



## **Intergovernmental Oceanographic Commission**

*Reports of Meetings of Experts and Equivalent Bodies*

# **Sixth Session of the GOOS Regional Alliance Forum (GRF-VI)**

<http://ioc-goos.org/GRF-VI>

Honolulu, Hawaii, USA

14-16 May 2013

### **Final Report**

**GOOS Report No. 2xx**

**UNESCO**

## Table of Contents

Table of Contents .....	2
Executive Summary.....	3
Opening.....	3
Keynote Speech: .....	3
Where is GOOS Heading? .....	4
Review and Analysis of Regional Alliance Assessments .....	5
Success Stories & Highlights from the GRAs .....	6
Special Topic Presentation: Ocean Tracking Network .....	7
Discussion on Benefits To and From the Global System.....	8
Focused Topic Area – Coastal Ocean Forecasting and Modeling .....	10
Presentation on Suomi National Polar-orbiting Partnership Data Products .....	11
Common Projects and Funding Mechanisms .....	11
Review of GOOS Regional Policy 2013.....	11
Discussion on Election of GRA Chair, Closure .....	11
Annex I: GOOS Regional Council Actions – V.1 -21 June 2013.....	13
Annex II: GOOS Regional Policy 2013 .....	19
Annex III: List of Acronyms.....	25
Annex IV: Attendance List .....	27

## **Sixth Session of the GOOS Regional Alliance Forum (GRF-VI)**

### **Executive Summary**

The May 2013 GRF VI, under the guidance of Zdenka Willis, chair of GOOS Regional Council, was attended by Representatives from 11 GRAs plus GOOS SC, IMOS, SOOS, PACIOOS, GODAE OceanView and OTN provided for wide ranging discussions on the role of the GRAs in furthering GOOS principles. The Forum reviewed and accepted the GRA guidance document, "GOOS Regional Policy 2013", which has been approved by the IOC-XXVII Assembly, and forms a clear basis for expectations and interactions between the GRAs and the GOOS Steering Committee. It was recognized that GRAs deliver services through the mediation of ocean models and analysis tools. The GRAs agreed that cooperation, sharing, capacity building and emphasis on modeling systems could be strong unifying mechanism for Global GRA participation. The GRAs were impressed with presentations about the Ocean Tracking Network and other animal tracking programmes, and recommends their inclusion into future GOOS Biological Panel deliberations.

The GRAs are committed to continuing the assessment of GRA capabilities begun by the GRF, and suggested expanding the asset map to include modeling capabilities. Continuously updated information about physical assets and human assets of the GRAs is essential to maintain communication and identify strengths and gaps in the GOOS observation networks deployed at regional scales. The GRAs are committed to contributing timely information on their activities to the GOOS project office and to maintaining the spirit of collaboration achieved at the Forum.

### **Opening**

The Sixth Session of the GOOS Regional Alliance Forum met on 14-16 May 2013 at the Outrigger Reef on the Beach Hotel, Honolulu, Hawaii, USA. Zdenka Willis, chair of GOOS Regional Council, led the forum which was attended by representatives from 11 GRAs plus GOOS SC, IMOS, SOOS, PACIOOS, GODAE OceanView and OTN. Ms. Willis affirmed the overall goals of the GRF VI to assess the needs, accomplishments, and observing capabilities of the GRAs to better define and communicate the roles, purpose, and goals of the GOOS Regional Alliance at the upcoming IOC Assembly in June. The forum would also be used to identify common projects and funding strategies for development of global coordination of the GOOS Regional Alliance and Global Ocean Observing System and how to better align with Blue Planet and the task structure of GEO.

### **Keynote Speech:**

Dr Sam Pooley, NOAA, Pacific Islands Fisheries Science Center, presented opening remarks and welcomed the session to Hawaii. Dr Pooley pointed out the socio-economic purpose of our work, noting

the bio-economic processes that generate fisheries in the first place. He stressed the importance of interdisciplinary studies of the ocean, including ocean observing, physical oceanography, biology, and biogeochemical studies. In order to meet mandates of managing marine ecosystems, collecting information in the marine environment is essential. Dr Pooley described some experiences of Pacific IOOS (PACIOOS) which participates in ocean observing through programmes for tracking the movement of loggerhead turtles across the Pacific; Coral reef monitoring; creating regional marine services based on satellite data; and making biological database information available to the public. PACIOOS has had success with community based and citizen science. GOOS may benefit from developing applications that allow the public to interact directly with scientists.

The group discussed the need for biological observation integration in GOOS, but noted the difficulties which still hinder even basic observation integration, such as integrating physical ocean and meteorological observations with fisheries data. PACIOOS responds to USA national interests (Magnus Stevens Act) and had little development with Pacific region OOS's.

## **Where is GOOS Heading?**

Dr Eric Lindstrom, Co-lead GOOS Steering Committee (GOOS SC), provided a brief history of the GOOS management and steering committee. To have the research community more broadly involved in ocean observing as a result of Ocean Obs'09 a committee was created that developed the Framework for Ocean Observing which became the foundation for the IOC restructuring of GOOS in 2011.

The GOOS SC is mapping out a clear statement of how the various components of GOOS weave together and interact. Modeling is seen as cross cutting integrator of programmes and should involve GRAs more actively. The primary tasks of the GOOS SC and its Panels are to define major questions and sustained observing requirements for essential ocean variables.

Three GOOS panels were established:

- Physics Panel - with links to JCOMM, CLIVAR, IODE/data management, and ocean forecasting
- Biogeochemistry Panel – Core IOCCP remains, but resources are needed to take on GOOS/FOO role. Goals of this panel would be to define EOVs and review with science/observing community, potential project identified is bio-Argo.
- Biology/Ecosystem Panel – Project ideas from this panel include a workshop in Q4 2013 with sciences, observing and user communities to define key questions, Joint workshops on biogeochemistry, defining EOVs

GOOS regional alliances are a structural element of GOOS, while governance of GOOS is through IOC governing bodies. The GOOS Steering Committee recognizes that energized GOOS projects could provide a way to engage funding. Projects that include specific objectives, milestones, and dates are attractive to funders. The GOOS SC should assist GRAs to develop such projects..

Dr Albert Fischer, GOOS Project Office Director, discussed the evolution of the GOOS program and its components from just climate and weather orientation to include a variety of societal drivers including fisheries, regional priorities, real-time services, assessment and management of ecosystem services. The GRAs are a major GOOS component – providing regional implementation of GOOS and interface to national level implementation and coordination between countries.

Dr Fischer outlined the IOC Core budget for GOOS, and issues for funding in 2012-2013 and the expected reduced funding in 2014. While IOC successfully acquired emergency funding in 2012 and 2013, there is much uncertainty for funding in 2014 and beyond. IOC Member states will be asked to do a prioritization exercise where it is expected that GOOS will be ranked high by most member states. IOC staff support to GOOS includes the GOOS program office in Paris, distributed for global panels from the OOPC technical secretariat, the IOCCP director in Poland, and OBIS funding, and regional support for GOOS in IOCARIBE, WESTPAC, IOCAFRICA, Perth and the GRA support offices.

