INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

Fifth Meeting of the Global Ocean Observing System Steering Committee (GOOS SC-5)
goosocean.org/goos-sc-5
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DRAFT Final Report
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1  Opening

The 5th Session of the GOOS Steering Committee was held at IOPAN in Sopot, Poland from the 1-3rd of June 2016. The meeting was opened by the GOOS Co-Chairs John Gunn and Eric Lindstrom, who welcomed attendees to the meeting, and outlined the agenda for the meeting, which was approved by attendees.

The Director of the Institute of Oceanology of the Polish Academy of Sciences (IO PAN), Prof. Janusz Pempkowiak welcomed all the participants to the GOOS Fifth Steering Committee meeting at IO PAN, Sopot, Poland. He remarked that the IO PAN was founded in 1983 as the successor to the Marine Station of the Academy, in existence in Sopot since 1953. The Institute's mission is to generate knowledge required to support the understanding, the sustainable use and protection of the marine environment. There are about hundreds of staff, including professors and students. The institute is scientifically driven with interest in large scale marine phenomena. He wished that all participants have a fruitful meeting and nice stay in Sopot, Poland.

Topic A: State and trajectory of the ocean observing system

2  GOOS Strategic Mapping

Albert (IOC) presented the GOOS Strategic Mapping, which is useful to identify the links between observations and societal benefits and between observations and observing programs, as well as to define the scope of GOOS, to create hooks for observation programs to join GOOS, and to aid the development of common definitions (e.g., of EOVs) across the Panels and with other groups such as GCOS. Albert noted that the process started last year and that, while the Mapping is dynamic, a version will be frozen every year. The GOOS Panels are responsible for updating the EOV specification sheets, while the JCOMM Observations Coordination Group is responsible for the Network specification sheets from existing GOOS Networks. GOOS is working with GEOBON on EOV overlap with EBVs and with GCOS on EOV-ECV overlap.

<Include a static view of the strategic map for reference?>
In the discussions, there was debate about whether it is important to distinguish between the GOOS system and the GOOS program (e.g., GCOS is responsible for the Global Observing System for Climate). The SC felt distinguishing this was largely an academic exercise, and it wasn’t clear what the benefit of such a separation would have.

The Steering Committee noted that it was important for groups contributing to GOOS to be able to see where they sit within the Strategic mapping. Notably, it was not clear how national and regional programmes, such as the GOOS Regional Alliances.

**Action 1:** Ensure that national/regional programmes are able to see how they connect into the GOOS Strategic Mapping  
**For:** Secretatiat to discuss with the GOOS Regional Forum Chair.  
**By:** GOOS SC-6.

**Action 2:** Panels to ensure that the parts of the 2016 Strategic Mapping are fully discussed in September at the cross-Panel meeting (i.e., EOV specifications harmonised and linked to Societal Benefits)  
**For:** GOOS Expert Panels.  
**By:** Strategic Mapping and EOV Specifications to be made publicly available by the end of October, for a 2-month public review period (December 2016).

### 3 Observing Networks

#### 3.1 JCOMM OCG

David Legler (Chair of JCOMM Observations Coordination Group) summarised status and plans of global sustained observing networks taking oceanographic and marine meteorological observations. This includes Argo Profiling Floats, Meteocean moorings and Drifters (Data Buoy Cooperation Panel), Repeat Hydrography (GO-SHIP), Global Tide Gauge network (GLOSS). Three key challenges/risks were highlighted and further discussed by the steering committee.

**Observations and data availability in EEZs.** Argo has a notification system for Argo floats, but as floats have an increased sensor payloads and with observations from semi navigable platforms become routine (i.e. gliders, unmanned surface vehicles, etc). The conversation could be framed in the context of commitments for making data available (e.g. IOC/WMO agreements such as WMO Resolution 60 on availability of climate data for climate services), and importantly, connecting to societal benefit and pathways to impact for national agencies.
**Action 3:** GOOS/JCOMM to discuss a strategy for highlighting data availability challenges and advantages at WMO and IOC Executive Councils in GOOS and JCOMM Presentations and relate to commitments to data availability, societal benefit  
**For:** Eric Lindstrom/John Gunn, Nadia Pinardi/Johan Stander, Albert Fischer.  
**By:** May 2017, ahead of WMO Executive Council and IOC Assembly.

**Action 4:** GOOS SC to form a group to discuss the root causes of EEZ data access issues (ie national security, fear over uncontrolled resource exploitation) and the counter-arguments about the advantages of data availability.  
**For:** GOOS SC Regional representatives, GEO, David Legler (to identify lead from network in OCG), Albert.  
**By:** Deliver report by GOOS SC-6

**Resourcing of sustained observations.** Observing system budgets of key national programmes are not keeping up with inflation. In addition, for some networks (particularly Argo, Drifters), we have a strong dependancy on a small number of programmes (and particularly US funding) for a large proportion of the array. The funding challenges have largely been offset by impressive efforts to increase performance and efficiencies of platforms, but forward projections suggest challenges in maintaining future commitments. Forum needed for programme managers to discuss support for sustained observing system.

Discussion focussed around requirements for EOVs and investment verses impact against these requirements (as opposed to pitching investment in one network verses another) helps to guide investment. Prioritising sustained observing programmes. Many national programmes are under pressure to sustain existing observing networks as well as expand into new areas. Guidance from the SC would be helpful for national programmes who need to priorities investment. GOOS has to ensure mechanisms are in place to set priorities for the global system to guide managers.

The SC also noted that the mechanisms for funding of sustained observing, and particularly the decision making process for prioritising investment is different in different countries. For instance, in the US, programme managers are highly connected to the science and the community of users. This is not the norm in most other countries. GOOS does not have a good picture of this funding/decision making landscape. The need to balance using informal fora verses formal (intergovernmental) mechanisms for such multilateral discussions was also raised. It was agreed that GOOS needs to develop an overview of the existing funding mechanisms for sustained observing to identify key programme managers and mechanisms, as well as assess areas where engagement with potential funders could be strengthened.

