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(of UNESCO)

Second Meeting of the Global Ocean Observing System Steering Committee (GOOS SC-2)

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Institute of Oceanology, Chinese Academy of Sciences, Qingdao, China
25-27 March 2013

Final Report

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Background

The GOOS Steering Committee (SC) is responsible for developing a work plan, using the concepts in the Framework for Ocean Observing, to update GOOS requirements, monitor and promote its development, assess the performance of the observing system, and advise on developing capacity of Member States.

The First Meeting of the GOOS Steering Committee (GOOS SC-1, 20-22 June 2012, Paris, France) established a work programme around three themes: 1. sustaining present observations; 2. expanding to new variables and serving new requirements; and 3. identifying regional priorities, capacity, and addressing gaps. The Committee highlighted the strength of treating sustained research and operational observations together, and agreed on the utility of the Framework for Ocean Observing and its focus on EOVs in articulating the multiple 'missions' addressed by a single observing system. It emphasized the importance of reaching out to users, including modeling users, in helping to evaluate observing system performance and identify requirements. It decided to base its work on physical EOVs, including GOOS requirements for real-time services and in the coastal ocean, around the Ocean Observations Panel for Climate (OOPC) shared with the Global Climate Observing System (GCOS) and the World Climate Research Programme (WCRP). The Committee affirmed the importance of expanding GOOS into new variables. It decided to work with the IOC-SCOR International Ocean Carbon Coordination Project (IOCCP) as the nucleus of a panel for carbon and biogeochemical variables, recognizing that any expansion in mandate would require additional funding and personnel support. It also decided that it would seek to develop a biology/ecosystems panel in cooperation with SCOR, the Group on Earth Observations Biodiversity Observation Network (GEO BON) and other activities. The Committee further recognized the importance of the GOOS Regional Alliance (GRA) concept, as a way of engaging national action at a regional level. The Committee recognized the need to develop capacity as a key element for global participation in GOOS, and in particular the need to identify and develop approaches to potential funders.

Summary of outcomes of GOOS SC-2

The Second Meeting of the GOOS Steering Committee (GOOS SC-2) took place 25-27 March 2013 in Qingdao, China, hosted by SC member Dr SUN Song at the Institute of Oceanology, Chinese Academy of Sciences. The meeting agenda can be found in Annex 3, and list of attendees in Annex 4. The meeting included a number of break-out sessions to discuss the implementation of GOOS in key areas. These included progressing ocean physics under the Ocean Observation Panel for Climate, Biogeochemistry and Biology under IOCCP and the proposed Biology Panel, the GOOS Regional Alliances and GOOS Regional Policy, and fundraising and outreach activities for GOOS. Short summaries are outlined below, with relevant documents attached in Appendices A-G. A workshop with a number of the institutions in Qingdao demonstrated the progress of Chinese sustained ocean observing system activities.

Significant progress was made in the definition of the work of three disciplinary GOOS panels reporting to the SC and sponsors, focused on:

- reviewing and prioritizing *requirements* for sustained observations, including defining EOVs as needed, assessing observing technology readiness and system adequacy, developing implementation plans and pilot projects;

- coordinating observing networks (in the case of OOPC in close cooperation with JCOMM Observations Programme Area Coordination Group), encouraging national commitments, promoting best practices and standards, data sharing, cooperation, and developing metrics of implementation;
- working with relevant groups to improve data management arrangements;
- developing processes for ongoing evaluation of the observing system; and
- supporting global ocean observing activities by involved parties, through liaison and advocacy.

These three panels are in two cases led by existing groups: for physical EOVs (and ocean Essential Climate Variables), the OOPC, and for biogeochemical EOVs, the IOCCP.

The SC **approved** the creation of a new SC sub-panel, the GOOS Biology Panel, with Ian Poiner (Australia) as chair.

The Committee clarified the three related components of GOOS, all working to GOOS Principles (found in GOOS-41, 1998). These are:

1. Global observing networks and projects coordinated through one of the three GOOS disciplinary panels,
2. GOOS Regional Alliances (GRAs) and their coordinated observing activity, and
3. National activities contributing to GOOS.

The Committee also emphasized the importance to GOOS of reanalysis and ocean modeling, as a cross-panel and regional activity. These activities help in the transformation of ocean data into actionable information, and in the evaluation of whether the observing system is meeting its requirements, along with other methods.

The costed work plan for the breadth of activities planned by the GOOS Steering Committee Workplan can be found in Annex 1.

The Second GOOS Steering Committee was held largely in discussion style, with a number of breakout sessions (see Agenda in Annex 3). This report therefore lays out the results of these discussions by topic area.

GOOS Panels

The SC **decided** to use three sub-panels in order to effectively carry out a number of its Terms of Reference (see [IOC Resolution XXVI-8](#)).

Physical EOVs: OOPC

The Ocean Observations Panel for Climate, formerly chaired by Eric Lindstrom (now GOOS SC co-chair) and with secretariat support from Albert Fischer (now GOOS Project Office director) has two new co-chairs: Mark Bourassa (Florida State University, USA) and Toshio Suga (Tohoku University and JAMSTEC, Japan), as well as a new secretariat, Katherine Hill, the new GCOS scientific officer at WMO since February 2013. The co-chairs of OOPC were agreed by the chairs of its sponsors GOOS, GCOS and WCRP. For GCOS, OOPC will remain the main interface for ocean observations for climate across all variables, liaising with the other GOOS panels as needed for necessary expertise outside of its domain.

The core work of the OOPC is in updating requirements to adapt to new needs, priorities, and technologies, and to evaluate the output of the observing system to assess its fitness-for-purpose; in both cases applying systems thinking. The panel met for the first time with its new leadership the week of 3-7 September 2013, along with the JCOMM Observations Coordination Group. The OOPC has also identified CLIVAR, IODE and other data management efforts, and the ocean forecasting community, as key partners in its work.

The OOPC's first activity will be supporting a Tropical Pacific observing system evaluation and review (scheduled for January 2014). Other areas under consideration for examination include decadal prediction requirements, observing strategy for boundary currents (building on the OceanObs'09 Community White Paper, a CLIVAR workshop, and growing glider coordination efforts), and polar seas.