Individually GRAs are the key implementers of GOOS, responding to regional priorities, capacities and needs, and to develop regional capacity. As a group, GRAs feed into the GOOS steering committee, learn best practices from each other, and develop common GOOS projects for cooperation.

The GOOS strategy for modeling was discussed and agreement was reached that modeling is an important area of development which the GOOS steering committee has taken as a priority. The development of modeling products and capability should be added to the GOOS regional policy.

Dr Fischer clarified that the panels are the leaders in defining and identifying requirements, not the GOOS Program office. The requirements are identified in an implementation plan for the development of a global program.

Dr Fischer reported that JCOMM has discussed the relationship between JCOMM, WMO, GOOS and GRAs and data management and the link to WIGOS activities.

The GOOS SC recognizes that National priorities come first and secondly regional priorities. There is a UN level driver for the sharing of coastal data, while recognizing that coastal observing systems are driven by national interest and national need. Coastal sciences could be advanced across nations through the development of communities of practice around particular types of coastal observations (e.g. HF radar), starting at the regional level and expanded to the global ocean.

Actions: 1, 2, 3

## **Review and Analysis of Regional Alliance Assessments**

Chair Zdenka Willis provided an overview of the summary of the GRA assessments. (On line document [GRF-VI-Doc-5 Compilation of GRA Assessments 2013](#)) The assessment was based on the [PICO plan](#), and designed to identify, holistically, similarities and differences between GRAs. The assessment showed that the GRAs respond to regional priority dictates, some are in the coastal region and some in the global ocean. The assessment reveals a great variety between GRAs of governance structures, data exchange readiness. Common to GRAs were the goal of coordination of observing systems across member nations, contributions to GOOS in their regions, the goal of exchange of oceanographic data and a priority placed on modeling services.

The forum found the assessment very useful and encouraged the secretariat to continue the project to ensure that these assessments are ongoing and continuous. The assessment mechanism needs improvement and integration with other IOC assessments. It will become a repeatable and useful tool in assessing over the years the status of the GRAs. A synthesis using a SWOT analysis – Strengths, Weakness, Opportunities and Threats, will help distill the information in a way that may better illustrate the capability and needs of the GRAs for national representatives and the IOC assembly. The synthesis is useful not only for IOC and other bodies, but for within the GRAs, where there is a widespread variety of

engagement by member countries. This assessment can help communicate about each GRA and the benefit for the individual country/member of more involvement/engagement by GRA member nations.

Actions: 4

## Success Stories & Highlights from the GRAs

Presentations were given by the participants on the accomplishments and successes of GRA programmes. Outline Information for each GRA was gathered through a template survey form and summarized in [GRF-VI-Doc-5 Compilation of GRA Assessments 2013](#). The “Success Stories” of the GRAs are summarized in reports provided for the Forum. The Presentations, Outline Information and Success Story documents are available on-line through links in the below table, or by going directly to the meeting web site: <http://ioc-goos.org/GRF-VI> :

GRA	Presenter	PowerPoint	Outline Information	Success Story
U.S. IOOS	Zdenka Willis	U.S. IOOS	<a href="#">US IOOS</a>	
PAC IOOS	Heather Kerkering	<a href="#">7.1 PACIOOS</a>		
GOOS Africa	Kuoadio Affian	<a href="#">7.2 GOOS Africa</a>	Africa GOOS	
Black Sea GOOS	Atanas Palazov	<a href="#">7.3 BS GOOS</a>	<a href="#">BlackSeaGOOS</a>	<a href="#">BulARGO</a> ; <a href="#">BlackSeaGOOS</a>
EuroGOOS	Patrick Gorringer	<a href="#">7.4 EuroGOOS</a>	<a href="#">EuroGOOS</a>	<a href="#">EuroGOOS</a>
IMOS	Tim Moltmann	<a href="#">7.5 IMOS</a>	<a href="#">IMOS</a>	
IOCARIBE	Doug Wilson	<a href="#">7.6 IOCARIBE</a>	<a href="#">IOCARIBE-GOOS</a>	
IOGOOS	Andreas Schiller	<a href="#">7.7 IOGOOS</a>	<a href="#">IOGOOS</a>	<a href="#">IndOOS</a>
MONGOOS	Andreas Schiller	<a href="#">7.8 MONGOOS</a>	<a href="#">MONGOOS</a>	
OCEATLAN	Frederico A. Saraiva Nogueira	<a href="#">7.9 OCEATLAN</a>	<a href="#">OCEATLAN</a>	<a href="#">GLOSS OCEATLAN</a> <a href="#">PIRATA</a> <a href="#">PNBOIA</a> <a href="#">MOVAR</a> <a href="#">REMO</a>
PIGOOS	Louise Wicks	<a href="#">7.10 PI-GOOS and Western Australia</a>	<a href="#">PI-GOOS</a>	<a href="#">PIGOOS SPREP</a>
SEAGOOS	Somkiat Khokiattiwong	<a href="#">7.11 SEAGOOS</a>	<a href="#">SEAGOOS</a>	<a href="#">SEAGOOS</a> <a href="#">MOMSEI</a> <a href="#">SEAGOOS OFS</a>
SOOS	Oscar Schofield	<a href="#">7.12 SOOS</a>		

GRASP			<a href="#">GRASP</a>	<a href="#">GRASP CPPS</a>
-------	--	--	-----------------------	----------------------------

## Special Topic Presentation: Ocean Tracking Network

Dr Fred Whoriskey, Ocean Tracking Network, Dalhousie University, Canada, spoke on the opportunities opening up with the new OTN observing program. He presented an overview of the Ocean Tracking Network, the infrastructure and platforms and resulting science. The OTN is funded by Canada Foundation for Innovation and also funded by the Natural Sciences and Engineering.

The OTN uses acoustic receivers to gather information from acoustic transmitting tags applied to just about any species they can get a tag on: fish, lobsters, seals (as a bioprobe providing real time observations), sharks, sturgeon and marine mammals. The field was developed in Canada in the 1970's and is now creating a global network to document movements/survival of valued species, identifying critical habitats, measuring associated environmental conditions, fostering innovation in technology, and informing management and policy.

OTN is a global network built on international partnerships, deploying 100% technically compatible strategic global arrays. OTN partners include the existing ocean observing systems, universities, government, NGOs, and industry. The network is united through data sharing with currently over 29 million detection records, based on international data standards, and open access via the web.

Dr Kim Holland, PACIOOS, summarized the history of animal telemetry in Hawaii working with HIOOS and now PacIOOS. He provided an overview of some of the work with animal telemetry in Hawaii and its relevance to OTN and GOOS. Some of their research concerns developing "animal oceanographers" which will collect environmental data such as temperature profiles to 800 meters using hammerhead sharks. Geolocation of tags and intermittent satellite coverage are a few of the problems faced.

Dr Tim Moltmann, IMOS, gave an overview of the animal telemetry and acoustic tagging activities that are occurring in Australia. The AATAMS – Australian Animal Tagging and Monitoring System uses acoustic technology as well as satellite tags to monitor coastal and oceanic movements of marine animals. The AATAMS has taken a national approach to develop a national program, forming a collaborative network of researchers. The group is tagging a large range of fish, sharks and mammals collecting both behavioral data/species movement and physical ocean data.

