGOOS Secretariat for the next term of 6 years from November 2020 – October 2026.
- (ii) Election of Dr. T. Srinivasa kumar for the position of IOGOOS officer representing Central Indian Ocean unanimously.
- (iii) For selection of IOGOOS Chair position through a virtual meeting with Officers and Head, IOC

Keeping in view of the timelines, forthcoming GRA Council meeting and IIOE-2 activities and other important roles, I request all the members to provide their concurrence by November 14, 2020.

With best regards,

Nagaraja Kumar

-----Original Message-----

From: Roxy Mathew Koll [<mailto:rocksea@gmail.com>]

Sent: 21 October 2020 10:06

To: 'Nagaraja Kumar M'

Cc: 'Lisa Beal'; 'Nick D'Adamo'; 'Jing Li'; 'Elaine McDonagh'

Subject: RE: Notification for IOGOOS Officer from Central Indian Ocean

Dear Nagaraja,

As IORP Co-Chair and IOGOOS Associate, I am nominating Dr. Srinivas Kumar (Director, INCOIS) for the IOGOOS position from central Indian Ocean.

INCOIS has played a leading role in in IOGOOS and IIOE2/IndOOS activities, and Srinivas has been actively involved in it during the last several years through IOC. He is also active in the UN Decade efforts, and IORP hopes to

work closely with IOGOOS and him on all these aspects.

Regards,

Roxy

From: Nagaraja Kumar M <raja@incois.gov.in>

Sent: 21 October 2020 09:42

Subject: RE: Notification for IOGOOS Officer from Central Indian Ocean

Dear IOGOOS Members,

I request you all to kindly send your nomination to the post of IOGOOS

Officer from Central Indian Ocean.

Regards,

Nagaraja Kumar

From: IOGOOS Secretariat [<mailto:iogoos@incois.gov.in>]

Sent: 07 October 2020 16:14

Subject: Notification for IOGOOS Officer from Central Indian Ocean

Dear IOGOOS Members,

As you remember during IOGOOS 16 meeting, the IOGOOS Officer and Chair, Dr.

S.S.C. ShenoI has retired from the member institute and has stepped down

from the Officer / Chair position.

As the IOGOOS Chair position is linked with the positions of IIOE-2

Co-chair, exofficio members in other subsidiary projects of IOGOOS such as

IORP, SIBER, IRF, it is required to fill this post.

As we were unable to fill the same during the IOGOOS 16 e-meeting, it is

tasked to the Secretariat to take it out of session. Meanwhile, we are

trying to keep get interim-Chair and will expedite the same and update.

Keeping in view of the above, I here with request all the members of IOGOOS

representing the Central Indian Ocean to send their nominations to the

position of IOGOOS Officer.

The detailed status of the present vacancies is attached herewith for reference.

With Best Regards,

Nagaraja Kumar

M. Nagaraja Kumar,

Scientist & In-Charge, Marine Fishery Advisory Services (MFAS),

Secretary, Indian Ocean Global Ocean Observing System (IOGOOS)

Indian National Centre for Ocean Information Services (INCOIS),

Ministry of Earth Sciences, Govt. of India

"Ocean Valley", Pragathi Nagar BO, Nizampet SO.

Hyderabad, Telangana -500090,

INDIA

Direct Tel: +91 40 2389 5013

DID: +91 40 2388 6031

Fax: +91 40 2389 5014

Mob: +91 94910 67556 / +91 8885566620

url: <http://www.incois.gov.in>

Alt Email: <mailto:raja.masuluri@gmail.com> / <mailto:masuluriraja@gmail.com>

Do not Print this, unless it is essentially required.