**Action 5:** Identify the funders and level of investment of sustained observing for each network. JCOMMOPS, engaging OCG networks, BioEco survey [possibly confidential report], drawing on GRA Survey.
For: JCOMMOPS to lead, David Legler to report. BioEco panel to advise on outcomes of survey.  
By: report on progress to GOOS SC-6.

**Action 6:** Identify a small group to assess map of funding. Identify where targeted engagement may enable the participation of new funders. Consider use of informal fora verses intergovernmental mechanisms (See TPOS 2020 Example)

**For:** GOOS Chairs, OCG Chair, GRF Chair, Secretariat)  
**By:** GOOS SC-6

### 3.2 Biogeochemical observing networks and synthesis

Maciej Telszewski (Project Director of the International Ocean Carbon Coordination Project (IOCCP) and the GOOS Biogeochemistry (BGC) Expert Panel) gave a presentation in which he summarized the status and future directions of ocean carbon and biogeochemical observations coordinated by IOCCP and the GOOS Biogeochemistry Panel. Special focus was given to recent developments in and identified action items for the following themes: i) underway pCO$_2$ observations, ii) ocean interior observations, iii) data synthesis products, iv) biogeochemical observations from autonomous profiling floats. A brief mention was also given to the successfully initiated series of ocean carbon and biogeochemistry training courses organized jointly by IOCCP with funding from IOCCP, GOOS, and other partners, providing practical training on using biogeochemical sensors in ocean observations.

Questions about the path forward for GOOS BGC, and the evolution of the non-carbon component of ocean observations were raised and discussed within the steering committee.

The path forward for IOCCP and the GOOS BGC Panel is provided through the recently-published 11th Session of the IOCCP Scientific Steering Group Report. In terms of designing an optimal biogeochemical observing network, the goals and performance metrics of GOOS BGC will be centred around EOVs and the science questions the GOOS BGC Panel identified. The Panel will not focus on metrics related to number of platforms deployed and/or operational, but rather on the quality of information that can be obtained from them. One example of a target metric for GOOS BGC Panel is whether the goal of constraining the global carbon fluxes within a 10% uncertainty is achieved. Another aspect of designing an optimal biogeochemical observing system is the consideration of modelling requirements for data and data synthesis products as well as getting advice from the modelling community on where and at what frequency in situ measurements should take place. Up to now the GOOS BGC Panel has not been receiving much input from the modelling community. However, two biogeochemical modellers are present on the GOOS BGC Panel. Moreover, the GOOS BGC Panel is now part of several regional programs and project, for example the EU Horizon2020 AtlantOS project, through which the Panel is being involved in exercises aiming towards enhancing the design of the ocean observing system.
**Action 7:** Develop a project (drawing also on work in AtlantOS) to work with the modelling community and develop firmer targets for observing networks to capture the global carbon and other biogeochemical cycles to within specifications for the synthesis products.

*For:* BGC panel  
*By:* Report progress to GOOS SC-6 meeting.

**Non-carbon component of the ocean biogeochemical observations:** IOCCP has only begun to coordinate non-carbon biogeochemical observations for the last few years as it gradually assumed a leading role in the GOOS BGC Panel. Consequently, the development of this component is evolving and cannot be considered as successful as the carbon observation component. Currently, oxygen observations are next in line in terms of the maturity of the observing network. A member of the GOOS BGC Panel, Masao Ishii (Japanese Meteorological Agency, Japan), provides scientific input to one of the task teams of the Biogeochemical Argo network. Another Panel member, Ken Johnson (MBARI, USA) will be a member of the Biogeochemical (BGC) Argo Scientific Steering Committee, thus assuring that the GOOS BGC Panel has the capacity to influence the ongoing evolution of the non-carbon biogeochemical observations on autonomous profiling floats.

**Action 8:** Ensure that Ken Johnson, on BGC Argo Steering Committee, brings the GOOS BGC Panel point of view regarding systems based design/integration to meet EOV requirements, to BGC Argo discussions.

*For:* BGC Panel  
*By:* immediate

### 3.3 Biological observing networks

GOOS Biology and Ecosystems Project Officer Patricia Miloslavich reported on the GOOS Biology and Ecosystems panel activities related to biological observing networks.

The panel has created an inventory of large-scale and long-term monitoring programmes that measure the EOVs that were proposed at the first expert meeting (Townsville, 2013) based on the themes productivity, biodiversity, and ecosystem services. The inventory was created through a community survey ([https://www.surveymonkey.com/r/goosbioeco](https://www.surveymonkey.com/r/goosbioeco)) which aimed to:

1. Evaluate the current state of over 50 biological observing networks
2. Identify pathways to aggregate and upgrade regional and national systems
3. Demonstrate the benefits gained from integrated systems and databases
4. Identify concept, prototype and mature EOVs

The current results of the survey are available online at [http://dev.iobis.org/goos](http://dev.iobis.org/goos). The aim is to make those results available in a graphical interface and to encourage more observing networks to fill in the survey and (regularly) update their information through an online interface. Through collaboration with OBIS, a global clearing house will be developed which will identify and link variables to the research and data management community, which will also allow us to carry out a network analysis to identify links between programs. A journal paper entitled "Identifying
priorities for global monitoring of marine biology and ecosystems” is in preparation and will use information from the survey and provide an analysis of the impact and feasibility of the proposed EOVs.

The SC discussed the progress made by the panel and recognized the importance of ongoing links between GOOS BioEco and GEOBON MBON community, and recognized the importance of the link to OBIS in providing outreach to the global marine biological community, and recommended to better streamline the data flow to global central systems such as OBIS. The SC advised the biological observing community to improve sharing standards and common approaches (methods).

The SC requested the survey be further advertised with the biological observing community and suggested reaching out to marine research stations such as those part of the World Association of Marine Stations and national bodies. It was suggested that there was an opportunity for the panel to increase public awareness of GOOS activities, through innovative citizen science programmes. The need for careful use of the word ‘Network’ (global approach or observing network), vs. program (individual observing effort) in description of the observing survey results was emphasised by the SC.

The SC noted the challenge of scaling up national and regional biological observing systems and build a truly global system monitoring biological and ecosystem EOVs, and recommended continued development of international engagement to develop EOVs that are widely accepted by the international community.