In considering observing needs in the coastal ocean, the OOPC will employ a number of strategies: building on observations that have both local and global utility (such as sea level), providing framework advice, starting with examining particular requirements for marginal and coastal seas connected to global requirements, linking with the GOOS Regional Alliances, encouraging "communities of practice" around coastal observing technologies (i.e., HF radar, gliders), and encouraging adherence to standards and data sharing in the coastal ocean. Data streams required to improve coastal analysis and prediction will be explored with the GRAs, the GODAE OceanView (www.godae-oceanview.org) Coastal Ocean and Shelf Seas Task Team (COSS-TT), and the GEO Coastal Community of Practice.

Due to the hiatus in OOPC activity, new leadership and expanded mandate, it was **decided** to develop a spin up support team from the GOOS Steering Committee to help get the panel on the right track. Members were also invited from the GCOS Steering Committee.

(Decision. Membership: Pierre Yves le Traon, Susan Wijffels, Eric Lindstrom, Albert Fischer (GOOS), Ed Harrison, Juliet Hermes (GCOS)).

Since the SC meeting, the Ocean Observations Panel for Climate has developed revised Terms of Reference (see Appendix A) and a draft work plan (see Appendix B). They have so far so far been commented on by OOPC members and interested members of the GOOS and GCOS Steering Committees. The documents formed the main topic for discussion at the 16th Session of OOPC, 3-5th September 2013 in Washington DC (www.ioc-goos.org/oopc-

16). OOPC is developing a discussion paper on quantitative approaches to observing system design and assessment. The major outcomes of that meeting will be posted in the final report of the meeting at the website above.

Plans for the Tropical Pacific Observing System (TPOS) Workshop (January 2014) are progressing. OOPC co-chair Toshio Suga has been appointed co-chair of the steering committee with David Anderson (UK/ECMWF). The OOPC secretariat Katy Hill will provide coordination support for the Workshop.

Biogeochemical EOVs: IOCCP

The core focus of the IOCCP will remain on coordination of ocean carbon and carbon-related observations and synthesis efforts for the scientific community. The IOCCP's secretariat funding, provided by the US National Science Foundation (NSF) for this purpose was decreased by 50% starting in October 2012, reducing staff support from two professionals to one.

In line with its goals and with its agreement to lead a panel considering biogeochemical EOVs for GOOS, the IOCCP has recently added oxygen, nutrients, and ocean acidification experts to its Scientific Steering Group (SSG). This SSG serves as the nucleus of the GOOS Biogeochemistry Panel. However, relevant funding must be secured before IOCCP will be able to play its full intended role as a GOOS Panel.

The IOCCP's main near-term activity for GOOS will be the definition of geochemical Essential Ocean Variables and their observing requirements, with a broad review by the scientific and ocean observing community. This will require a particular link to modelling, synthesis, and data assimilation activities in US Ocean Carbon Biogeochemistry (OCB) project, OceanSITES, the Ocean Acidification International Coordination Centre (OA-ICC), the IGBP Surface ocean lower atmosphere study (SOLAS) and Integrated Marine Biogeochemistry and Ecosystem Research (IMBER) projects, the GODAE OceanView Marine Ecosystem and Prediction Task Team (MEP-TT) and more.

Plans are under way to hold an expert workshop alongside the new GOOS Biology Panel, 13-15 November 2013, in Townsville, Australia, to advance in this work.

There is great potential to develop and extend pilot projects such as Bio-Argo, which would expand the capabilities of an observing platform whose core mission is physical variables, with additional biogeochemical variables beyond oxygen. A summary of the IOCCP Biogeochemistry Work Plan for GOOS is found in Appendix C.

Biology and Ecosystem EOVs: new GOOS panel

The first activity of the new GOOS Biology-Ecosystems Panel, which is being led by Ian Poiner (Australia, former CEO of the Australian Institute of Marine Science and former co-chair of the Census of Marine Life) and supported by Sarah Grimes (GOOS Project Office, on European Commission GEOWOW project funds, about 10% time), will be to define the major questions and sustained observing requirement for EOVs in the biology and ecosystems space. The panel will build on the legacy of the GOOS Panel for Integrated Coastal Observations' Requirements for Global Implementation of the Strategic Plan for Coastal GOOS (GOOS-193), which focused on key coastal ecosystem services and threats. It will focus on new technologies and platform development; liaise with GOOS Regional Alliances, the GOOS Biogeochemistry Panel and other key international and national groups, using the

Framework for Ocean Observing to organize its work. The draft Terms of Reference in for the biology panel are found in Appendix D.

The panel will seek to define a minimal set of biology and ecosystem EOVs to define a global baseline against which to judge future change. These EOVs will include drivers of such change, ecosystem state variables, and data required to develop indicators. While scientific considerations will drive its work, it will need to balance feasibility and impact in making its recommendations for the observing system. A summary of break out session discussions and next steps for the biology panel can be found in Appendix E.

The interim GOOS Biology Advisory Group (comprised of 5 members with expertise in marine biological science) is currently selecting nominees for the full GOOS Biology Panel. The intention is for this new Panel to meet for the first time 13-15 November 2013 at a Workshop together with the science, observing and user communities. This Workshop will define a range of key questions and build focus for the panel's full vision and initial five-year work plan (until 2019). In particular, initial goals of the Workshop are to identify priority EOVs and a potential pilot project to commence the global biological observing network. The GOOS Biology Panel envisaged a joint workshop with IOCCP on biogeochemistry and biology to finalize its vision and plans and to set milestones. This work will include the ocean modeling community. It plans a better inventory of the EOV observing effort and a review of the OceanObs'09 Community White Papers. In addition, a communication strategy will be developed to guide the promotion and awareness of GOOS Biology observations and to seek external funding for proposed activities (**Action:** Secretariat for discussion with Biology Advisory Group).

Following the SC meeting, the joint workshop of technical experts for the GOOS Biology and Biogeochemistry panels is being organized, and will be held in Townsville, Australia from 13-15th November 2013. A draft agenda is in Appendix F (see also ioc-goos.org/GOOSBio2013).

Cross-panel work

The SC will develop a GOOS cookbook of best practice around Observing System Evaluation and optimization, and comparative analysis as well as links between the coastal ocean and deep sea, and among physical, chemical and biological observing networks.

The SC suggested that the JCOMM Observations Coordination Group may wish to invite the Global Alliance of CPR Surveys (GACS, www.globalcpr.org) to the table as an observing network with global ambition and to develop similar working methods with other panels, notably the JCOMM Ship Observations Team. (**Recommendation:** Candyce Clark, note: this was done for the OCG's September 2013 meeting)

To ensure that the panel activities connect up and to progress overarching activities, it was **recommended** that an intermediate meeting of the GOOS co-chairs, panel chairs and secretariat in late 2013/early 2014 (**Action:** secretariat/co-chairs to find suitable dates/location).