Australia has been collaborating with OTN since the Perth OTN line deployment, the first outside of Canada. Dr Moltmann noted the power of leveraging systems that are already in place. The initial establishment of an array is labor intensive, but once others begin running more sensors, the cost comes down. The system uses a "top down" approach to better meet needs of fisheries and conservation management, but design depends on research questions, often a bottom up requirement. Environmental managers and fisheries managers need to be more engaged in the system.

Challenges include providing open access to species level data, which leads to controversial risks of giving information to poachers endangering threatened species. There is a need for a change to the manufacturer's software to allow direct export of data to the database. There is also a risk of people building tags that are of poor quality that don't meet the necessary data standards.

The Forum discussed problems with animal tracking data sharing and making the data open access. Tracking researchers are very protective of their data citing the risk that when the sample size is not large, the data could be misinterpreted, misused or purposefully misrepresented. The effort of tagging animals can be great, and the perceived ability of other groups to access the results of that tagging without benefiting the primary researchers is a risk of open access to these data. These problems lead to reluctance to unify the data needs of the animal tracking research community.

On the other hand Dr Holland commented that the majority of data used by the fishery industry is pretty basic (SST, chlorophyll) in comparison to the data researchers are looking at (stratification profiles, time-series, etc.). Methods to assure proper citation of data were also discussed.

The Forum recommended that animal tagging research and in particular the OTN can be greatly benefited by collaboration and unification of systems. The GRAs can contribute immediately by identifying ongoing projects in their regions, and encouraging equipment interoperability, common databases, coordinated ship usage and sharing of best practices in future projects. First steps will be to assure that OTN and animal trackers are present in GOOS Biology Panel and JCOMM activities, such as the SatCOMM Forum and Joint Tariff Agreement meetings in October 2013.

The animal tracking network initiative should be taken forward to other venues and communicated from a GOOS and GRA perspective. Since animal tracking is still largely an individual researcher programme, great impact can be had by providing communication and collaboration to the community. The GRAs will play an important role by identifying and entraining national researchers in GOOS systematic thinking. Dr Whoriskey concluded by noting that this will become a component of Ocean observing systems and the OTN is looking for ways to aid GRAs in their mission, by sharing resources to make it more cost effective and possible.

Actions: 5, 6, 7, 8, 9, 10,

## **Discussion on Benefits To and From the Global System**

Dr Tom Gross, GOOS Project Office and IOC Secretariat, led a discussion on the Benefits To and From the Global System of the GRAs. The contribution of GRAs TO the Global Ocean Observing System is generally agreed to be as key implementers of GOOS, responding to regional priorities, capacities and needs and developing regional capacity. In turn the GRAs gain FROM GOOS communication and collaboration values in the framework of learning of best practices, interacting with one another (MOUs and other agreements, etc.), data sharing and developing common projects, which emphasize collaboration and sharing. However GRAs are mostly driven by regional priorities and it is not clear how the new GOOS structure will reinforce these GRA modalities.

The GOOS Panels are concerned with developing requirements and variables, assessing the readiness and usefulness of Essential Ocean Variables which will be encouraged as the basis of the Observing System. Regions and the GRAs will play an important role advising the Panels of their priorities and needs, so the Panels can address questions of how to move GOOS forward. The members of GRAs must be active in the GOOS Panels and in other JCOMM activities to promulgate GRA priorities.

Actions 2, 3, 15, 22



GRA Priorities fundamentally serve societal benefits. The particular listings of societal benefits should be reviewed to assure that GRAs have a clear view of their priorities which can be communicated to the GOOS Panels. Identification of priorities which are common across many GRAs will be a very useful outcome, and will aid collaboration. Societal benefits are manifest through oceanographic services, which are designed and delivered at the national and regional scale. It is important that GOOS and JCOMM recognize that the GRAs can be used to report on and connect services with the global goals of GOOS and JCOMM.

Actions 3, 4, 12, 15

Priorities vary within GRAs depending on geographies, country priorities and more. High level priorities can be agreed upon, such as the seven priorities set out by IOGOOS. But such a high level view does not include the “why” for the priorities, which is usually answered at the finest levels. GRAs should, and do, implement priorities themselves, without necessarily integrating with global priorities. GRAs are able to implement and integrate National and regional systems and GRAs have demonstrated they have the ability to produce downstream products and applications of observations that add value. The GRAs have the capability to inform the GOOS Panels where there are gaps in regional observation systems and where capacity needs to be built.

The GRAs can benefit from collaboration links built at the global scale between GRAs with each other and with other international organizations, such as GOOS, JCOMM, IODE, GEOSS etc. The group discussed the value of identifying projects to move collaboration forward. Projects for capacity building and projects for developing standards could be developed. Capacity building is one measure of common activity, but GRAs are also operational and coordinating bodies, which can benefit by establishing standard methodologies, and conducting technological development for members.

A prerequisite step to these collaborative projects will be to develop better communication between GRAs and with other GOOS activities, such as those carried out through JCOMM and IODE. Several recommendations to enhance inter-GRA communication and communication from GRAs to the GOOS SC were proposed, including promotion of joint meetings and participation in JCOMM expert teams.

Action 13, 14, 15, 16, 17, 18

The

Dr. Gross continued the discussion was continued the next day with an emphasis on the Benefits which GRAs can derive from international coordination through GOOS. GRA chairs were queried on how their programmes have benefited by the affiliation with the GOOS. How was value found in being labeled as a GOOS Regional Alliance? Several points arose:

- Elevates stature of the programs in GRA countries for GOOS
- Allows more, small countries to be involved in GOOS.
- Facilitates and coordinates projects across the region under the GRA
- Capacity building is optimized and better coordinated through the GRA.

- GRA will benefit by leaning on the intergovernmental agreements approved by the IOC assembly.
- Being a GRA should facilitate the communication with other GRAs.
- International agencies that may have interest in particular regions will look favorably and possibly with funding, upon the GRAs speaking with a common voice, as an integrated group.

From this list it is evident that communication between GRAs and by the GOOS about GRAs is a primary benefit. The question is then how to improve the communication capabilities of the IOC and to benefit the GRAs? Currently the communication with the IOC governing bodies is not adequate, and better more compelling reasons must be given to the IOC member states to support GRAs and GOOS. It is recognized that the main purpose and activity of the IOC is coordinating activities between countries, demonstrating that by working in common systems there is a benefit to engaging GRAs. The group agreed that working on a few shared programmes would demonstrate these values. Identifying possible programme ideas requires more information on shareable assets and gaps which collaboration will aid.