The SC lastly thanked the IOC for financial support of the Expert workshop on marine monitoring at the CBD SBSTTA/20 meeting and recognized the value of extending engagement with that community to develop EOVs that will assist reporting against Aichi targets and SDG goals.

**Action 9:** GOOS BioEco panel to send survey to marine research stations and relevant national programmes.
**For:** GOOS BioEco panel  
**By:** as soon as possible

### 3.4 GRAs

Tim Moltmann, chair of the GOOS Regional Alliances (GRA) Forum summarized the status of GRAs, and noting the challenge of reporting on the status of GRA observations in a consistent way, given the diverse nature of the GRAs. He reported on the meetings and activities of the GRAs since the last steering committee meeting in May 2015. In particular, he highlighted a survey of the GRAs in 2012-2013, which included requests for information on funding, governance, and observation types. For instance, in terms of funding, the GRAs fall into 3 groups: GOOS Africa and IOCARIBE remain unfunded; SEAGOOS, PIGOOS, NEARGOOS, GRASP, OCEATLAN, MONGOOS, IOGOOS and EUROGOOS are funded projects while the
US IOOS IMOS are funded programmes. While they are heterogeneous in nature, synergies were identified across the GRAs; for instance, many GRAs use common observing platforms, and saw opportunities to collaborate further in areas such as best practices.

With regard to engagement with other parts of the GOOS programme, the GRAs have three main interests:

**To develop/engage in GOOS development projects** - it is unlikely that project will be developed that engage across all of the GRAs, there are opportunities for sub-groups of GRAs to work together to capitalise on common challenges and priorities.

**Common observing technologies are being used across GRAs**, such as HF Radar, Gliders, and Animal Tagging, and the GRAs are keen to work with other parts of the GOOS programme towards ensuring they are recognised as components of GOOS, and requested clarification of what the process is for recognition.

**GRA Observation activities by EOV**: 3 GRAs have provided a summary of their observation activities by EOV, and they are proposing to take an EOV view across the GRAs during 2016, drawing on the EOV Specifications, with a view to providing a coastal view of EOV requirements, and observing status.

**Action 10**: A process for networks to be recognised as part of GOOS is required, considering engagement through GRAs, Expert Panels and JCOMM OCG.

**For**: Secretariat, in consultation with GRF Chair, OCG Chair, Expert panels.

**By**: GOOS SC-6 meeting

**Topic B: Strategy, partnerships and planning**

**4 Sponsor Views**

Presentations were provided by 4 sponsors of GOOS;

- The Intergovernmental Oceanographic Commission (IOC) of the United Nations Environmental, Scientific and Cultural Organisation (UNESCO),
- the World Meteorological Organisation (WMO),
- the United Nations Environment Programme (UNEP) and
- the International Council for Science (ICSU).

**The Intergovernmental Oceanographic Commission (IOC)**

Albert Fisher reported on IOC as sponsor of GOOS on behalf of the IOC Executive Secretary Vladimir Ryabinin who apologised for not being able to attend the meeting.
Based on a recent IOC stakeholder survey, GOOS came out as one of the top three most visible programmes of IOC. Currently IOC’s future strategic directions is under discussion, and in particular how all of the IOC programmes can work together towards serving the new emerging frameworks and agreements, such as the Sustainable Development Goal 14, the Paris agreement of UNFCCC, the Sendai Framework for Disaster Risk Reduction and the Samoa pathway for SIDS. The SC discussed how GOOS can strengthen engagement with the UN frameworks and agreements; particularly around the implementation of EOVs. This will be included as part of the GOOS strategy which is under development.

**The World Meteorological Organisation (WMO)**

Etienne Charpentier (WMO Secretariat) reported on behalf of Wenjian Zhang (WMO Secretariat) on the WMO perspective on GOOS. He explained that WMO activities with regard to observing systems were now undertaken in the WMO Integrated Global Observing System (WIGOS) Framework, where the Pre-Operational Phase of WIGOS for the period 2016 to 2019 has now started per decision of the 17th World Meteorological Congress (Cg-17, Geneva, Switzerland, May/June 2015).

He recalled the importance of ocean observations to address the user requirements of the WMO Application Areas, and other cross cutting areas whereby such requirements are strong for more than half of them, e.g. Global and Regional Numerical Weather Prediction, Ocean Applications, sub-seasonal to longer prediction, climate monitoring, climate services, and the Global Cryosphere Watch etc. WIGOS is comprised of four WMO owned observing components, i.e. the Global Observing System (GOS), the observing component of the Global Atmosphere Watch (GAW), the WMO Hydrological Observing System, and the Global Cryosphere Watch. With WIGOS, and its contribution to GOOS and GCOS, the WMO is also working with partner organizations to achieve sustainability and better interoperability, and harmonize standards and practices for these systems. While WMO benefits from ocean data provided by GOOS and the co-sponsors, WMO Members also contribute observing platforms and instruments to GOOS.

Cg-17 decided on five priority areas for the pre-operational phase of WIGOS, i.e. (i) to develop WIGOS guidance materials responding to the new WIGOS Technical Regulations and the WIGOS Manual, (ii) to further develop the WIGOS Information Resource (WIR) and the OSCAR ([oscar.wmo.int](http://oscar.wmo.int)) database of observational user requirements, and observing systems capabilities, (iii) to develop and implement a WIGOS Data Quality Monitoring System, (iv) to develop concept and establish WIGOS Regional Centres (WRCs), and (v) to undertake national implementation of WIGOS.

It was noted that WIGOS offered opportunities for WMO to strengthen its collaboration with the IOC, UNEP, and ICSU in support of GOOS while addressing the operational needs, which are important to WMO. Sustainability of the ocean observing system and sharing of the ocean data in real-time are key while providing consistent & coherent data series. It was also noted that for climate monitoring and sub-seasonal to longer term prediction, there is an increasing
need for historical ocean data to be provided in delayed mode. The GOOS SC noted the collaboration of JCOMM and the IODE in this regard through development of the Marine Climate Data System (MCDS).

The United Nations Environment Programme (UNEP)

Ms Jacqueline McGlade (Chief Scientist and Director a.i. of UNEP's Division of Early Warning and Assessment, UNEA) presented UNEP’s perspectives as sponsor of GOOS.