Save the Trees and Save the Environment

Briefing Paper for IOGOOS-16 Agenda

16 July 2020

From Chair IOGOOS

For: Renewal and updating of IOGOOS membership structure

Motivation

It is important and it has become timely to renew the IOGOOS membership framework, given the changes to its fundamental constituency of aligned groups, projects, etc since the early phases of IOGOOS. This view also derives from the comments made at the 9thGOOS Regional Alliance Forum, Tokyo Aug 2019 (GRA9), on IOGOOS's profile and visibility and role and from general discussions held on this matter at IOGOOS-15. The GRA9 forum was notable for comments made by some other GRA members and the GRA Chair (past and present) that it has become difficult (from the 'outside') to easily understand how all of the various historical and emergent GOOS related entities fit and work together in respect to the GRA mission, and in the context of IOGOOS as the long standing GRA for the IO as a whole. Noting that: IOGOOS began in 2002, adding to IOCINDIO's IO role; IOCINDIO became dormant from around 2005-2015; IOP (now IORP) emerged in 2005 with significant motivational and functional support from IOC-GOOS/IOGOOS and CLIVAR (ICPO); thereafter(2010) SIBER and IRF emerged (again aligned and supported by IOGOOS); then IIOE-2 emerged (2015), with IOGOOS as a major sponsor and providing one of the IIOE-2 Steering Committee's co-chairs; and most recently IOGOOS linked with (i) the Decadal Review of IndoOS (minor sponsorship and via cross-collegiate connections through members) and (ii) the UN Decade, including via IIOE-2 which is being seen as a ready-to-go contribution to the UN Decade.

Proposed new membership framework.

1. Retain: Current Members and Assoc Members remain. (approx. 27 members from over 15 countries).
2. Add: New members as follows (of course appreciating that some of the below are already in the membership and some names are duplicated because the person occupies, at present, more than one membership category, and so this list below is for completeness and future reference as names of persons applicable to each membership place may change):

Note: New members are to be derived from key projects that are aligned with IOGOOS (ie projects having IOGOOS as patron or co-patron or linked to IOGOOS):

Leaders of SIBER, IORP, IRF, IIOE-2, IOCINDIO, GRA Council and leaderships/Secretariat heads of collaborating patrons and major sponsors of these groups (eg IOC-GOOS, ICPO, IMBER) to become (through invitation via IOGOOS Chair) formal members of IOGOOS (to represent their constituencies in respect to GOOS). Their membership categories would be:

- ‘Member’ - if from within IO region.
- ‘Associate Member’ - if from outside IO region.
- Currently, this means:
 - SIBER Raleigh Hood and Greg Cowie = Assoc Members
 - IORP Roxy Koll = Member; Lisa Beal = Assoc Member
 - IRF Sidney Thurston = Associate Member
 - IRF Convener Nick D'Adamo = Member
 - IIOE-2 Co-Chairs
 - Vladimir Ryabinin = Associate Member
 - Peter Burkill = Associate Member
 - Satheesh Shenoj = Member
 - IIOE-2 JPO Directors:
 - Satya Prakash = Member
 - Nick D'Adamo Member
 - IOC-GOOS Director Albert Fischer (IOC HQ GOOS Project Office) = Assoc Member
 - ICPO Director Jose Santos = Associate Member
 - ICPO Secretariat rep. Jing Li = Associate Member
 - IMBeR Director = Assoc. Member; IMBeR Secretariat Rep. = Associate Member.
 - IOCINDIO Chair M Atmanand = Member
 - IOCINDIO Secretariat Rep Justin Avanzano = Associate Member
 - GRA Chair R Venkatsen = Member
 - IOC-PPO (as an IOGOOS sponsor/patron) Nick D'Adamo = Member

Note: The Members / Associate Members mentioned here are based on their present roles in IORP, SIBER, IRF, IIOE-2, IOC, GOOS, etc. The above roles are not based on the individual.

Note also (for consideration):

- I. Consider inviting leaderships of SEAGOOS, GOOS Africa, IMOS, WAGOOS – given that they overlap with IOGOOS geographically and thematically.
- II. Similarly, WESTPAC, IOC AFRICA, RCOWA, ROPME, PERSGA, WIOMSA... others?

Obligations (expectation?) of Members

- Provide annual reports (either verbal, written, brief or detailed- as is sensible and practicable, year-to-year, consistent the level of collaboration and engagement with IOGOOS). Submit in whatever form is sensible, to IOGOOS meetings – ie summary of progress in respect to contribution to GOOS (in light of IOGOOS being a GRA), with their reports helping as background for IOGOOS’s reporting to the wider GRA Forum every two years.
- This then provides IOGOOS to be better recognised as the seminal GRA for the IO region *as a whole*, and for it to be able to effectively and meaningfully represent the contributions of the suite of GOOS related project alliances in the IO (related to IOGOOS) to the wider GRA Forum every two years.

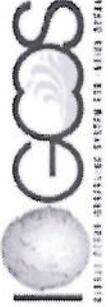
- This will be a fundamentally important contribution to the GRA Forum mission for global GOOS.