The group agreed that an assessment of GRA activities is necessary for a variety of reasons. It would help GRAs identify gaps and opportunities between GRA observation systems. It would identify the contacts in each region to facilitate GRA to GRA communication. It would demonstrate to IOC governing bodies, and to national stakeholders, the value of GRA activities and how they would benefit by participation in a global system. The assessment should be conducted every year. It should identify national and regional GRA activities and highlight international activities and collaboration between GRAs. An asset map could be elaborated with the help JCOMM-OPS products with additional input from GRAs. EuroGOOS has good examples and a system of asset map maintenance which the GRAs may use. The IODE data portal may also be a tool to create a asset map (Action 14). Care must be taken when implementing these technical solutions that the assets map or assessment may lose the “people” assets (the institutions, organizations, etc. involved with the GRA).

Sharing of data and resources will include sharing knowledge between GRAs. A necessary first step is to be sure that neighboring GRAs are invited to one another’s annual meetings and other GOOS programme meetings (Action 15, 16, 17).

The general idea of asset assessments was seen to be open ended. The methods, including enhanced surveys, annual reports and database sharing, will be developed and refined over the years, as follow on to the assessment Z. Willis organized for this session.

## **Focused Topic Area – Coastal Ocean Forecasting and Modeling**

Dr Andreas Schiller, Co-chair GODAE OceanView, presented an overview of the Global Ocean Data Assimilation Experiment. GODAE successfully built a data processing system for Argo, GHRSSST, altimetry, in-situ observations and integrated those with modeling and data delivery systems. GODAE’s greatest contribution was the demonstration of the feasibility and utility of high resolution forecasting. The next phase for GODAE is now OceanView which has the challenge of delivering high resolution modeling for regional and local areas for weather forecasts, climate, coastal issues and, perhaps, ecosystem modeling.

The focused topic area of Coastal Ocean Forecasting and Modeling quickly became a continuation of the discussion of asset maps begun in the previous session. The White Paper of the COSS-TT and GODAE OceanView Workplan begin the process of creating a modeling asset map. A EuroGOOS modeling assessment discovered more than 90 models with much overlap. EuroGOOS questionnaires gathered model metadata used to collect critical information about models and products. It was noted that GRA model assessments will quickly reveal observation gaps and needs. Past OSE and OSSE's have revealed that there is severe under observing occurring.

Actions: 19, 20

## **Presentation on Suomi National Polar-orbiting Partnership Data Products**

– Dr Lihang Zhou, NESDIS, Center for Satellite Applications and Research (STAR)

## **Common Projects and Funding Mechanisms**

Zdenka Willis (GOOS RA Council Chair) provided a brief presentation on Blue Planet/GEO. The GEO work plan is volunteer and outside the UN system, so GEO presents an alternative venue for international collaboration, "Science without Borders". GEO provides new platforms to demonstrate importance of sustained in situ and satellite observations of marine and freshwater environments, and the value of integrating these with models. The Forum advised that GEO should be engaged by the GRAs.

## **Review of GOOS Regional Policy 2013**

The Chair introduced the GOOS Regional Policy 2013 document. The Forum Participants had examined the document and provided wording suggestions via mail the previous weeks. The Forum examined the document and reached agreement on several wording changes.

Following the GRA Forum VI the GOOS Regional Policy 2013 document was further examined by the GOOS SC and presented to the IOC XXVII Assembly in July 2013. The IOC XXVII Assembly approved the document as GOOS Report No. 200, or IOC/INF-1308. The approved final GOOS Regional Policy 2013 is presented in Annex III.

Action: 11

## **Discussion on Election of GRA Chair, Closure**

Excerpt from GOOS Regional Policy 2013:

"GOOS Regional Council leadership will be a member of the GOOS Regional Council. The chair will be elected by simple majority vote by the GOOS Regional Council, and will serve for 2 years. The chair can be extended for a second 2 years if agreed to by the GRC and the incumbent. The GOOS Regional Council may decide to elect a vice chair to aid the chair in the administration of the GOOS Regional

Council. The leadership structure of the GOOS Regional Council may be changed by consensus of the GOOS Regional Council members.”

Zdenka Willis was appointed chair of the GRA Council in October of 2011 for term of two years, until October 2013.

There was consensus that the group would like Z. Willis to remain chair for a second term. Z. Willis accepted upon the condition that a vice chair be appointed to aid her. It was decided by the GRC to accept Z. Willis’ recommendation and solicit nominations for the vice-chair position to be elected by correspondence in October.

The Chair proposed quarterly conference calls to track the actions from the forum, for the further development of new actions and projects, and to continue regular communications within the GRA Council.

Dr Tim Moltmann announced that he would like to propose that IMOS be put forward for official status as a GRA. The recommendation will be forwarded to the GOOS SC, in accordance with the GOOS Regional Policy 2013.

Actions: 21, 22, 23

The Chair presented a list of possible action items derived during the discussions. The approved action items are listed in Annex I.

Zdenka Willis thanked participants for their active engagement in the Forum and closed the proceedings, 16<sup>th</sup> May, 2013.

**Annex I: GOOS Regional Council Actions – V.1 -21 June 2013**

No.	Action Description	Lead (Support)	Due Date	Status	Notes
1	Eric invited the GRAs to attend the upcoming webinars on special topic areas to start in June.	GOOS Program Office			GRF-6 Forum Session: Where is GOOS Heading?
2	Lend GRA expertise to the GOOS panels through volunteers. <ul style="list-style-type: none"> <li>Will communicate to the panel leads that there is willingness of the GRA to participate</li> </ul>	Zdenka Willis to send e-mail requesting volunteers	1 August		GRF-6 Forum Session: Where is GOOS Heading?
3	Formulate the value chain of the GRAs to GOOS, and communicate that to the GOOS Steering Committee. <ul style="list-style-type: none"> <li>GRA Leads will send 3 items for the value chain of GOOS and 1 item for what you think the GOOS SC can help us with. Zdenka will compile these responses and send it forward to the SC within 45 days.</li> </ul>	Zdenka Willis (Input from GRA Leads)	1 August		GRF-6 Forum Session: Where is GOOS Heading?
4	Create a SWOT analysis of the GRA assessments for turn around to the IOC assembly.	Zdenka Willis (Laura Griesbauer)	4 June	Completed, will present at IOC.	GRF-6 Forum Session: Review and Analysis of GRA Assessments

No.	Action Description	Lead (Support)	Due Date	Status	Notes
5	Evaluate the OTN data policy using the Framework for Ocean Observing and redistribute to the GRAs for comment.	Fred Whoriskey (with input from Tim Moltmann and Doug Wilson.)	1 August	Draft Submitted to Zdenka 14 June. Zdenka will circulate to the GOOS Regional Council for review.	GRF-6 Forum Session: OTN discussion
6	Go back to the physical and biology GOOS panels to work on identifying EOVs that can be measured using this technology. <ul style="list-style-type: none"> <li>Biologists ask the OOPC to identify to what accuracy, precision, resolution, and latency should they aspire (maturity of satellite tags vs. acoustic tags).</li> <li>New GOOS biology panel needs to engage with OTN to determine EOVs.</li> </ul>	-Eric Lindstrom for OOPC -Tim Moltmann will facilitate introductions with Biology panel	1 Sept.		GRF-6 Forum Session: OTN discussion
7	GRAs endorsed the tagging concept as a critical element of GOOS as we move forward as a way to couple physical and biological data. <ul style="list-style-type: none"> <li>Zdenka will communicate this message to the GSC and John Gunn.</li> </ul>	Zdenka Willis	1 June	Completed – will be briefed by John Gunn at IOC. John's briefing to be posted after IOC meeting.	GRF-6 Forum Session: OTN discussion