Observation requirements for modeling and reanalysis was **recommended** as a cross panel and GRA project which needed to be driven at a Steering Committee level, tackling ocean-coastal and physics to biology. Strong engagement would be needed by groups such as GODAE OceanView (**Recommendation:** Eric Lindstrom and Albert Fischer to pursue at the November 2013 GODAE OceanView Symposium).

GOOS Projects

The Steering Committee agreed to define and promote 'GOOS Projects' as a way to engage funders and energize observing communities. Projects should include objectives and expected results, milestones and dates, costing, and should specify their contribution to GOOS. For existing networks and projects, the SC **agreed** to define principles for GOOS 'affiliation', which will draw on the GOOS Principles, and where benefits to those affiliated are clearly articulated (**Action:** Secretariat to draft for discussion with Steering Committee). The GOOS Panels and GRAs will develop projects. Principles for definition of projects will be developed by the SC (**Action:** Secretariat to draft for discussion with the Steering Committee).

Fundraising and outreach

GOOS will improve communication on the changes in GOOS structure and orientation, with the biology/ecosystems and biogeochemistry communities, GOOS Regional Alliances, and national focal points. GOOS will develop a monthly webinar to improve internal communication amongst the GOOS community (**Action:** led by Eric Lindstrom/Secretariat; panels and secretariat to suggest 3 topics each).

The Steering Committee were alarmed by the budget cliff expected in 2014-15 at the IOC (see summary in Annex 2). The aspirations of the GOOS panels and GRAs seriously outstrip the available human and financial resources to support the coordination activity, even at the level of the full proposed UNESCO/IOC budget 2014-15. Subsequently, IOC learned that its draft budget being proposed to UNESCO for its governing body meetings in October and November 2013 would freeze any new hiring and result in a regular programme activity budget just over 50% of that requested.

Fundraising will therefore be a key activity of the GOOS SC, built on the panel's work plan and the GOOS project proposal portfolio. GOOS will seek secondments, cash contributions, and national in-kind contributions, including exploring the possibility of finding a host Member State for the GOOS Project Office or portions of its functions. Steering Committee decided to develop a high level statement for awareness of the situation first with IOC executive secretariat, member states and larger community (**Action,** led by Co-Chair John Gunn and presented to the IOC Assembly in June 2013)

Given the human and financial resources shortfall for its full Work Plan, the SC had serious concerns about the ability of the GOOS Project Office to perform its core functions, let alone support the expanded goals that flow from the Framework for Ocean Observing, developed by the post OceanObs09 task team and approved by the IOC Assembly in 2011. If the level of funding for 2014-2015 cannot be increased, the SC agreed that there were inadequate funds to support the critical operations of three panels, and it thus resolved that the available funds should be directed towards the viable operation of only one panel—the OOPC—and that plans for the GOOS Biogeochemistry and GOOS Biology and Ecosystems panels and observing system components should be shelved until such time as adequate resources are identified. This will have serious implications for the implementation of the Framework for Ocean Observing and the delivery of an expanded set of societal benefits, and will very likely bring a strong and negative reaction from the ocean observing community.

The SC recognized the requirement for, and its central role in attracting external funds to support a range of projects associated with GOOS activities. However, without the foundation of GOOS Panels and the support of the observing community and the national programmes, the SC believed that the chances of attracting significant extra-budgetary support were

significantly reduced, and that eventually the GOOS and IOC role in global coordination of ocean observations will be marginalized.

The Steering Committee **decided** to form a subcommittee for fundraising and outreach to develop a plan for GOOS communication and engagement with potential funders. (**Decision**. Members: Eric Lindstrom, John Gunn, Albert Fischer, Tom Gross, Sarah Grimes, Katy Hill, Maciej Telszewski, Tony Knapp and Candyce Clark). Tasks include

- Develop a summary of the full costs of coordination needs for GOOS, to include 3 panels, communication, liaison, regional coordination and capacity development. (**Action**: Secretariat, done: see Annexes 1 and 2)
- Develop a project ideas portfolio with input from panels and GOOS Regional Alliances (**Action**: Secretariat, Panels, GRAs)
- Develop a statement of strategies that GOOS will consider to seek the necessary funds and coordination support including delaying new panels and activities, moving the secretariat, secondments and cash contributions (**Action**: Secretariat and co-chairs)

Since the steering committee meeting, the secretariat have started work on a Communications and Outreach Strategy, focused around communication needs, target audiences and key messages, for review by the steering committee before implementation (**Action**: Secretariat).

GOOS Regional Alliances and a regional framework

The Steering Committee reaffirmed GOOS Regional Alliances as a structural element of GOOS, and reviewed GOOS regional policy, guidance and principles ahead of the GOOS Regional Forum (14-16 May 2013, Hawai'i, USA). With the change in GOOS structures, the SC noted that the GOOS Regional Policy which was endorsed by the IOC Assembly at its 22nd session (2003), required some correction and updating, retaining the role of the IOC governing bodies in recognizing and evaluating GRAs.

The SC clarified the role of the GRA representative on the Committee, and GRA expectations of the GOOS SC and its panels. These include advice on the Framework for Ocean Observing, Essential Ocean Variables, observing system design, and where appropriate engagement in projects. The SC noted that a regular effort of communication with GRAs was needed in order to maintain their engagement in a global system. (**Recommendation**: GRA engagement to be part of overall communication strategy)

The SC developed a revised draft of the GOOS Regional Policy for consideration by the GOOS Regional Forum and for eventual approval by the 27th Session of IOC Assembly. The final approved version of the 'GOOS Regional Policy 2013' is found in Appendix G.

GOOS Vision and Implementation Plans

The SC will develop a **GOOS vision statement** that is high-level, focused on societal benefit, embodies Framework for Ocean Observing concepts, and aimed at both the IOC Member States and the ocean observing community (**Action**: Co-chairs/Director to draft for discussion with Steering Committee)

It will also develop an **implementation plan** that starts from EOVs, and extends to platforms, technology, data management, models and information (**Action:** Co-chairs/Director to draft outline, for discussion with Steering Committee, related to Communications Strategy above).