The priorities with GOOS rest firmly within the UNEA, as a contribution to Agenda 2030 and a global framework of indicators. At the UNEA, UNEP is asked to deliver statistics on the environment and convert global data into statistics and indicators. The recent UNEA adopted resolutions on marine plastics, the need to improve the coverage, as well as on nutrients and coral reefs. Within a few weeks, UNEP needs to provide a workplan in 3 areas: nutrients, plastics and Ocean Acidification. UNEA has provided UNEP a mandate to work across the UN on these topics.

UNEP has 2 other priorities of relevance to GOOS:

Adaptation, vulnerability and assessment. UNEP needs to provide information on country level on impacts from climate change, sea level rise, risks, in particular for SIDS. UNEP seeks to collaborate with IOC and WMO in developing such services. We need to align up with the WMO global climate system and move from EOV observation to adaptation (e.g. coral bleaching).

Delivering to global reporting requirements especially related to Agenda 2030 Sustainable Development Goals. UNEP is well-positioned to translate data into baselines and statistics and provide a digital repository for data and papers. UNEP seeks collaboration with GOOS on data analytics and scale requirements. The Indicator Reporting Information System (IRIS) is an online national reporting system that has been developed by UNEP. This system can provide great visibility to GOOS and may help leverage funding for observing systems.

Action 11: GOOS to branch out to include contaminants/pollutants expertise to develop an EOV, and negotiate expectations / way forward with UNEP [linked to reporting on SDG14, nutrients and plastics particularly]
For: BCG Panel, in collaboration with UNEP (who will suggest a member)
By: next BCG Panel meeting (Feb 2017)

International Council for Science (ICSU)

Ms Lucilla Spini (Head of science programmes of the International Council for Science) represented ICSU and reported on the latest developments at ICSU and introduced its overall structure and mission. ICSU is member-based non-governmental body with 31 Union members
122 National members and 22 Associate members, and is playing an active role in the Science-for-Policy interface, advising on policy for science, technology and innovation and safeguarding the universality of science through capacity development. She reported on two recent activities: (i) Science education, public outreach and engagement (ICSU Grants Programme) and (ii) Research capacity mobilisation: African Early Career Scientists’ Programme 2016-2020 (with support from the Swedish International Development Cooperation Agency).

GOOS is currently part of the ICSU family together with other Observing Systems such as GCOS, GTOS and GEOSS. ICSU will review GOOS in 2017 (pending consultations with Co-Sponsors).

ICSU would like to see stronger collaborations between GOOS and Future Earth, and join forces - have a pro-active ocean observing community - to support the 2030 agenda. ICSU is supporting UN-DESA with the global sustainable development report (GSDR) through briefs and expert meetings. Being accredited by ECOSOC, ICSU can register scientists to attend some of the important upcoming events: Science, Technology and Innovation Forum (6-7 June 2016) and the High-Level Political Forum on sustainable development (11-20 July 2016).

**Action 12**: GOOS SC to develop scope and draft Terms of Reference of independent review, and suggestions for review board members, for comment/acceptance by the GOOS sponsors

**For**: Secretariat, soliciting SC for membership

**By**: February 2017 GOOS SC Exec meeting

5 Partner views

**Group on Earth Observations (GEO)**

Despite the growth in GEO membership since its inception in 2005 (to 102 members and 92 participating organisations), there remain under-represented regions (South America, Africa, Gulf States, and Pacific Island States). GEO’s aim is to leverage, not duplicate, Earth Observation by encouraging cooperation, coordination, and capacity building, as well as build information systems and foster data sharing. Free and open data access is a central GEO tenet. Since moving away from a data-repository model to one of being a data broker, data requests through the GEO portal have increased considerably. GEO needs to increase its focus on in-situ data; the heavy volume of space-derived data has seen remotely-sensed data get disproportionate attention. GEO would like GOOS to engage in Blue Planet to form the ocean component of GEO. Discussions by the SC focussed on the value proposition of such a partnership, and particularly clarity on governance, roles and responsibilities.

**Committee on Earth Observation Satellites (CEOS)**

An association of space agencies established in 1984 to coordinate space observations and exchange information standards among nations, CEOS is considered the space arm of GEO.
CEOS has organised 7 virtual constellations of satellites, 4 of which deal with ocean data. CEOS will participate in the development of the GCOS Implementation Plan. CEOS has a number of publications (e.g., on space-based information for Disaster Risk Reduction) on its website to help GOOS increase the effectiveness of remotely-sensed data.

Global Climate Observation System (GCOS)

As part of the climate policy development and assessment cycle, GCOS is responsible for providing climate data to the UNFCCC and IPCC. GCOS is developing an Implementation Plan (which follows the Climate Assessment most recently done in 2015), and is looking for GOOS input during the review period in July. GCOS will add a number of ECVs related to mitigation and want to close the water, energy, and carbon budgets.

Action: GOOS SC members invited to provide comments on the GCOS-developed Implementation Plan during the 6-week review period including July 2016. (Secretariat to remind SC).
For: Secretariat to remind SC
By: July-September 2016

GEO Blue Planet: Oceans and Society

The goal of Blue Planet is to leverage and coordinate marine and coastal observations and their transformation into products and knowledge (i.e., develop a value chain). A Secretariat has recently been established and they have applied to GEO as an initiative. Their 3 objectives are to support ocean partners, to identify gaps in meeting user needs, and to provide services and information. Blue Planet has a new governance structure, a new website (geoblueplanet.com) that just went live, and their 3rd Symposium will be held in the U.S. next year. Blue Planet is looking for discussions with GOOS to help identify additional Flagships that Blue Planet should propose to GEO; AquaWatch (water quality) has already been proposed.