No.	Action Description	Lead (Support)	Due Date	Status	Notes
8	GRAs need to explore what is the mutual benefit and how to work with the various groups to bring this into the in situ networks.	OTN and GRA members. Fred to work with GRA members. Laura to provide e-mail addresses to Fred (done).	Ongoing		GRF-6 Forum Session: OTN discussion
9	Identify someone to attend the SATCOM Forum and JTA meeting in the fall.	GOOS Program Office	1 August	Completed, K. Holland and F Whoriskey invited to meetings.	GRF-6 Forum Session: GOOS Benefits
10	Create an OTN overview slide for John Gunn to present at the IOC assembly as part of his GOOS presentation.	Fred Whoriskey	31 May	Completed, see action #7	GRF-6 Forum Session: OTN discussion
11	Finalize draft of the Framework for GOOS Regional Alliances and distribute to GRA Leads and GOOS SC.	Zdenka Willis (Laura Griesbauer)	17 May	Completed, compiled comments from GRA Leads and forwarded updated document to IOC/GOOS Program Office for final review (May 31). Will be posted after endorsement at IOC.	GRF-6 Forum Session: Review and Finalize GOOS Regional Framework

No.	Action Description	Lead (Support)	Due Date	Status	Notes
12	Update annual GRA assessments to identify the national activities that are occurring that contribute to the Global system and highlight any international activities that demonstrate collaboration between the GRAs. Highlight the activities that are occurring at a regional level.	GOOS Program Office, GRAs	Ongoing		GRF-6 Forum Session: GOOS Benefits
13	Assist the GOOS Steering Committee to develop the communication package on GOOS. <ul style="list-style-type: none"> <li>Develop the GRA slides for this package.</li> </ul>	GOOS Program Office (GRC Chair)	1 October		GRF-6 Forum Session: GOOS Benefits
14	Recommendation for GRA to work to populate the Ocean Data Portal of IODE in order to create an asset map. <ul style="list-style-type: none"> <li>Patrick Gorringe volunteered to lead with assistance from Tim, Doug, and Zdenka. Patrick will use Europe as test case with IODE.</li> </ul>	Patrick Gorringe (Tim Moltmann, Doug Wilson, Zdenka Willis)	1 November		GRF-6 Forum Session: GOOS Benefits
15	Encourage the development of the relationship between GRA and JCOMM. <ul style="list-style-type: none"> <li>Identify GRA members who serve on JCOMM expert teams.</li> </ul>	Giovanni Coppini	1 October		GRF-6 Forum Session: GOOS Benefits



No.	Action Description	Lead (Support)	Due Date	Status	Notes
16	<p>Recommendation of promoting joint meetings of the GRAs focused on specific topics (technology, data management, ARGO, etc.).</p> <ul style="list-style-type: none"> <li>• GRA Leads, report these meetings to the GOOS program office.</li> </ul>	GRA Leads	Ongoing		GRF-6 Forum Session: GOOS Benefits
17	<p>Recommended action to invite neighboring GRAs to any annual meetings the GRA holds.</p> <ul style="list-style-type: none"> <li>• GRA Leads, report these meetings to the GOOS program office.</li> </ul>	GRA Leads	Ongoing		GRF-6 Forum Session: GOOS Benefits
18	<p>Action to review and update the GRA membership lists on the GOOS webpage. – (Lead: GRA Leads, within 30 days.)</p>	GRA Leads	1 August		GRF-6 Forum Session: GOOS Benefits/Wrap Up
19	<p>Recommendation that the GRAs identify and catalogue models in use in their regions for development of an asset list. Suggestion to use the template used by EuroGOOS.</p> <ul style="list-style-type: none"> <li>• Patrick Gorringe will share the template with the chairs to evaluate the template and define the task.</li> </ul>	Patrick Gorringe	1 Feb. 2014		GRF-6 Forum Session: Coastal Ocean Forecasting and Modeling

No.	Action Description	Lead (Support)	Due Date	Status	Notes
20	<p>Make a recommendation on the modeling needs of the GRAs and the connections with GODAE OceanView and JCOMM ET-OOFS task team.</p> <ul style="list-style-type: none"> <li>GRA Council will extract the tables from the PICO plan and discuss with GODAE OceanView as a basis for GRA strategic modeling guidance.</li> </ul>	Andreas Schiller (Paul DiGiacomo)	1 December		GRF-6 Forum Session: Coastal Ocean Forecasting and Modeling
21	<p>Development/Redesign of the GRA website.</p> <ul style="list-style-type: none"> <li>Take down broken links.</li> <li>Update GOOS map on site and in presentation.</li> <li>Send recommendations for changes to the website to Tom.</li> </ul>	Tom Gross	1 August	Completed, GOOS map has been updated, links verified. Further changes to GOOS website are anticipated.	GRF-6 Forum Session: Wrap Up
22	Create a Standard E-mail distribution list.	Tom Gross	ASAP		
23	Set up conference calls of the GRC – schedule of 3 times a year				

## Annex II: GOOS Regional Policy 2013

Available as [GOOS-200; IOC/INF-1308](#);

The Global Ocean Observing System (GOOS) Regional Alliances (GRAs) identify, enable, and develop sustained GOOS ocean monitoring and services to meet regional and national priorities, aligning the global goals of GOOS with the need for services and products satisfying local requirements. As an integral part of GOOS, the GRAs are tasked with adhering to the GOOS Principles (1998) of shared ocean observations, data policy, best practices and capacity development in their implementation of regional and national ocean observation systems.

Historically, the GOOS Regional Alliances were introduced as a way to integrate national needs into a regional system and to deliver the benefits of GOOS strategy, structure, and programmes at a regional and national level. The first GRAs were formed in 1994 and 1996 and were guided by the GOOS Regional Policy (IOC-WMO-UNEP/I-GOOS-VI/3 Annex VII, 2006)<sup>1</sup>. This Regional Policy grew outdated after the reform of GOOS structures by the IOC Assembly in 2011, and this document is intended to replace the 2006 GOOS Regional Policy<sup>1</sup>. The GRAs have evolved to meet a wide range of societal challenges related to both coastal and open ocean observations, and so this policy has also evolved to reflect GRAs today.

### 1. BACKGROUND

1.1. The Global Ocean Observing System (GOOS) is a permanent global collaborative system for observations, modelling and analysis of marine and ocean variables to support operational ocean services worldwide. GOOS provides accurate descriptions of the present state of the oceans, including living resources; continuous forecasts of the future conditions of the sea for as far ahead as possible, and the basis for climate change assessments and scenarios. GOOS is sponsored by the Intergovernmental Oceanographic Commission (IOC), United Nations Environmental Programme (UNEP), World Meteorological Organization (WMO) and International Council for Science (ICSU), and is the ocean component of Global Earth Observing System of Systems (GEOSS). GOOS is implemented by Member States through their government agencies, navies and oceanographic research institutions working together in a range of global thematic panels and observing networks and regional alliances.