Proposed changes to the IOGOOS financial framework

- Revise the \$500 USD annual fee – as it discourages some members from participating and history shows that, in reality, it is not a fee that is being honoured across the board.
- Start to use the existing IOGOOS budget surplus from the pool of past membership fees to provide tactical and strategic support to key initiatives (see below, for example).
- Have a timely strategic review as to how the IOC's \$10K USD per year sponsorship to IOGOOS is to be used in support of IIOE-2 into the future, especially in light of the IIOE-2 being extended out to 2025.
- **NOTE: The above Membership fee doesn't applicable to the co-opted members / associated members from the projects such as IORP, SIBER, IRF, IIOE-2 and other regional panels / leadership institutes such as IOC, GOOS and other GRAs.**

Enhance Capacity development under IOGOOS

- Make better use of India ITC Ocean for regular (at least 1-2 per year) CD exercises based at ITC Oceans, under the auspices of IOGOOS, in collaboration with IOC's OTGA. EG
 - Annual CD workshop under the objective of taking advantage of the earlier work and now re-initiating the IOGOOS Pilot Project *Modelling for Ocean Forecasting and Process Studies (MOFPS)*
- Other workshop ideas as deemed of high priority by the IOGOOS membership (eg Coastal Vulnerability – already started via IOCINDIO: recall workshop in Hyderabad 2019).
- Ditto – similarly, make better IOGOOS related use of the Cat II Centre in Iran (RCOWA).
- Ditto – for other regional training centres.



INDIAN OCEAN GLOBAL OCEAN OBSERVING SYSTEM (IOGOOS)

INCOIS, "OCEAN VALLEY", PRAGATHI NAGAR (BO), NIZAMPET (SO), HYDERABAD-500 090, INDIA

Phone: +91 40 2389 6031, 040 2389 5013; e-mail: iogooos@incois.gov.in

Receipts and Payments Account for the period from April 1, 2019 to March 31, 2020

Receipts	Amounts (Rs.)	Payments	Amount (Rs.)
Opening Balances:			
i) Andhra Bank, Pragathi Nagar Branch, Hyderabad, Account No.171410100022355	7,48,706.00	Duplicate Statement Charges	288.00
ii) Andhra Bank, Pragathi Nagar Branch, Hyderabad, Account No.171410100022346	21,59,341.50	IOGOOS Accounts Audit fee paid to PPKG & Co. for the FY 2011-12 to 2018-19	51,840.00
Interest received from savings accounts at Banks	1,01,342.00		-
Membership Fee received from NIOT Chennai for the FY 2017-18 and 2018-19	69,430.00		-
Membership fee received from MOI Mauritius for the FY 2017-18 and 2018-19	68,703.00		-
Membership fee received from KISR Kuwait for the FY 2017-18 and 2018-19	65,862.00		-
Membership Fee received from IMS Tanzania for the FY 2017-18 and 2018-19	67,594.00		-
Membership Fee received from NIOT Chennai for the FY 2019-20	35,411.00		-
Membership Fee received from INCOIS india for the FY 2019-20	36,925.00	CLOSING BALANCES:	
Membership Fee received from CSIRO-Australia for the FY 2019-20	34,432.00	i) Andhra Bank, Pragathi Nagar Branch, Hyderabad, Account No.171410100022355	8,64,570.00
		ii) Andhra Bank, Pragathi Nagar Branch, Hyderabad, Account No.171410100022346	24,71,048.50
Total	33,87,746.50	Total	33,87,746.50



(P.S. Chaitanya)
Assistant Manager

Place: HYDERABAD
Date : 09/06/2020

S. Nageswara Rao

(S. NAGESWARA RAO)
Sr. Accounts Officer, INCOIS

S. Nageswara Rao
Senior Accounts Officer

M. Nagababaji Kumar
09/06/2020

(M. NAGABAJA KUMAR)
Secretary, IOGOOS



INDIAN OCEAN GLOBAL OBSERVING SYSTEM (IOGOOS)

INDIAN OCEAN GLOBAL OBSERVING SYSTEM (IOGOOS)

INCOIS, "OCEAN VALLEY", PRAGATHI NAGAR (BO), NIZAMPET (SO), HYDERABAD-500 090, INDIA

Phone: +91 40 2389 6031, 040 2389 5013; e-mail: iogoods@incois.gov.in

Receipts and Payments Account for the period from April 1, 2019 to March 31, 2020