GODAE OceanView (GOV)

GOV, the follow-on to GODAE, seeks to build a global system of observations, communications, modelling and assimilation for comprehensive ocean information. Following the recommendation of an external evaluation, GOV developed a Strategic Plan including the transition from demonstration to provision of services. Closer links between GOOS and GOV’s 6 task teams (including the Coastal Ocean and Shelf Seas TT for multidisciplinary downscaling and forecasting; the Marine Ecosystem and Validation TT for integrating biogeochem and ecosystems into physical oceanography operational systems; and the Observing System Evaluation TT for assessing observation impacts) would prove beneficial to both GOOS and GOV. GOV seeks closer engagement with GOOS, particularly through its Task Teams;
**Action 14:** GOOS Panels and the GRA Council to better engage with the appropriate GODAE OV Task Team(s)

**For:** GOOS Panels

**By:** include in report to GOOS SC-6

**International Oceanographic Data and Information Exchange**

The IODE coordinates 67 National Ocean Data Centres (NODCs) and in April 2016 added 20 Associate Data Units (ADUs). IODE manages the Ocean Biogeographic Information System (OBIS) and has developed a new data standard that includes metadata. IODE’s foci include data standards and capacity building, including through OceanTeacher and, more recently, regional training centres. The IODE has an intersessional w.g. to revise the IODE structure to meet today’s needs; currently its biggest users are the science community, but it is looking beyond that to serve more end users as well.

IODE would like to support GOOS in the development of information products and services and progress on this is already underway through close engagement between GOOS Bio-Eco and IODE/OBIS. Recognising IODE’s role in ocean data standards and best practices (oceandatapractices.net), IODE encourages the GOOS network to share their best practices with IODE. IODE would like to develop joint GOOS-IODE activities, including in capacity development through its OceanTeacher Global Academy (OTGA) project. A survey/reporting tool could be developed to monitor EOV data management activities at NODCS, ADUs and OBIS nodes. An ad-hoc joint IODE-GOOS task team (stakeholder consultation group) could be established to assess end-user requirements for data and information products and services.

**ACTION 15:** GOOS leadership to consider whether review of data systems is conducted in IODE, JCOMM, and GOOS in concert with the GOOS Review.

**For:** GOOS, JCOMM, IODE Leadership (Chairs/Secretariat)

**By:** report back to GOOS SC-6

6 GOOS Strategy and Implementation Plan

To launch this session John Gunn led a discussion tying the previous session presentations to potential actions or directions for GOOS. John focussed on the direction of the GOOS programme, in the context of developments and priorities of the 3 GOOS Expert panels in the context, the relationships of GOOS, ICSU, and Future Earth. The interdependancies across a multidisciplinary, multi-user observing system were emphasised, and is a strength of the GOOS model. Emphasis is needed on partnering for the delivery of products to meet stakeholder requirements.

A GOOS Strategy and Implementation Plan are both presently under development.
A GOOS Strategy is under development: It was discussed that determining where GOOS fits in the value chain is critical to understanding its strategic direction; while observations are at the basis of sound decision making, there are a number of extra steps that need to be in place to deliver societal benefit. There is a need to reverse engineer the FOO and make a determination if by listening more intently to users will it be that GOOS is measuring the right thing.

The SC discussed the current GOOS organisation, and the need, once a high level strategy is in place, to ensure its activities are aligned with delivering to strategic priorities. Given the distributed nature of GOOS activities, and the emphasis on energising a community to deliver to GOOS, a strategy will enable the community to see where they fit into GOOS, will inform the GOOS Implementation Plan, panel work plans and will also inform regional and national engagement; for instance, enable a discussion about strengthening the GRas and their feedback into the GOOS programme.

Action 16: A GOOS Strategy to be developed based on discussions for for consideration/approval by the SC.
For: GOOS Director/Co-Chairs in consultation with the SC Executive.
By: For approval at the GOOS SC-6 meeting

A draft Implementation Plan was presented by Tim Moltmann, provided as a background document to the meeting. Given the aspirations post the OceanObs09 Conference and the development of the Framework for Ocean Observing, it has taken time and effort to establish, focus and staff the 3 panels of GOOS. The panels are off and running and tackling tasks particular to their respective domains and communities; It was timely to stocktake on what GOOS has achieved, and set priorities for the next phase to ensure GOOS panel activities deliver to a common set of goals.

This GOOS Five Year Implementation Plan (2016-21) is designed to guide next stage development of the global ocean observing system using the Framework’s systems approach. For (1) requirements and EOVs, (2) observing networks and systems, and (3) information products and services,

the Plan:
- sets out five year goals;
- assesses current strengths and weaknesses (including resources and capacity building);
- considers opportunities and threats that could either enable or impede progress; and
- recommends priority actions, with milestones on one, three and five year timeframes.

Integration and cross-cutting issues (e.g. communication) are addressed in a separate section, as well as implementing mechanisms (including GOOS pilot projects). The critical role of GOOS in capability and capacity development is addressed here. Whilst this Plan has a five year timeframe (2016-21), it should be noted that the third, decadal, international Ocean
Observations Conference being planned for 2019 (OceanObs’19) presents an excellent focal point for assessment of progress.

An assessment of the major constructs of GOOS is included in the plan, against the 3 priority areas. It was noted in particular that the 3 panels of GOOS are supported at varying levels with varying timeframes of funding security. Securing ongoing support for the GOOS panels will be critical to GOOS meeting expectations in delivering against the FOO.

The activities of JCOMM through its observations coordination group and JCOMMOPS technical coordination office deliver strongly to GOOS; their role in GOOS needs to be more clearly articulated; particularly the process for engaging new networks. Finally, the Data Management landscape is complex and heterogenous; with many organisations and constructs, at varying levels of activity, to engage. However, effective delivery of data and fit for purpose products is critical to demonstrating the impact of GOOS.

Connecting up the information chain to societal benefit requires a clarifying and potentially strengthening partnerships with other groups such as CEOS and GEO Blue Planet. There is also a need for continued development of relationships with and within GRAs potentially through connections to key national groups and data users. Finally, it was agreed that GOOS needs to foster a network of champions across the community; which will be aided by articulating priorities, roles and partnerships through the GOOS strategy, enabling organisations and individuals to see where they fit in the GOOS landscape, and what they can contribute.

**Action 17**: GOOS Implementation Plan to be finalised for approval by the SC.
**For**: Albert Fischer/Tim Moltmann, in consultation with the GOOS Executive
**By**: For approval at the GOOS SC-6.

**Action 18**: GOOS to discuss strengthened collaboration with CEOS and Blue Planet including clarity on roles and partnerships in the context of the FOO implementation.
**For**: GOOS Co-Chairs, Paul DiGiacomo.
**By**: GOOS SC-6.