1.2. GOOS Regional Alliances (GRAs) are comprised of national and institutional efforts that come together at the regional scale to facilitate the advancement of GOOS, to aid the integration and coordination of sustained interdisciplinary ocean observations and services for scientific and societal benefit, and to provide mutual support for capacity development. The membership of GRAs varies between regions. In general they are made up of governmental and/or non-governmental organizations, and therefore have limitations in the controls they can impose and the communities they reach. The overall GOOS objectives will be most effectively met through GRAs adopting GOOS guidelines and principles (GOOS Principles<sup>4</sup>, Framework for Ocean Observing<sup>7</sup>) as well as supporting GOOS implementation plans (GOOS-1845, GOOS-1936), within the constraints of available resources and national law.

1.3. Within the framework of GOOS, the GRAs are encouraged to continue developing joint projects and alliances to meet the needs of their constituents.

1.4. GRAs contribute to and benefit from the global observing system coordinated through GOOS global panels. GRAs facilitate sustained ocean observing, data management, modelling and services that meet regional and national priorities. GRAs are not distinctly open ocean or coastally focused but respond to the needs of national and regional efforts they represent; however the nature of the GRAs is well-suited to accelerate the integration and expansion of observations and modelling from global to local scales. GRAs are capable of identifying observing system gaps and proposed strategies to fill those gaps.

1.5. GRAs are both informally and formally brought together. Informally in that they are often voluntary organizations that see benefit in coordinating across national boundaries. Formally, a minimum structure and adherence to GOOS Principles is outlined below for recognition as part of GOOS.

1.6. GRAs are and need to be driven by regional initiative. Considering the strong links that GRAs have with their national and regional stakeholders and regional heterogeneity, they can choose to embrace various organizational structures and forms. The relationship of the GRAs to GOOS must be flexible to take this into account.

## 2. THE ROLE OF GOOS REGIONAL ALLIANCES

2.1. GRAs should strive to:

- Uphold GOOS Principles (1998, GOOS-41)<sup>4</sup> and implement a Framework for Ocean Observing (IOC/INF-1284 rev.)<sup>7</sup>.
- Serve as a **platform for coordination and facilitation** of:
  - the identification of regional sustained observing **requirements** for societal benefit areas,
  - transboundary **observing networks**, and their link to global GOOS/Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) networks including those identified in GOOS implementation plans by the GOOS Steering Committee and its disciplinary panels,
  - real-time and archived **data streams**, from in situ and relevant satellite observations, and their link to regional and global networks (e.g. International Oceanographic Data and Information Exchange IODE, Carbon Dioxide Information and Analysis Center CDIAC, the World Data Centers system, and the WMO Information System WIS),
  - the timely, free, and **unrestricted access** to data collected by the GRAs, as stated in Resolution XXII-6, IOC Oceanographic Data Exchange Policy<sup>8</sup>, To achieve this, GRAs may develop and adopt their own international legal instruments in support of their regional data exchange policies, as appropriate.
  - information products and model output for the region that provide societal benefit, and their links to global and other international efforts (e.g GODAE OceanView, JCOMM), and

- **assessment** of regional **readiness and capacity** in each of the areas above, and the overall **performance** of the system in providing users with fit-for-purpose data and information products.
- Promote/manage programmes on **developing regional capacity**:
  - Through **sharing** of experience, success stories, best practices,
  - **Institutional capacity**: seeking sources of national and international financing, as part of end to end systems, developing win-win partnerships for technology transfer, working with existing GOOS, JCOMM, and IODE capacity-building programmes, and
  - **Human capacity**: scholarships, exchanges, technical skills workshops, programmes/workshops to develop leadership and grant-writing skills.
- **Encourage the development** of Regional and National Ocean Observing Systems by:
  - **Promoting the visibility and value** and recognition of the services provided by ocean observing systems with governmental agencies and private companies and encourage integration at national, regional and global levels,
  - **Advancing the scientific and technological developments** upon which services depend,
  - Identifying gaps at regional and national level for ocean observations; and
  - Encouraging and coordinating **participation** in international initiatives **considered of interest** by the GRA.

### 3. QUALIFICATIONS

3.1. A GRA is formed via recommendation or by agreement by IOC Regional Subsidiary Bodies, and/or between participating countries, and/or national organizations, and/or international bodies (Regional monitoring networks, Regional Fishery Bodies, Regional Seas Conventions, etc.). Membership should be chosen to best serve the data and information needs of organizations that use, depend on, or are responsible for the management of the marine environment and its resources in the region.

3.2. To be recognized as a part of GOOS, a GRA must show that it conforms to GOOS Principles and guidelines.

3.3. To the extent that the geographic range and activities of a GRA overlap with those of other GRAs, the GRAs involved shall establish formal and informal cooperation to ensure effective use of resources to the benefit of all.

### 4. APPROVAL

4.1. Proposals to be recognized as a GRA must be approved by the Assembly or the Executive Council of the IOC. Recommendation for recognition will be received through the GOOS Steering Committee (GOOS SC) or from IOC Regional Subsidiary Bodies in consultation with the GOOS SC.

4.2. Proposals to be recognized as a GRA must include the following:

- Evidence that a management structure is in place that can deliver an integrated and sustained system by linking, enhancing and supplementing existing infrastructure and expertise in the region.
- Provision of an acceptable plan that has been endorsed by stakeholders (data providers and users) from the region and describes the procedures by which the observing system will be established, developed, and sustained. This must include procedures for quality assurance, conformance to internationally accepted standards and protocols for measurements, data management, and communications.

## **5. GRA RESPONSIBILITIES**

5.1. To ensure that there is a single forum where regional GOOS activities can be considered in their entirety, all recognized GRAs are expected to:

- designate one or more representatives to the GOOS Regional Council,
- participate in the bi-annual GOOS Regional Forum,
- provide at a minimum an annual report of activities,
- be responsive to GOOS Implementation Plans,
- participate in activities agreed to by the GOOS Regional Council, and
- maintain current management information with the GOOS Project Office for public display.

5.2. Reports to the GOOS SC shall include among other things (a) analyses of the extent to which GOOS Principles have been implemented, (b) status of regional ocean observing and forecasting systems and plans for development and (c) information about the provision of data (data quality and data availability) and the development of downstream services in forms and at rates required by user groups.

5.3. A decision to remove recognition of a GRA can only be made by the IOC Assembly or Executive Council, informed by advice from the GOOS Regional Council or the GOOS Steering Committee, or by recommendation from an IOC Regional Subsidiary Body in consultation with the GOOS SC.

## **6. GOOS REGIONAL COUNCIL (GRC)**

6.1. The GOOS Regional Council consists of the lead from each of the GRAs or their designated representative. The GOOS Regional Council was created by the GRAs at the 2nd GOOS Regional Forum (Nadi, Fiji, 2004) and is not a subsidiary body of IOC. Its creation was noted by I-GOOS-VIII (2007). This section is provided for the information of the Assembly.