The intersection of this plan (including the timeframes for review and update) with existing implementation plans, such as GCOS implementation plans, will need to be developed to avoid overlap of effort. However the SC felt that it was important for the observing community to identify their contribution to GOOS, and to set milestones for GOOS to measure progress beyond the implementation targets set for climate.

GOOS Business

The GOOS Steering Committee, after reviewing reports prepared by the co-chairs and secretariat, made a number of requests to the IOC Assembly.

The SC **decided** to request the IOC Executive Secretary to bring a draft resolution on the Perth Regional Project Office (PRPO) as an IOC decentralized office to the IOC Assembly for its consideration, regularizing an office that was established in 1998. The 27th IOC Assembly (June 2013) adopted a resolution approving the formalization of the Perth Programme Office (PPO, note revised name).

After having considered a proposal from the Mediterranean Oceanography Network for the Global Ocean Observing System (MONGOOS, temporary site: www.moon-oceanforecasting.eu), the SC **decided** to ask the IOC Assembly to consider recognizing MONGOOS as an additional GOOS Regional Alliance, merging the former MedGOOS GRA with the EuroGOOS Mediterranean Operational Oceanography Network (MOON). The 27th IOC Assembly (June 2013) recognized this decision.

Regional Workshop

A half-day regional workshop was held to give the Steering Committee the opportunity to engage with some of the organizations and scientists involved in ocean observations in Qingdao. The list of participants is provided in Annex 4. The Steering Committee greatly appreciated the presentations and was very impressed with the development of observing capability.

For physics and open ocean activities, the importance of the International CLIVAR project (part of the World Climate Research Program) and IOC Sub-Commission for the Western Pacific (IOC-WESTPAC) for regional coordination was noted. The Steering Committee also noted that the sustainability of observing activities would be supported by the articulation of the value of observing data generated for ocean forecasting, seasonal forecasting and product generation.

For activities in the coastal to open ocean and observations for biogeochemistry and ecosystems, the steering committee noted that coastal phenomena were connected to larger scale processes. It was noted that GOOS could play a role in sourcing/identifying improved sensor technology and technology transfer to the region. The challenges and benefits of making data available was discussed, with the steering committee noting that this was a common goal with common challenges for nations involved in GOOS.

The potential for an Open Science Conference was discussed, focusing on the design and development of a regional observing system

Annex 1. GOOS Work Plan 2012-2015

The Steering Committee reviewed progress in the work plan it had set itself for 2012-2013 at the GOOS SC-1 meeting. It proposed the following Work Plan outline for approval by the 27th IOC Assembly, which adopted it.

This work plan responds to all of the objectives set out in the draft IOC Medium Term Strategy for 2014–2021 (IOC-XXVII/2 Annex 3), while concentrating on function B (*Maintain, strengthen and integrate global ocean observing, data and information systems*) and the cross-cutting Capacity Development function F.

Work Plan tasks and objectives

1. Articulate 10-year goals for GOOS and develop a GOOS Implementation Plan with goals and milestones, drawing where possible on existing implementation plans and processes.
2. Through the SC, its panels, and partner programmes JCOMM and IODE, exercise the Framework for Ocean Observing for global observing networks; with the objectives of (i) sustaining present observations and (ii) expanding to new variables and serving new requirements; and more specifically to:
 - a. engage with key global conventions, assessments, and Member States on their needs for ocean information to address societal challenges, and to define or refine observing requirements for Essential Ocean Variables in collaboration with the scientific and ocean observing communities; assess the readiness of observing system elements, based on their feasibility and impact in addressing requirements; and contribute to a GOOS Implementation Plan,
 - b. coordinate platform-based observing networks and elements, promoting the use of standards and best practices, engaging the GOOS Regional Alliances and national programmes, developing opportunities for collaboration and common technical support, encouraging data sharing, and developing metrics for information,
 - c. review the status and requirements for data management arrangements together with partner organizations, with emphasis on improving data interoperability, and
 - d. develop processes of ongoing evaluation of the observing system in liaison with ocean analysis and forecast activities and users.
3. Improve GOOS Regional Alliance implementation with a particular focus on capacity development,
 - a. identifying regional priorities, capacities, and addressing gaps through the development of GOOS Projects, and
 - b. maintaining ongoing communication and reporting in both directions between the GOOS Project Office and GRAs.
4. Set a framework for definition of GOOS Projects, and develop fundraising and outreach efforts for all elements of GOOS:
 - a. engaging IOC Member States (including through regional Sub-Commissions), GOOS Regional Alliances, and the scientific community, and
 - b. identifying and developing engagement with potential donors to the GOOS Programme.

Annex 2. Operations: financial and human resources required for the work plan

A table below details the operations in support of the work plan activities, how they support the work plan tasks and objectives above, the funds required, the human resources required, and the expected regular programme and extrabudgetary support (financial and human) for 2014–2015, with explanatory notes.

Overall full implementation of the work plan above for 2014–2015 is estimated to require US\$ 961k in financial resources, and 6.75 full-time equivalent (FTE) professional staff in the GOOS Project Office, IOC Sub-Commission offices, and in dedicated in kind support in other locations (presently the Institute of Oceanology of the Polish Academy of Sciences for IOCCP and the WMO-based GCOS Secretariat for OOPC).

In the draft IOC Programme and Budget for 2014–2017 (IOC-XXVI/2 Annex 4), assuming the US contribution to UNESCO is restored, the regular programme allocation for GOOS is US\$ 431k and about 2.05 FTE in staff. Additional extrabudgetary funds from voluntary contributions (mostly to non-IOC offices) and project funds bring an additional US\$ 70k and 1.35 FTE in staff.

This means that the shortfall for full work plan implementation is US\$ 460k and 3.35 FTE in staff, again assuming a full requested 2014-2015 UNESCO/IOC budget allocation. This true shortfall is likely to be about 50% higher in both human and financial terms, depending on the budget adopted for IOC by the UNESCO General Conference in November 2013.

The GOOS SC will work with its panels and the GRAs to develop GOOS Projects that may bring additional funds. It will also seek cash contributions, secondments, and other in kind support from IOC Member States, including considering moving the GOOS Project Office or portions of its functions to a host country.

See the *Fundraising and outreach* section above in the main body of this report for more on SC concerns and priorities relative to this shortfall.