**Topic C: Reviewing the work of GOOS Structures**

7 GOOS Panels

7.1 Physics and Climate panel (OOPC)

John Wilkin (OOPC member) presented an update on OOPC activities, including the status of the panel membership, the outcomes of the OOPC meeting held in April 2016, and the next
activity of OOPC, which will be focussed on boundary currents and their interaction with the shelf.

OOPC is seeking new membership as the panel is continues to be quite lean (7 members); as previous chairs are stepping down (Toshio Suga and Mark Bourassa), and retirements/departure have outstripped ability to bring in new expertise. Given the panels challenge of meeting the needs of both GCOS and GOOS, a larger membership is needed to spread the load.

OOPC met overlapping with the JCOMM Observations Coordination Group in Esporles, Majorca in April 2017. The main focus of the meeting was discussions improving consistency of EOV Specifications, targets in Network Specifications, and building on these documents to develop the GCOS Implementation Plans which include actions by EOV and by Network.

The panel then reviewed progress against the OOPC Work Plan, particularly the upcoming panel focus on Boundary currents. A session was held at ocean sciences in February which attracted alot of presentations. Many Boundary Current observing activities already underway, and there is likely a role role for OOPC to engage and provide some coordination to regional activities, and ensure they plug into Global sustained observing.

As next steps, OOPC will engage with the GODAE OceanView Coastal Ocean and Shelf Seas Task Team (COSS TT), with a view to holding a workshop in 2017. The potential for strengthened engagement with the GOOS Regional Alliances, including strengthening relevance for societal benefit was discussed, as well as the potential to include Biogeochemistry, engage the Large Marine Ecosystem activities (such as the Agulhas Somali Current LME) and the connection to the GODAE OceanView Marine Ecosystem Analysis and Prediction Task Team.

**Action 19:** Develop an inventory of western boundary currents observation activity and their trajectory (short term pilots, sustained activity, etc.); including priority points of engagement with GRA activities in boundary currents

**For:** Tim Moltmann, John Wilkin

**By:** GOOS SC-6.

7.2 Biogeochemistry panel (IOCCP)

GOOS Biochemistry Panel Chair Toste Tanhua (also Scientific Chair of the International Ocean Carbon Coordination Project - IOCCP) presented an update on IOCCP and the GOOS BGC Panel activities in the intersessional period. In the context of the gradual process of IOCCP becoming the GOOS BGC Panel, a need for updating IOCCP’s terms of reference was identified in order to better reflect the new structure, tasks and responsibilities held by the
IOCCP. Main BGC Panel activities were focused on the implementation of the Framework for Ocean Observing through the establishment of BGC EOVs and development of the EOV specification sheets, including verification of the consistency in defining phenomena. Most of IOCCP activities on top of those related to the GOOS BGC Panel were centred around developing best practices guides for observations, ocean biogeochemistry data stewardship and synthesis product development, as well as knowledge products. IOCCP continues to provide a communication platform for the global ocean carbon and biogeochemistry community. Toste proceeded to highlight specific examples of the developments including IOCCP’s involvement in several SCOR working groups, the release of SOCATv3 and GLODAPv2 data synthesis products, and IOCCP position paper on data management which proposes the establishment of two GDACs for ocean biogeochemistry data. Few outstanding issues were also identified related to, for example, the need to establish targets for observing networks. In response to Toste’s presentation two questions were raised and discussed by the GOOS SC.

During the discussion a risk was highlighted that if the EOV specification sheets are developed without two-way communication with the observing networks, who have their strategy for development, there could be a disconnect between the work of the GOOS Panels and the development of the observing networks. In response, the BGC Panel stated that they are mitigating that risk by:

- Ensuring that representatives of all observing networks are involved in the development of EOV specification sheets so that this process is aligned with what the current state and future plans of the networks are.
- Ensuring that EOV specification sheets are “owned” by the biogeochemical community and not the Panel itself.

**Action 20:** GOOS BGC to consider choosing one BGC EOV, for example Oxygen, and exercise the full cycle of the Framework EOV from defining the EOV Spec Sheet with input from networks to concept implementation by the networks themselves.

**For:** GOOS Biogeochemistry Panel

**By:** report progress to GOOS SC-6 meeting.

The SC discussed the balance of expertise on the GOOS Biogeochemistry Panel. The current lack of an ocean colour expert was highlighted, and it was noted that ocean colour expertise was initially part of the scope of IOCCP until the formation of the International Ocean Colour Coordination Group (IOCCG). Currently, IOCCP SSG has recognized that there is need for ocean colour expertise as a result of the gradual evolution of IOCCP into the GOOS BGC Panel.

**Action:** GOOS SC requests that an Ocean Colour expert from IOCCG is invited to the GOOS BGC Panel, as well as to strengthen the two-way communication between the two bodies.

**For:** GOOS Biogeochemistry Chair and Secretariat

**By:** Next GOOS Biogeochemistry/IOCCP meeting.
GOOS Biology and Ecosystems Co-Chair Sam Simmons presented the goals of the panel, the process followed to identify EOVs following a DPSIR framework adapted to the FOO, and the action plan of the panel for 2015-2019.

Societal relevance of issues (to reflect impact) was evaluated by identifying the drivers and pressures requiring sustained biological ocean observations from the review of 24 relevant international bodies, their goals and indicators. These drivers and pressures were prioritized according to the number of conventions addressing each of them. Feasibility of biological variables was estimated through an online survey to observing programs (so far 67 responses which can be viewed on-line). Based on this process and acknowledging previous frameworks, the Panel proposed initially 9 EOVs of which 5 refer to functional groups and 4 to ecosystems. Draft specification sheets for 8 of the 9 EOVs have been completed by the panel. An initial plot of impact/feasibility (still a work in progress as more data is coming in through the survey) suggests zooplankton diversity and coral cover are at a higher level of readiness. Other activities carried out by the Panel include initial engagement with the JCOMM Observations Coordination Group, contributing to the GCOS Implementation Plan, reaching out to the science community globally, as well as to the policy community through the SBSTTA (CBD).