6.2. The GOOS Regional Council provides a unified voice for global coordination and facilitates the exchange of information between GRAs and communication to and from the GOOS SC and GOOS Project Office (GPO).

6.3. The GOOS Regional Council responsibilities are to:

- capture information about each of the GRAs,
- discuss potential pilot projects for consideration regionally and by the GPO for funding through IOC or other mechanisms,
- communicate information about GOOS to the GRAs,
- assist with communications on the importance of ocean observing, and
- provide expertise across the GRAs and share best practices.

6.4. The GOOS Regional Council will be funded by the GRAs. The GPO may seek extrabudgetary funding to support representation of GRAs from developing countries at meetings of the GRC.

6.5. The GOOS Regional Council chair roles are to:

- collect information about the activities of the GRAs in coordination with the GPO,
- provide information about the activities of GOOS to the GRA's in coordination with the GPO,
- organize the GOOS Regional Forum bi-annually, and
- actively represent the GRAs to the GOOS SC and participate in the GOOS SC work plan as agreed to by the GRC.

GOOS Regional Council leadership will be a member of the GOOS Regional Council. The chair will be elected by simple majority vote by the GOOS Regional Council, and will serve for 2 years. The chair can be extended for a second 2 years if agreed to by the GRC and the incumbent. The GOOS Regional Council may decide to elect a vice chair to aid the chair in the administration of the GOOS Regional Council. The leadership structure of the GOOS Regional Council may be changed by consensus of the GOOS Regional Council members.

## **7. RELATIONSHIPS of GRAs WITH GOOS AND IOC BODIES**

7.1. The GOOS Steering Committee (SC) recognizes the GRAs as an important component of GOOS. The GRAs are represented on the SC by the GOOS Regional Council chair, an *ex officio* member. The GOOS SC does not have an official role in the governance of the GOOS GRAs, but will act to bring issues associated with GRAs to the IOC governing bodies if an intergovernmental decision is required.

7.2. The GOOS panels will be developing the work plan and implementation plan for the GOOS SC. The GRAs should take the panel's guidance into consideration when determining their work plans.

7.3. GOOS global observing networks and programmes are those linked to the three GOOS disciplinary panels and appearing in GOOS Implementation Plans. GRAs should seek to participate in these global GOOS networks and programmes by providing expertise to the panels, implementing programmes through the GRA, or facilitation at a regional scale. GRAs can be very effective in accelerating the build out of the GOOS in coastal areas. GOOS-193 and

the output of the three GOOS panels will guide the work of the GRAs in the coastal domain, which will complement national needs.

7.4. GRAs also support collaboration with regional and developing observing systems (e.g. the Southern Ocean Observing System SOOS, and the Sustained Arctic Observing Network SAON).

7.5. GRAs also support national ocean observing systems.

7.6. The IOC Sub-Commissions, Committees, Programme Offices, and Project Offices, have important roles in the development and coordination of GRAs established under their purview. The IOC Bodies can (as appropriate) provide facilitation and support to all GRAs. GOOS is particularly closely linked to other IOC global programmes such as JCOMM and IODE. GRAs should engage with regional activities in these programmes to seek mutual benefit.

## References

1. [GOOS Regional Policy: IOC-WMO-UNEP/I-GOOS-VI/3 Annex VII, 2006](#)
2. [Terms of Reference GOOS Regional Council: Annex IV I-GOOS-VIII Final Report, Terms of Reference GOOS Regional Council, GOOS-165](#)
3. [IOC Res. XXVI-8 Resolution Strengthening and Streamlining GOOS](#)
4. [Strategic Plan and Principles for the Global Ocean Observing System \(GOOS\), \(1998\): GOOS-41.](#)
5. [Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC \(2010 Update\): GOOS-184](#)
6. [Requirements for Global Implementation of the Strategic Plan for Coastal GOOS, \(2012\): GOOS-193](#)
7. [Framework for Ocean Observing. By the Task Team for the Integrated Framework for Sustained Ocean Observing: UNESCO 2012, IOC/INF-1284 rev.,doi:10.5270/OceanObs09-FOO](#)
8. [IOC Oceanographic Data Exchange Policy: IOC Resolution XXII-6, 2003](#)
9. [GOOS Regional Bodies: Annex VIII of "The Integrated Strategic Design Plan for the Coastal Ocean Observations Module of the Global Ocean Observing System", GOOS-125, 2003](#)



## Annex III: List of Acronyms

AATAMS	Australian Animal Tagging and Monitoring System
BS GOOS	Black Sea GOOS
BulARGO	Bulgaria Argo
CLIVAR	Climate Variability and Predictability
COSS-TT	Coastal Ocean and Shelf Seas Task Team
CPPS	Comisión Permanente del Pacífico Su
EOVs	Essential Ocean Variables
EuroGOOS	European GOOS Regional Alliance
GEOSS	Global Earth Observation System of Systems
GLOSS	Global Sea Level Observing System
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GOOS Africa	GOOS Africa GOOS Regional Alliance
GOOS SC	GOOS Steering Committee
GRA	GOOS Regional Alliance
GRASP	GOOS Regional Alliance of Southeast Pacific
GRF	GOOS Regional Forum
IMOS	Integrated Marine Observing System
IndOOS	Indian Ocean Observing System
IOC	Intergovernmental Oceanographic Commission
IOCAFRICA	IOC Africa Sub-Commission
IOCARIBE	IOCARIBE GOOS Regional Alliance
IOCARIBE	IOC Caribbean Sub-Commission
IOCCP	International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange
IOGOOS	Indian Ocean GOOS Regional Alliance
IOOS	Integrated Ocean Observing System
JCOMM	Joint WMO-IOC Commission for Oceanography and Marine Meteorology
MOMSEI	Monsoon Onset Monitoring and its Social & Ecosystem Impacts
MONGOOS	GOOS Regional Alliance
NOAA	National Oceanographic and Atmospheric Administration
OBIS	Ocean Biogeographic Information System
OCEATLAN	GOOS Regional Alliance for the Upper Southwest and Tropical Atlantic
OTN	Ocean Tracking Network
PACIOOS	Pacific Integrated Ocean Observing System
PIGOOS	GOOS Regional Alliance
PIRATA	Prediction Research Moored Array in the Tropical Atlantic

PNBOIA	Programa Nacional de Bóias, Brazilian National Buoy Programme
REMO	Rede de Modelagem e Observação Oceanográfica, Observaton Research Network
SEAGOOS	Southeast Asia GOOS Regional Alliance
SEAGOOS OFS	SEAGOOS Ocean Forecasting System
SOOS	Southern Ocean Observing System
SPREP	South Pacific Regional Environment Programme
SWOT	Strengths, Weakness, Opportunities and Threats
WESTPAC	Western Pacific IOC Sub-Commission
WIGOS	WMO Integrated Global Observing System
WMO	World Meteorological Organization

## **Annex IV: Attendance List**

### **Chair GRA Council**

Mrs Zdenka WILLIS  
Director, U.S. Integrated Ocean Observing  
System Program Office  
National Oceanic and Atmospheric  
Administration, Washington  
Integrated Ocean Observing System (IOOS)  
1100 Wayne Avenue, Suite 1225  
Silver Spring Maryland 20910  
United States  
Tel: +1 301 427 2420  
Fax: +1 301 427 2073  
Email: [Zdenka.S.Willis@noaa.gov](mailto:Zdenka.S.Willis@noaa.gov)