Receipts	Amounts (USD)	Payments	Amount (USD)
Opening Balances:			
i) Andhra Bank, Pragathi Nagar Branch, Hyderabad, Account No.171410100022355	9,899.59	Duplicate Statement Charges	3.81
ii) Andhra Bank, Pragathi Nagar Branch, Hyderabad, Account No.171410100022346	28,551.39	IOGOOS Accounts Audit fee paid to PPKG & Co. for the FY 2011-12 to 2018-19	685.44
Interest received from savings accounts at Banks	1,339.97		-
Membership Fee received from NIOT Chennai for the FY 2017-18 and 2018-19	918.02		-
Membership fee received from MOI Mauritius for the FY 2017-18 and 2018-19	908.41		-
Membership fee received from KISR Kuwait for the FY 2017-18 and 2018-19	870.84		-
Membership Fee received from IMS Tanzania for the FY 2017-18 and 2018-19	893.75		-
Membership Fee received from NIOT Chennai for the FY 2019-20	468.21		-
Membership Fee received from INCOIS india for the FY 2019-20	488.23	CLOSING BALANCES:	
Membership Fee received from CSIRO-Australia for the FY 2019-20	455.27	i) Andhra Bank, Pragathi Nagar Branch, Hyderabad, Account No.171410100022355	11,431.57
Total	44,793.69	ii) Andhra Bank, Pragathi Nagar Branch, Hyderabad, Account No.171410100022346	32,672.86
		Total	44,793.69

(Exchange rate 1USD=INR 75.63)



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(P.S. Chaitanya)
Assistant Manager

Place: HYDERABAD
Date : 09/06/2020

S. Nageswara Rao
(S. NAGESWARA RAO)
Sr. Accounts Officer, INCOIS

S. Nageswara Rao
Senior Accounts Officer

M. Nagaraj Kumar
(M. NAGARAJA KUMAR)
Secretary, IOGOOS

List of Active and Non-Active Members of IOGOOS and present focal points

Sl. No	Organization / Institution	Signatory	Focal Contact Persons	Address	Active / Non-Active Status
1.	Bureau of Meteorology	Dr. Neville Smith	Dr Boris Kelly-Gerreyn Head, Observing Strategy Section, Observations & Infrastructure Division email: boris.kelly- gerreyn@bom.gov.au	Bureau of Meteorology 700 Collins Street, Docklands, VIC 3008 T : +61 (3) 9669 4183 M: +61 (0) 417 912 516	Active
2.	CSIRO – Australia	Dr. Gary Meyers	Dr. Andreas Schiller Deputy Chief, Marine, CSIRO Marine and Atmospheric Research - Hobart Andreas.Schiller@csiro.au	GPO Box 1538 Hobart 7001 Australia Tel: 61362325208 Fax: 61362325123	Active
3.	Indian National Centre for Ocean Information Services	Dr. K. Radhakrishnan	Dr. S. S. C. Shenoi, Director shenoi@incois.gov.in	"Ocean Valley", Pragathi Nagar BO, Nizampet SO, Hyderabad - 500 090, India Tel: 00914023895000 Fax: 00914023895001	Active
4.	National Institute of Oceanography	Dr. Ehrlich Desa	Dr K. Sunil Singh. Director sunil@nio.org	Dona Paula Goa 403004 India Tel: 0091 832 2450200 Fax: 0091 832 2450602 Mob:	Active
5.	National Institute of Ocean Technology	Prof. M. Ravindran	Dr. Atmanand, Director director@niot.res.in /	Pallikaranai, Chennai-601302 India Tel: 0091-44-2461029	Active