Annex 3. Agenda

1. Opening

- a. Welcome to Institute of Oceanology, Chinese Academy of Sciences, including a welcome by the State Oceanic Administration
- b. Goals of the meeting - *Gunn (and Lindstrom)*
- c. Adoption of the agenda
- d. Logistics announcements
- e. Status report on GOOS (system and programme including work plan progress, human and financial resources) - *Fischer*
- f. Steering Committee roundtable - quick report: your actions to promote GOOS since SC-1

2. GOOS Panels

Objectives:

Adopt Terms of Reference and methods of work for panels in:

- physics (led by OOPC including its role as GCOS focal point for GOOS, considering requirements for services, and evaluating fitness-for-purpose),
- geochemistry (led by IOCCP but including IOCCG-ocean colour, coastal expertise), and
- biology/ecosystems (in cooperation with GEO BON, building on the legacy of PICO);

Identify early wins for these panels, consider the open ocean / coastal interface, and the type of advice that would be useful to GRAs

Supporting documents:

- draft Terms of Reference for each panel [Albert, Sarah, output of Sunday meeting]; including concept of programme leads and participants

Meeting format:

- introduction to topic - *Gunn with Fischer/Hill for OOPC, Tanhua/Telszewski for IOCCP, Poiner/Grimes for biology*
- Plenary discussion and feedback
- Breakouts (2 or 3) to refine ToRs and work plans

3. GOOS Projects

Objective: Define 'projects' as a working method for GOOS to energize parts of the observing system. Projects would become a focus for engaging Member States, funders, and the observing system community. They could focus on any aspect of the Framework for Ocean Observing and building readiness in requirements, observing networks, data management, information generation, and/or capacity development.

Questions: How will projects be adopted by GOOS SC? What types of projects will have broadest appeal to Member States?

Supporting documents:

- Deep Ocean Observing Strategy [Lindstrom, Curdy]

Meeting format:

- introduction to topic - [*Lindstrom*]
- Plenary discussion and feedback
- Breakout(s) to refine concept and brainstorm project ideas

4. Fundraising, engaging Member States, outreach

Objective: Building on agenda item 3, to

- define a strategy and work plan elements to raise funds for GOOS - the observing system at global, regional and national levels, and the programme based at IOC, and
- develop a 'menu' of possible 'asks' (projects) to shop with donors (Member States, UN/multilateral organizations, development organizations)

Supporting document:

- Menu of potential donors

Meeting format:

- introduction to topic - *Gunn*
- Plenary discussion and feedback
- Breakouts (2 or more) to define actions for GOOS project office, to work further on project definition

5. GOOS regional implementation and capacity development

Objectives: Review and articulate GOOS regional strategy; find common threads of work across regions and GOOS Regional Alliances; articulate how the interaction between the global system and regional expressions should work, in both directions

Questions:

- How do GOOS Regional Alliances find value in the GOOS label? What do GRAs want from the global system?
- What does the global system want from GRAs?
- Is the GOOS Regional Forum an effective mechanism for exchange and building of capacity? Should the GOOS Project Office concentrate on capacity development in particular GRAs?
- Can common threads of work be found amongst the GRAs as a focus to develop capacity-building programmes? coastal forecasting? cheap and robust coastal sensors and platforms?

Supporting documents:

- GOOS Regional Policy (2003, IOC-WMO-UNEP/I-GOOS-VI/3 Annex VII)
- Generic GOOS Regional Alliance Terms of Reference (2013, IOC secretariat)
- Provisional agenda of the GOOS Regional Forum, May 2013, Hawaii'i

Meeting format:

- introduction to topic - *Willis*
- Specific input from the regionally-appointed members of SC - *Postnov input written, Johnson input by teleconference*
- Breakout - in parallel with breakout 4

6. GOOS 10-year vision

Objectives: Refine and debate

Supporting document: Draft vision / goals [Lindstrom lead]

7. GOOS Work Plan

Objectives: To adopt the GOOS 2-year work plan (2014-2015) for approval by the IOC Assembly in June 2013. Prioritization in matching GOOS Project Office human and financial resources with work plan

Supporting document: Draft work plan [Fischer]

Possible breakouts as needed and as time permits

8. GOOS business including sponsor input

Objectives: Review and ratify decisions as proposed by the co-chairs and secretariat

Topics:

- Sponsor input from WMO, UNEP, and ICSU
connection to WMO by teleconference
- Recommend that IOC Assembly approve a new GOOS Regional Alliance: Mediterranean Oceanography Network for the Global Ocean Observing System (MONGOOS), replacing the Mediterranean Operational Oceanography Network (MOON) and MedGOOS
- Formalization of Perth Regional Programme Office as an IOC decentralized office focused on GOOS (particularly IOGOOS and PI-GOOS) - GOOS SC asked to propose to IOC Assembly
- GOOS promotion and outreach with relevant global, regional, and national bodies - calendar of events, SC volunteers to take role
- GOOS as a priority in IOC

Supporting document: Chair's recommendations [Fischer lead in preparing] with links to background documents

9. Closing

Regional Workshop

Tuesday 26 March 9:00-12:30

Sun Song will have a brief introduction of the GOOS meeting in Qingdao. Albert Fischer will introduce the mission and goal of the new GOOS.

There will be four presentations to introduce the strategies and activities for the ocean observation in China. After the four presentations, there will be a free discussion.

1. The intra-seasonal to intra-annual variability in Eastern Indian Ocean

Weidong Yu, The First Institute of Oceanography, SOA

2. Ecosystem observing activities in China: From Continental shelf to the Western Pacific

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3. Progresses in regional and global ocean observations by China.

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4. Observing activities of the Northwestern Pacific Ocean Circulation and Climate Experiment (NPOCE) in China.

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Appendix A: Draft OOPC Terms of Reference

(The 'physical panel' for GOOS; 12 August 2012 version prepared for OOPC-16)

Recognising the need for ocean observations beyond those for climate, and the increased need to connect to societal issues in the coastal zone, OOPC's role has evolved to oversee the Ocean component of the Global Climate Observing System (GCOS) and the physical variables for the Global Ocean Observing System (GOOS), while defining sustained ocean observing requirements for the World Climate Research Program (WCRP). In this context, OOPC provides advice on scientific requirements to the Joint WMO-IOC Technical Commission on Oceanography and Marine Meteorology (JCOMM), which is responsible for the coordination of implementation of platform-based observing system components. It is recognized that there are potentially a large number of groups that OOPC needs to interact with. These connections will be fostered in the context of progressing the OOPC Work Plan, which details OOPC activities and foci with a 3-5 year time horizon.