Next steps include completing specification sheets for all EOVs, continuing to seek validation from the scientific community, improving integration across ‘networks’ and disciplines, and increasing the visibility of the panel’s efforts to identify EOVs through publication of a scientific paper and use of the survey results to develop a visual on-line map tool of the biological observing ‘networks’. An overall goal is to have at least one EOV at a mature level by 2019, and one more well on the way.

During the discussions it was noted that the different panels use term the term ‘Network’ differently and there is a need for consistency. For the physics, climate observing system, a ‘Network’ is a globally coordinated observing programme generally focussed around a platform type, with generally well defined missions and targets. For the biology community, ‘network’ has a range of other meanings. In addition, the difference between the EOV name approach between the panels was highlighted (i.e. Harmful Algal Blooms incidence, is something that is calculated from other EOVs), and it was requested that the panel consider consistency among the panels in the terminology of the EOVs.

The SC discussed process for identifying other EOVs (subvariables/supporting variables) needed to deliver the EOV, and how this is addressed across the panels. For example radiance, ocean color, should be captured in the spec sheet for Phytoplankton. Recommendation is to discuss how this input will be included in the spec sheets and to work closely with the IOCCG to make sure they know what our requirements are.
**Action 22:** GOOS BioEco panel to complete specification sheets, working with the other panels to agree on a glossary of agreed terminology and definitions, including identification of supporting variable requirements.

*For:* GOOS BioEco panel, engaging other panels where needed.

*By:* early 2017.

**Action 23:** GOOS BioEco and BGC panels work together on the specification of Ocean Colour and Phytoplankton EOVs

*For:* GOOS BioEco, BGC panel chairs/secretariats

*By:* early 2017

Referring to the Phytoplankton and zooplankton EOVs, it was highlighted that at the OceanObs09 conference it was recommended that the Continuous Plankton Recorder activities evolve into a global programme (now the Global Alliance of CPR Surveys). However, as many areas of the oceans have not been sampled by the program. Recommendation is to have further thought with the CPR on plans to expand geographically (through panel member Sonia Batten - CPR), including any other zooplankton sampling initiatives.

**Action 24:** BioEco panel to Work with GACs on strategy to expand observations of plankton in the global ocean (through CPR and other methods).

*For:* GOOS BioEco Panel

*By:* Report on progress at GOOS SC-6

Challenges of sharing biological data, particularly data from the EEZ was highlighted noting that this information will often not be publically available. It was agreed that this would need to be addressed through demonstrating the benefits of sharing data, something that GOOS SC members could advocate within their regions.

### 7.4 GCOS Implementation Plan 2016

**Introduction:**

The 2016 GCOS Implementation Plan (IP) was introduced by Toste Tanhua, who co-lead the drafting of the Ocean Chapter. Toste focused on explaining changes to the ECVs and their potential implications for the work of three GOOS Expert Panels. Differences between the 2010 and 2016 ECVs were presented and justification for those given. Toste presented the timeline for the review and publication of the GCOS IP. Recommendations to update certain EOV names were given in order to increase consistency with the newly defined ECVs. Toste requested input from the GOOS SC on review of the ocean chapter and selected systems cycles sub-chapters, when the IP is released for public review in July 2016.
The SC discussed the role of GOOS in maximizing the impact of the GCOS IP. The SC agreed is well placed to ensure the plan has impact as the ocean writing team for the 2016 GCOS IP maintained active communication with the three GOOS Panels, and JCOMM OCG throughout the drafting process. The public review processes should assure that any further inputs and recommendations from the GOOS community are taken into consideration in the final GCOS IP. The SC agreed that the expert panels should engage with identified implementors of IP actions to ensure they are aware of actions and that future efforts are prioritised accordingly.

**Action 25:** The GOOS SC requested that the fragilities (e.g. lack of sustained funding) of the ocean observing system is highlighted in the new GCOS IP.
**For:** GCOS IP authors
**By:** immediate

**Action 26:** The GOOS expert panels ensure GCOS IP is actioned by targeted communication with the identified implementers.
**For:** GOOS Panels, GRA Council
**By:** After the publication of GCOS IP in November 2016.

8     JCOMM Observations Coordination Group (OCG)

David Legler, OCG Chair presented the activities of the JCOMM OCG, outlining the main task areas of the group’s work plan, and changes in governance which are under way. The work plan focuses on requirements (including engagement with WMO), observing system coordination, standards and best practices, and new technology, capability. Focus of the group is particularly currently on standards and best practices, engaging new networks, JCOMMOPS oversight and guidance, and data integration and interoperability. The work plan requires a step up in effort, and so the governance will also be expanded to bring onboard Vice Chairs to oversee focus areas of the work plan.

Discussion focussed on the process for OCG expanding membership to new networks, how this is done, and how far into biogeochemistry and biology it should go, and the mutual benefits and costs of strengthened engagement with emerging networks. It was agreed that there is benefit to networks engaging who use e.g. common/similar platforms or measure common EOVs. to capitalise on synergies. I.e. Use of ships, moorings, etc., while e.g. a network measuring mangrove cover may not have so many synergies. OCG Has a work plan. Need to assess whether there is mutual benefit in new networks engaging in the work plan. For some networks, some but not all of the work plan will be of relevance; for instance, many coastal networks will not necessarily be focussed on the articulation of global targets, but there would be mutual benefit in their engagement in discussions across networks on standards and best practices, data and information, use of new technologies, etc. Ultimately it was agreed OCG is one of the coordination mechanisms for observations, but others may be needed in the future.
Concerns were raised that JCOMMOPS performance reports are mostly focussed on real-time data streams, but this will be addressed in the ongoing development of the websites.

**Action 27:** Discussions should be initiated to encourage JCOMM to maintain flexibility needed to bring more non-met service observing networks into OCG.
*For:* JCOMM OCG Chair.
*By:* JCOMM-5 Session, report to GOOS SC-6.

**Action 28:** The GOOS Strategy should be clear on the different responsibilities of GOOS, JCOMM OCG in design, implementation, and monitoring of the observing system.
*For:* GOOS Director, Co-Chairs, GRF Chair.
*By:* GOOS SC-6

**Action 29:** Work towards more integrated reporting on the status of the observing system through JCOMMOPS.
*For:* JCOMM OCG, JCOMMOPS, and BCG Panel, BioEco Panel, OBIS.
*By:* Report on progress at GOOS SC-6.