			atma@niot.res.in	Fax: 0091-44-2460275	
6.	Intergovernmental Oceanographic Commission	Dr. William Erb	Dr. Nick D'Adamo Head, IOC Perth Email: n.D'Adamo@bom.gov.au Nick.D'Adamo@bom.gov.au	IOC Perth Regional Program Office, PO Box1370 Perth WA 6872 Australia Tel: 61 08 9226 2899 Fax: 61 08 9226 0599	Active
7.	Iranian National Institute for Oceanography and Atmospheric Science (INIOAS)	Dr. Nasser Hadjizadeh Zaker	Dr. Behrooz Abtahi, Director inioas@inio.ac.ir	No.3, Etemad Zadeh St., Fatemi Ave., Tehran, IR. Iran Postal Code: 1411813389 Post Box: 14155-4781 Tel: (0098)21-66944873-5 Fax: (0098)21-66944869 Web site: http://www.inio.ac.ir	Active
8.	Kenya Marine & Fisheries Research Institute	Dr. Johnson Kazungu	Prof. James M. Njiru (PhD), Director Email: director@kmfri.co.ke or kmfridirector@gmail.com	Kenya Marine and Fisheries Research Institute Headquarter and Mombasa Centre P.O. Box 81651 080100 Mombasa, KENYA Tel: +254 (041)475151/4 Wireless: +254 (020) 8021560/1 Fax: +254 (041) 475157	Non-Active
9.	Laboratoire ECOMAR,	Prof. Chantal	Prof. Henrich Bruggemann Professor	Université de La Réunion	Non-Active

	Université de La Réunion	Conand	Email : henrich.bruggemann@univ-reunion.fr ecomarse@univ-reunion.fr	15 Avenue René Cassin CS 92003 97744 ST DENIS CEDEX 9 FRANCE phone 02 62 93 86 86	
10.	Mauritius Oceanography Institute, Mauritius	Mr. Harry Ganoo	Dr. Ruby MOOTHEN PILLAY,, Officer-In-Charge., Email: moi@intnet.mu / rubykm@moi.intnet.mu	Mauritius Oceanography Institute, 4th Floor, France Centre, Victoria Avenue, Quatre Bornes, Mauritius Tel: 230 427 4434 Fax: 230 427 4433	Active
11.	INAHINA	Dr. Albano Gove	Dr. Augusto Bata, Director augustobata@yahoo.com.br mutevuie@inahina.gov.mz	Av. Karl Marx No. 153 PO Box No. 2089, Maputo Mozambique Tel: 258 1 430 186/8 Fax: 258 1 430 185 www.cfm.co.mz	Non-Active
12.	South African National Committee for IOGOOS	Prof. Mark R. Jury	Dr Nkanyiso Mbatha Email: MbathaNB@unizulu.ac.za nkanyisombatha5@gmail.com	Dept. of Geography & Hydrology University of Zululand PB X 1001 Kwa-Dlangezwa 3886 Tel: +27 35 902 6400 Fax: +27 35 193420 C: +27 723995436	Active
13.	National Aquatic Resources Research & Development Agency (NARA)	Dr. T. Kamal Dharmasiri Tennakoon	Dr. K. Arulananthan, Head, National Institute of Oceanography Marine Sciences arul@nara.ac.lk	Crow Island, Colombo 15 Sri Lanka Tele: +94-11-2521008	Active (Partly)
14.	NOAA Office	Dr. Sidney	Dr Sidney THURSTON	NOAA Climate	Active

	of Global Programs	Thurston	Program Manager Email: Sidney.Thurston@noaa.gov	Program Office Phone: +1-301-427-2459 FAX: +1-301-427-0033 www.climate.gov www.economics.noaa.gov/?goal=climate	
15.	South African Institute for Aquatic Biodiversity	Dr. Anthony J. Ribbink	Dr. Angus Paterson, Managing Director a.paterson@saiab.ac.za / saiab@saiab.ac.za Alternative contact : Mr Ryan Palmer R.Palmer@saiab.ac.za	Somerset Street, Private Bag 1015 Grahamstown 6139 / 6140, Eastern Cape, South Africa Tel: +27-46-603 5800 Fax: +27-46-603 5825 Ph: +27 83 2754407 (Dr. Angus Paterson)	Active
16.	University of Port Elizabeth	Prof. Dan Baird	Prof. Dan Baird Email: zladdb@zoo.upe.ac.za	Department of Zoology P.O. Box 1600, Port Elizabeth 6000 South Africa Tel: +2741504341 Fax: +27418042317	Non-Active
17.	Durban School of Life and Environment Sciences	Prof. Anthony Forbes	Prof Anthony Forbes Proffessor Department of Zoology Email : forbesa@biology.und.ac.za	University of Natal Durban 4041 South Africa Tel: +270312603183 Fax: +270312603183	Non-Active
18.	Curtin University	Prof. Mervyn John Lynch	Prof. Mervyn John LYNCH Proffessor Email : m.lynch@curtin.edu.au	P.O. Box 41987 Perth, WA 6006 Australia Tel: 61892667540 Fax: 61892662377	Non-Active
19.	Institut Halieutique & des Sciences Marines	Dr. Man-wai Rabenevana	Dr Thierry Lavitra Director Email : lavitra_thierry@yahoo.fr	Fisheries and Marine Science Institute, PO Box 141 - Port Road, Avenue De France, 601 Tulear, Madagascar Tel: 00	Active