In light of these relationships, the OOPC will operate with the following Terms of Reference.

1. **Assess, review and prioritise requirements** for sustained ocean observations of physical Essential Ocean Variables (EOVs), and ocean Essential Climate Variables (ECVs) in support of GOOS, GCOS and WCRP by;
 - 1.1. engaging the broad stakeholder community (primary scientific) to assess, review and update requirements for EOVs and ECVs,
 - 1.2. assessing the readiness of observing technologies, identifying those that have high feasibility and high potential impact in delivering required information,
 - 1.3. assessing the adequacy of present global EOV/ECV observations to make recommendations for phased implementation, contributing to the GCOS Implementation Plan and GOOS work plan, and
 - 1.4. providing an authoritative source of guidance on the development of national coastal and ocean observing requirements and observing system implementation plans.
2. Work with the JCOMM Observations Coordination Group and other relevant regional bodies to **coordinate observing networks** that contribute to ocean ECVs and physics EOVs by;
 - 2.1. encouraging GOOS Regional Alliances (GRAs) and national commitments to regional and global observing networks
 - 2.2. promoting common best practices and observing standards for global and national observations
 - 2.3. promoting data sharing for global and national observations [and adherence to IOC data policy, GCOS Monitoring Principles]
 - 2.4. identifying opportunities for synergistic cooperation and/or common technical support, and
 - 2.5. developing metrics for implementation.
3. Work with the International Ocean Data Exchange (IODE), JCOMM, WMO Information System (WIS), GRAs and other partner organisations (e.g. Group for Earth Observing (GEO), WCRP) to **review the status of and requirements for data and information**

management, availability, and resultant products encouraging interoperability and stringent evaluation of fitness for purpose.

4. Help develop a **process for ongoing evaluation** of the observing system in liaison with users of the data, based on the optimum suite of platforms for required variables, spatial and temporal scales and accuracy.
5. Support global ocean observing activities by involved parties (national/regional activities including GRA's and global programs) through **liaison and advocacy for agreed plans**.
6. **Report to** the GOOS Steering Committee, GCOS Steering Committee and WCRP Data Advisory Council on the progress in implementing the ocean component of the GCOS Implementation Plan and the physics component of the GOOS Framework for Ocean Observations.
 - 6.1. Liaise with other GCOS and GOOS Panels, WCRP Steering Groups and other relevant entities such as WMO and IOC commissions on observing system issues.

The Chair(s) of the Panel will be selected by the OOPC panel, and approved by the steering committees of the 3 sponsors (GOOS, GCOS and WCRP). Members will be approved by the Chairs of the 3 sponsors and other partner organizations, and serve (repeatable) two year terms.

Appendix B: Draft OOPC Work Plan Highlights

In the OOPC break out sessions, the role of the panel was discussed considering it's expanded mandate of delivering physical variables for GOOS in addition to delivering the Ocean component of GCOS and moving towards the coast requirements. As an output of these discussions, two documents have been developed:

- Draft revised OOPC Terms of Reference
- Draft OOPC Work Plan

The most recent versions of these documents can be found on the OOPC-16 meeting website (www.ioc-goos.org/oopc-16).

Overarching approach:

OOPC are keen to move towards taking a more quantitative, systems approach to observing system design and assessment, focusing on variables, scales and accuracy requirements, which then informs the best combination of platforms to deliver those requirements. Quantitative approaches will also be explored for assessing products and their uncertainties, and hence 'fitness for purpose. Approaches considered will include empirical, statistical and modeling techniques. A discussion paper is being developed for discussion at the OOPC meeting, circulation with the community, and presentation at key meetings such as the GODAE OceanView Symposium in November 2013

Key areas of focus:

Based on the discussion during and following the steering committee meeting, some key areas of potential focus were identified, with a priority/timeline for specific action/activity from OOPC, acknowledging that OOPC should continue to monitor and connect to activities in these areas. These are likely to be further prioritized at the OOPC-16 meeting.

In 2013/14, specific action is expected in:

- The Tropical Pacific Observing System Workshop (TPOS), likely to be held in early 2014. OOPC co-chair Toshio Suga is co-chair of the steering committee.
- The Deep Ocean Observing System. While this is expected to be driven at a Steering Committee level, OOPC will lead on identifying the physical requirements.
- Review and adequacy report for the Ocean Component of the 2010 GCOS Implementation Plan.

2014/15:

- Explore the need/potential for a review of the Upper Ocean Thermal Observing System, drawing on other recent activities.
- Explore the need/potential for an Observing Boundary Currents workshop,

2015/16

- Explore the potential for OOPC activity in reducing errors in Air Sea Fluxes, drawing on the activities progressed under WCRP and other groups.
- Revision of the GCOS Implementation Plan, including new requirements for Essential Climate Variables, (ECVs) and filling gaps (e.g. Deep Ocean).

2016-19

- Explore the potential for focused activity in Regional, shelf and Coastal Seas.
- Arctic and Southern Ocean observation requirements
- Preparations for OceanObs'19

Appendix C: IOCCP Framework for Ocean Observing Work Plan

The 'biogeochemical panel' for GOOS

A key recommendation from the OceanObs'09 Conference held in Venice in September 2009 (www.oceanobs09.net) was for international integration and coordination of interdisciplinary ocean observations. Based on impressive agreement among the many groups at the Conference and their strong desire to work collectively, the sponsors commissioned a Task Team to develop an Integrated Framework for Sustained Ocean Observing (hereafter referred to as the FOO). The FOO structure adopted by GOOS is built on three Ocean Observing System Panels (Physics, Biology/Ecology and Carbon/Biogeochemistry) interacting to establish a set of Essential Ocean Variables (EOVs) which would then be promoted as fundamental measurements needed to address the current scientific and societal ocean/climate-related issues and enable funding of the interdisciplinary, integrated global ocean observing network (the improved, multidisciplinary GOOS). The IOCCP was asked by the Task Team to lead the Biogeochemistry Panel very early on in the Framework drafting process. The IOCCP SSG replied positively to this request but requested a separate funding from GOOS/IOC for staff support and related work.

With that in mind the IOCCP SSG agreed to take on some coordination tasks for a wider range of biogeochemical parameters beyond inorganic carbon (coordination of designing and implementation of a large scale observing network), in particular oxygen and nutrients, in order to play its role in the FOO.