### **GRA Chairs**

#### **GRASP**

Captain Patricio CARRASCO  
Director  
Servicio Hidrográfico y Oceanográfico de la  
Armada  
Chile  
Tel: +56 32 22 66 502  
Fax: +56 32 22 66 542  
Email: [pcarrasco@shoa.cl](mailto:pcarrasco@shoa.cl)

#### **MONGOOS**

Dr Giovanni COPPINI  
Euro-Mediterranean Centre on Climate Change  
Via Augusto Imperatore 16, scala B, 1° Piano  
73100 Lecce  
Italy  
Tel: +39 083 2671050  
Email: [giovanni.coppini@cmcc.it](mailto:giovanni.coppini@cmcc.it)

#### **SEA GOOS Chair**

Dr. Somkiat KHOKIATTIWONG , Senior  
Researcher

Phuket Marine Biological Center  
51 Sakdhidate Road  
Lean Panwa  
Phuket 83000  
Thailand  
Tel: + 66 76 391128  
Fax: + 66 76 391127  
Email: [skhokiattiwong@gmail.com](mailto:skhokiattiwong@gmail.com)

#### **Black Sea GOOS**

Dr Atanas PALAZOV  
Director  
Institute of Oceanology, Bulgarian Academy of  
Sciences, Varna  
P.O.Box 152, Varna 9000  
Bulgaria  
Tel: +359 52 370 484  
Fax: +359 52 370 483  
Email: [palazov@io-bas.bg](mailto:palazov@io-bas.bg)

#### **IO GOOS**

Dr. Andreas SCHILLER  
Senior Principal Research Scientist  
State Ministry of Research and Technology  
CSIRO Marine and Atmospheric Research  
Hobart  
GPO Box 1538  
Hobart TAS 7000  
Australia  
Tel: +61 3 6232 5300  
Fax: +61 3 6232 5000  
Email: [Andreas.Schiller@csiro.au](mailto:Andreas.Schiller@csiro.au)

#### **IOCARIBE**

Dr. Douglas WILSON  
IOCARIBE-GOOS Project Coordinator  
Caribbean Wind LLC  
222 Severn Ave Suite 15  
Building 7-10  
Annapolis Maryland 21403

United States  
Tel: + 1 410 507 8587  
Email: doug@coastaloceanobs.com

Tel: +20123779117  
Fax: +2034801174  
Email: mamsaid2@hotmail.com

## **GRA Chair Alternates**

### **Africa**

Prof Kouadio AFFIAN  
Director of CURAT  
Université de Cocody Abidjan, Centre  
Universitaire de Recherche et d'Application en  
Télédétection  
22 BP 582 Abidjan 22  
Cote D'Ivoire  
Tel: +225 22 44 52 70  
Fax: +225 22 44 52 70  
Email: k\_affian@yahoo.fr

### **EuroGOOS**

Dr Patrick GORRINGE  
EuroGOOS Deputy Director  
Swedish Meteorological and Hydrological  
Institute, Norrköping  
Folkborgsvägen 1  
SE-601 76 Norrköping  
Sweden  
Tel: +46 11 495 8000  
Fax: +46 11 495 8001  
Email: Patrick.Gorringe@smhi.se

### **Africa**

Prof. Mohamed SAID  
Head of Physical Oceanography Department  
National Institute of Oceanography and  
Fisheries, Alexandria  
Kayet Bay – Al Anfoushy  
Alexandria  
21556  
Alexandria  
Egypt

### **OCEATLAN**

Capt. (Ret) Frederico SARAIVA NOGUEIRA  
Institutional Adviser on IOC Affairs  
Brazilian Navy, Directorate of Hydrography and  
Navigation  
Rua Barão de Jaceguai S/No  
Niterói  
24.048-900  
Rio de Janeiro  
Brazil  
Tel: +55 (21) 2189 3013  
Fax: +55 (21) 2189 3088  
Email: frederico.asn@gmail.com

### **OCEATLAN**

LcDR Miguel VÁSQUEZ  
Head Of Oceanography Department  
Servicio Hidrográfico y Oceanográfico de la  
Armada  
Chile  
Tel: 56-32-2266671  
Fax: 56-32-2266542  
Email: mvasquez@shoa.cl

### **PI-GOOS**

Louise WICKS  
Program Manager  
UNESCO IOC Perth Regional Programme Office  
c/- Bureau of Meteorology  
Level 5  
1100 Hay Street  
West Perth Western Australia 6019  
Australia  
Tel: +61 (0)8 9481 0406  
Email: L.Wicks@bom.gov.au

## Secretariat

Laura GRIESBAUER  
NOAA/US Integrated Ocean Observing System  
1100 Wayne Ave, Suite 1225  
Silver Spring MD 20910  
United States  
Email: laura.griesbauer@noaa.gov

Dr Thomas GROSS  
Programme Specialist GOOS, Web Services  
Intergovernmental Oceanographic Commission  
of UNESCO  
1 rue Miollis  
75732 Paris cedex 15  
France  
Tel: +33 1 45 68 39 92  
Fax: +33 1 45 68 58 12  
Email: t.gross@unesco.org

## Experts and Observers

Dr Kim HOLLAND  
Univeristy of Hawaii at Manoa, Hawaii Institute  
of Marine Biology  
46-007 Lilipuna Road  
Kane'ohe Hawaii HI 96744  
United States  
Tel: (808) 236-7410  
Email: kholland@hawaii.edu

Dr Eric LINDSTROM co-chair GOOS-SC  
Physical Oceanography Program Scientist  
NASA Headquarters  
Earth Science Division, Room 3D74  
Science Mission Directorate  
NASA Headquarters  
Mail Suite 3B74  
300 E Street SW  
Washington DC 20546  
United States

Tel: +1 202 358-4540  
Fax: +1 202 358-2770  
Email: eric.j.lindstrom@nasa.gov

Tim MOLTSMANN  
Director IMOS  
Integrated Marine Observing System  
University of Tasmania  
Private Bag 110  
Hobart Tasmania 7001  
Australia  
Tel: + 03 6226 276  
Fax: + 0407 558 004  
Email: tim.moltmann@imos.org.au

Prof. Oscar SCHOFIELD  
Chair of the Department of Marine and Coastal  
Sciences  
Coastal Ocean Observation Laboratory  
Institute of Marine and Coastal Sciences  
School of Environmental and Biological Sciences  
Rutgers University  
New Brunswick New Jersey 08901  
United States  
Email: oscar@marine.rutgers.edu

Fred WHORISKEY  
OTN Director  
Life Sciences Centre,  
1355 Oxford St.,  
POB 1500,  
Halifax B3h 4R2  
Canada  
Tel: 902 494 4095  
Email: [FWhoriskey@dal.ca](mailto:FWhoriskey@dal.ca)

Lihang ZHOU  
Center for Satellite Applications and Research  
(STAR)