			ihs@syfed.refer.mg	261 (0) 20 94 941 67	
20.	Indian Space Reserach Organisation	Dr. V. Jayaraman	Dr. Shantanu Bhatwade bshantanu@isro.gov.in	Earth Observation Systems, ISRO Head Quarters Bangalore INDIA	Active
21.	University of Dar es Salaam	Prof. Alfonse M. Dubi	Dr. M.S. Kyewalyanga Director, director@ims.udsm.ac.tz maggie@ims.udsm.ac.tz	Institute of Marine Sciences P.O. Box 668 ZANZIBAR, TANZANIA Tel. +255 24 223 2128 +255 24 223 0741 (office) +255 24 223 4175 (res.) Fax: +255 24 223 3050 Mobile: +255 744 462 417	Active (Partly)
22.	Agency for Assessment and Application of Technology (BPPT)	Dr. Jana T. Anggadiredja	Mr. Muhammad Ilyas m.ilyas@bppt.go.id	BPPT Building I - 18th Floor Jl.M.H. Thamrin 8 - Jakarta 10340, INDONESIA	Active
23.	Indonesian Institute of Science (LIPI)	Dr. Jan Sopaheluwakan	Mr. Augy Syahailatua augy.lipi@gmail.com	Jl. Gatot Subroto Jakarta INDONESIA	Active
24.	Ministry of Marine Affairs and Fisheries	Dr. Indroyono Soesilo	Dr. Anastasia Rita Tisiana Dwi Kuswardani anastasia.tisiana@gmail.com Mr. Riyanto riyanbas@yahoo.com	Agency for Marine and Fisheries Research Jl Letjen M.T. Haryono Kav. 52-53 Jakarta 12770 INDONESIA Tel/Fax. +62 21 79180458	Active
25.	MERCATOR	Dr. M. Francois Gerard	Dr. M. Francois Gerard Charge de Mission pour les Affaires Oceanographiques Email :	Meteo France - Direction de la Meteorologie Nationale, 1, quai Branly 75347 Paris	Non-Active

			francois.gerard@meteo.fr	Cedex 07 FRANCE Tel. +33 (0)1 45 567011 Fax: +33 (0)1 45 567005	
26.	Maldives Meteorological Service	Dr. Ali Shareef	Dr. Ali Shareef Deputy Director General Email: shareef@meteorology.gov. mv alisharyf@gmail.com	Hulhule' 22000, Maldives. Phone: +960 332 6200 Cell:+960 7771828 Fax: +960 332 0021	Active
27.	Bay of Bengal Large Marine Ecosystem (BOBLME)	Dr. Chris O'Brien	Dr. Chris O'Brien Regional Coordinator Email: chris.obrien@fao.org	FAO Regional Office for Asia and the Pacific, Maliwan Mansion, 39 Phra Atit Road, Bangkok 10200, Thailand	Request for Withdrawal
28.	Institute of Marine Sciences and Fisheries	Dr. Md. Ashraful Azam Khan	Dr. Mohammad Zahedur Rahman Chowdhury Director & Associate Prof. zahedims@cu.ac.bd director.imsf@cu.ac.bd Cell: +8801711788270	University of Chittagong, Chittagong-4331, Bangladesh Tel: +88-031- 726311~14, 716552, +88-031-710347 Fax: +88-031-726310	Active
29.	Kuwait Institute for Scientific Research	Dr. Najj M. Al-Mutairi	Dr. Faiza Al-Yamani Executive Director Environment and Life Sciences Research Center Email: faizayamani@gmail.com	P.O.Box 24885 Safat 13109 Kuwait Tel: +965-24989320/21 Fax: +965-24989319	Active

29 institutes from 17 countries (including IOC and BOBLME): 19 Members- Active, 03 Members- Partly active, 06 Members- Completely In-active, 01 Member- Requested for Withdrawal