The IOCCP developed and agreed to follow a 4-step work plan leading to the initial assessment of the existing observing network. The IOCCP is

- (i) compiling the available information on societal and scientific requirements regarding the marine biogeochemistry parameters necessary for inclusion into the FOO as EOVs;
- (ii) consulting with programmatic and institutional partners on their requirements for the multidimensional feasibility assessment of the proposed parameters. It is important that observing, modeling and sensor/instrument developing communities are involved;
- (iii) leading the multidimensional feasibility assessment of the proposed parameters built on the FOO recommendations and will
- (iv) summarizing the results for inclusion into the Global Climate Observing System (GCOS) Implementation Plan.

The main deliverable of this work will be a *Summary of the multidimensional feasibility assessment of the marine biogeochemistry parameters necessary for inclusion into the Framework for Ocean Observing (FOO) as Essential Ocean Variables*.

After several months of collaborative work, the IOCCP and its institutional and programmatic partners will meet for a 3-days Workshop of Technical Experts, which will take place 13-15 November 2013 in Townsville, Australia, aiming to perform a multidimensional feasibility and readiness level assessment of each of the identified biogeochemical requirements and parameters to be proposed as EOV's in the upcoming update of the GCOS Implementation Plan.

Appendix D: Draft GOOS Biology Panel Terms of Reference

Recognizing growing scientific and societal needs for sustained observations of ocean biological and ecosystem variables, and building on the GOOS Framework of Ocean Observing and the work of the Panel for Integrated Coastal Observations, the GOOS Steering Committee [and other partner groups] have established a Panel for Observations of Coastal and Ocean Biology and Ecosystems with the following Terms of Reference¹:

1. Review and Prioritize **requirements** for sustained ocean (high seas and coastal) observations of biological and ecosystems Essential Ocean Variables (EOVs) to achieve the goals of its sponsors, and in particular to:
 - a. engage the broad scientific community to **define EOVs** based on scientific and societal information needs,
 - b. **assess the readiness** of observing technologies, identifying those that have high feasibility and high potential impact in delivering required information,
 - c. assess the **adequacy** of present global EOV observations and make recommendations for **phased implementation** [contributing as relevant to sponsor's plans],
 - d. provide a source of technical advice on the development of national coastal and ocean observing requirements and observing system implementation plans, and
 - e. propose **pilot projects** (that will also serve to co-ordinate networks, articulate data models and inform an evaluation process).
2. **Coordinate observing networks** that contribute to these EOVs by:
 - a. encouraging national commitments to global observing networks,
 - b. promoting common best practices and observing standards for global and national observations,
 - c. promoting data sharing for global and national observations,
 - d. identifying opportunities for synergistic cooperation and/or common technical support, and
 - e. developing metrics of implementation.
3. Work with partner organizations to articulate a **consensus data model** for the biological and ecosystem EOVs, encouraging interoperability. With respect to this, maintain close links with GEOBON.
4. Develop a **process for ongoing evaluation** of the observing system, in liaison with users of the data, assessing whether information outputs (analytic and model-based) are adequate for research and societal goals, feeding back into expressed requirements.
5. Support global ocean observing activities by involved parties, through **liaison and**

¹ This is one of three expert Panels established under GOOS (the other two being for Physics and Carbon/Geochemistry). The Terms of Reference for the three panels are similar (while recognizing they are at different levels of maturity with respect to articulation of EOV's and operationalization of observing system components), however they are focussed on discrete components of the ocean system. Recognizing the imperative for synergies between and integration across Panels (and the GOOS SC), the Panel Chairs will be members of the GOOS SC.

advocacy for agreed plans.

6. **Report** to GOOS SC [and other sponsor governing bodies, including GEOBON and IPBES].

The Chair of the Panel will be appointed by the GOOS SC [and partner organizations]. Members will be approved by the Chairs of the GOOS SC and other partner organizations, and serve (repeatable) two year terms. Continuation of the panel and/or adjustment of its Terms of Reference will be reviewed by its sponsors after no more than four years.

Appendix E: GOOS Biology Panel discussion outcomes

1. There is general support for the 2014 Workplan and Terms of Reference (with emphasis that both need to include capacity building to assist fundraising).
2. Dr Ian Poiner was appointed Chair.
3. The 2014 Workplan is to:
 - a. **Aim for the formation of a full Panel** with an enthusiastic and diverse group of people (representing science and programmatic themes)
 - b. **Hold an overlapping Workshop with Biogeochemical and Biology/Ecosystems** – with involvement from GRAs to guide the **immediate Identification of EOVs** and use of **Demonstration Projects** (especially positive news projects eg how do obs assist aquaculture)
 - c. **Ensure consultation with Partners and Sponsors** (eg CBD), and **other GOOS Panel** for potential fundraising.
 - d. Create a **Full Vision towards 2019** (inclusive of a **Community Engagement Strategy** communicating that GOOS is open and coastal/real time and sustained ongoing observations)
4. **5 Year Plan: 2014 to 2019** – it was acknowledged that a five year work plan would guide the sustained biological monitoring and ocean observations. **However, this will only progress if further funding is secured.**

Appendix F: Draft Agenda for GOOS Biogeochemistry / Biology workshop

8 October 2013 version - this agenda is under active revision and focuses on the biology panel breakout sessions

Joint Workshop of Technical Experts for the Identification of Ecosystem Essential Ocean Variables

Wednesday to Friday, November 13 -15, 2013

At the Australian Institute of Marine Science (AIMS) Laboratories at Cape Cleveland, Townsville, Australia

This Workshop is jointly funded by the European Commission's FP7 GEOWOW Project, IOC/UNESCO and the Australian Government.

Wednesday, 13 November

08:00 – 10:30 Opening of the meeting - Joint session

- **INTRODUCTION/ WELCOME / Expectations from the WS** [Albert Fischer (GOOS Secretariat/GEOWOW); Toste Tanhua (Chair, GOOS Biogeochem Panel) and, Ian Poiner (Chair GOOS Biology and Ecosystems)]
- **CONTEXT** – GOOS/ FOO/ OOPC/ EOVs / Readiness/ New Biology and Biogeochemistry Panels / Pilot Projects + GOOS Regional Alliances / Coastal and Open Ocean/ PICO Plan [John Gunn – Co-Chair, GOOS Steering Committee]. Example ECVs, introduction by someone (from OOPC?).
- Essential Climate Variables/ Essential Biodiversity Variables – Introduce the concept of requirement driven design of the observing system, guiding the selection of EOVs. - John Gunn
 - Biology Ecosystem Synthesis Report – summary of findings (Dave McKinnon)
 - Biogeochemistry Synthesis Report – summary of findings (????)
- **INTRODUCTION FROM EACH PARTICIPANT** – their role, their research and how it may fit in (in plenary, both groups)

11:00 – 12:30 Biogeochemistry Panel separate session 1 – Requirements / Needs

11:00 – 12:30 Biology Panel separate session 1 – Requirements / Needs

- Understanding what we are trying to achieve – planned outcomes from the WS:
 - List of major societal challenges and scientific questions requiring sustained global observations of ocean biological variables,
 - Define and prioritise EOVs including measurement requirements (frequency and resolution)
 - Evaluation of 'readiness' of observation systems
 - For for each EOVS – what is required to improve current observations.
 - Priority list of potential observation systems for ecosystem EOVS
 - Candidate pilot projects.

Requirements:

- State of knowledge - Biology Ecosystem Synthesis Report – presentation of findings (Dave McKinnon)
- Define the societal needs for biology/ecosystem observations (why we should spend time and money on measuring these variables for decades), e.g. climate change, fisheries, health of ecosystems, healthy ocean, industry (e.g. tourism, transport etc).
- Define requirements for EOVs based on societal and science needs. Come up with a list of requirements, i.e. societal or science driven questions that needs sustained monitoring of biogeochemical variables to answer.
- What are the types of variables needed for modelling (Andrew Constable)
- What long term global/regional biology observation systems are already in place, what variables do they measure and why?

Participants will be asked to prepare input to these bullets before the meeting.

13:30 - 15:30 and 16:00 - 17:45 Biogeochemistry Panel Session 1. Continues

13:30 - 15:30 and 16:00 - 17:45 Biology Panel Session 1. Continues

- Initial prioritization of requirements and define the EOVs that are needed (1st cut).

17:45- 18:00 Plenary –Summary from each Panel

Thursday, 14 November 2013

8:30 - 10:30 and 11:00 - 12:30 Biogeochemistry Panel Session 2.

8:30 - 10:30 and 11:00 - 12:30 Biology Panel Session 2

- Priority list of requirements and define the EOVs that are needed taking into consideration:
 - Redundancies; and,
 - Likely spatial and temporal resolution.
- EOV observational requirements and an assessment of existing observing system.
- Review the agreed list of EOVs and define spatial and temporal resolution observational requirements.
 - E.g. Spatial resolution: Surface or interior ocean? Coastal or open ocean. At what spatial resolution in those realms?
 - Temporal resolution: Decadal, annual, seasonal, weekly, diurnal?
 - Accuracy and/or precision requirements.
- Ensure the temporal and spatial resolution needs to be tied to the requirements already defined.
- Existing long term global/regional biology observation systems – can they meet any of the identified requirements?
- Evaluate the ‘readiness’ to observe each EOV and recommendations for improvement and/or development.

13:30 – 15:30 Biogeochemistry Panel separate session 3 - Continues

13:30 – 15:30 Biology Panel separate session 3 - Continues

16:00 – 18:00 Joint session with the Bio/Eco Panel – cross-fertilization

- Present EOVs from each panel
- Discussion on overlap, synergy, redundancy etc.

Friday, 15 November 2013

08:30 – 10:30 Biol Panel separate session 4 – Review of EOVs, Readiness and existing observing system.

- Finalise the “Readiness table” - for each EOV agree on:
 - the ‘readiness’ of observation systems
 - what is required to improve current observations.
 - priority list of potential observation systems for ecosystem EOVs

11:00 – 12:30 Biology Panel separate session 4 – continues

13:30 – 15:30 Biology Panel separate session 5 – Pilot Projects

- Potential pilot projects – based on the devised list of priority EOVs, what already exists (eg readiness of observation systems, GRA networks) and what monitoring systems could be established if there was funding?
- Selection of proposals to be made for endorsement by the GOOS Steering Committee, based on the priority candidate EOVs and potential pilot projects.

16:00 – 18:00 Joint session with the Bio/Eco Panel – Meeting Summary and Further Steps

- Discussion on overlap, synergy, redundancy etc.
- Formulate a 10 year plan; envision a 70% cut in funding, or a 500% increase.
- Potential Pilot Projects
- Funding Discussion - what funding is available, and what are the potential funding bodies/rounds to approach for the funding of the potential proposals based on the list of Candidate EOVs and Pilot Projects

ANTICIPATED WORKSHOP OUTCOMES - IOCCP / Biogeochemistry

- 1) Define Essential Ocean Variables (EOVs) for biogeochemistry.
- 2) Define societal relevance for ocean biogeochemical observations (motivate why we should spend time and money on measuring these variables for decades).
- 3) Define requirements for frequency and resolution of measurements.
- 4) Present a list of EOVs appropriate for each of the frequency and resolution requirement. These lists can have different EOVs, and specify different accuracy demands.
- 5) Define the state of readiness for EOVs on the various frequency and resolution levels. Matrix of readiness for all EOVs and frequency and resolution; requirements, observations, data streams.
- 6) Recommendation for each EOVI / level on how to improve the observational network from the current state.

ANTICIPATED WORKSHOP OUTCOMES - Biology

A Report stating:

- List of major societal challenges and scientific questions requiring sustained global observations of ocean biological and biogeochemical variables,
- Priority List of ecosystem EOVs prepared for GEOWOW and GOOS,
- Evaluation of 'readiness' of observation systems
- Priority list of potential observation systems for ecosystem EOVs,
- Candidate pilot projects (at least 3);
- Identified funding opportunities;
- Identified pilot projects for endorsement by the GOOS Steering Committee; and
- Nominations for GOOS Biology and Ecosystems Panel Members / potential Date for a Panel Meeting; and
- Identification of dates for 'writing workshops' for writing the funding proposals for the pilot projects.

Appendix G: GOOS Regional Policy 2013

as formulated in Qingdao, refined by the GOOS Regional Forum (May 2013, Hawai'i), and adopted by the 27th IOC Assembly (July 2013)

Available in 4 languages (E, F, S, R):

http://ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=11235

GOOS REGIONAL POLICY 2013

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)¹. 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 Policy¹. 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 Principles⁴, Framework for Ocean Observing⁷) 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)⁴ and implement a Framework for Ocean Observing (IOC/INF-1284 rev.)⁷.
- 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 Policy⁸, 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](#)