### 9 GRAs

Tim Moltmann provided a GRA Update (see document 9a), highlighting three GOOS GRA priority items for consideration at the SC meeting.

Consideration of HF Radar as a new observing element of GOOS (document 9c) was discussed at length. From the framework (expanded EOVs) there will be a need to have new networks to meet these observing requirements. The Steering Committee supported further development of the draft HF Radar proposal in consultation with OOPC (regarding requirements/EOVs) and JCOMM OCG (regarding coordination). The discussion highlighted the need for the for GRAs, Expert Panels and JCOMM OCG to interact more effectively. The February 2017 meeting in Miami, Florida will be one opportunity. Other means of cross fertilisation were encouraged (e.g. Panel co-chairs presenting at GRA teleconferences etc.).

The comparison of EOVs being developed by the three panels with EOV views from GRAs (where available) was noted and supported for further development – (See Document 9b).

N.B. The third GRA priority (MESCAT pilot project) was considered under agenda item 10.

**Decision:** The SC agreed for the HF Radar to become an observing element of GOOS.

**Action 30:** GEO HF Radar Community to engage with OOPC (regarding requirements/EOVs) and JCOMM OCG (regarding coordination).
*For:* GEO HF Radar Community
*By:* Report on progress at GOOS SC-6
10 Projects

10.1 The Tropical Pacific Observing System, TPOS 2020 Project

Neville Smith (TPOS 2020 Co-Chair) provided an update on progress. The SC met in October last year in Hobart, and since then, the development of the interim plan has been the main focus. It has since gone through friend’s review, and is currently under revision. The main criticism of the plan from the friends review focused on the lack of traceability of recommendations, and the need to use the FOO concepts. The plan (renamed the First Report) will go out to public review at the end of July. In parallel, the project is initiating a Transition planning process, and needs to step up its engagement activities. Focus to recently has been on engagement through WMO and the forecast community.

Regional activities (TPOS 2020, AtlantOS, etc), need to be harmonized, brought back into the global system. OceanObs19 mechanism for that harmonisation.

**Action 31**: Steering Committee Members are invited to review the TPOS 2020 Interim Plan in July 2016.

**For**: GOOS SC Members

**By**: September 2016.

10.2 The Deep Ocean Observing Strategy (DOOS)

GOOS Co Chair Eric Lindstrom gave an overview of the DOOS strategy, its status, and plans going forward. A Deep Ocean Observing Strategy document was developed following a workshop in 2011 by a small writing team. Eric noted that progress had stalled as it was decided that the TPOS 2020 project needed space to develop, and took precedent given the urgency caused by challenges sustaining key components. This year, leadership has been secured for the DOOS project; Lisa Levin (Scripps Institute of Oceanography), and the strategy will go out to public review, and a survey will be conducted of deep ocean observing activities in the lead up to a workshop in December 2016. The Project will be reaching out to JCOMM OCG and others in the project to assess deep ocean observing activities being conducted and planned. DOOS will also need to engage in technology development activities to meet requirements.

Synergies with other regional projects such as TPOS 2020 and AtlantOS was discussed. The GOOS SC is a good forum to ensure the synergies across regional/thematic activities are identified, to enable the projects to effectively connect back into the development of the Global Ocean Observing System as whole, in a coherent way.

10.3 AtlantOS
The European-funded (21M over 4 years, ending in April 2019) project’s goal is to integrate loosely coordinated observation programmes for the entire Atlantic, and includes partners in Brazil, the U.S., and Canada. It is designed as a contribution to GEO and the Blue Planet, and has as an outcome a BluePrint to be delivered in time for Ocean Obs ‘19. An initial requirements is being drafted - the final version at the end of the project will include refinements from the modelling, observation, and user communities based on simulation experiments, networks’ plans for technology/sampling improvements, and the translation of required applications and services into the need to measure EOVs. ICES is a major partner in the biology/ecosystem area, and work continues in reconciling differing approaches (i.e., EOV-based and non). There will likely be a number of workshops with the joint GOOS Panels to agree on applications/phenomena and their associated EOVs. Engagement with funders is key to ensuring a lasting impact. TPOS2020 has some similarities to AtlantOS, and Neville’s talk provided caution about jumping too quickly to scenarios (i.e., before fully exploring societal benefits, associated phenomena, and then EOVs).

This project is an opportunity to establish/strengthen links between IOC/GOOS and ICES. The need to engage with end-users (to ensure fit-for-purpose) and funders/governments (to ensure sustainability).

**Action 32**: Initiate focussed discussions amongst the GOOS development projects on synergies, lessons learned and common approaches.

**For:** GOOS Secretariat

**By:** ongoing, report back by GOOS SC-6

### 10.4 GRA Projects

GOOS Regional Alliances Forum Chair Tim Moltmann introduced a project proposed by the GRA called the MEditerranean Sea-level Change And Tsunamis (MESCAT), a capacity building programme to improve the network of tide gauges around the Mediterranean coast. The project is small scale compared to TPOS and ATLANTOS, but considered to be a valuable addition by the GRAs. He requested comments and feedback on the project concept in general, and MESCAT specifically.

The meeting discussed that GOOS projects are important and can increase visibility and impact for both GOOS and IOC. The SC was pleased that the GRAs were proactively considering potential projects which would bring benefits across a number of GRAs. Projects should be seen as a way to bring additional effort and resources to GOOS. They should be focused on sustained observing, including being seen as a catalyst for innovation, moving the system forward while addressing the existing gaps.

With respect to potential future projects which might be considered with engagement from GRAs,, constructive suggestions were made about engaging with Large Marine Ecosystem (LME) programs, and with the boundary current/coastal ocean emphasis being pursued by OOPC (Physics panel).
**Decision:** The SC supported the GRA project initiative in general, and MESCAT specifically, and encouraged the GRAs to work towards its implementation.

**Action 33:** Report back on progress in establishing the MESCAT project to the GOOS SC

**For:** GRA Forum Chair

**By:** GOOS SC-6.

### 10.5 General discussion on projects

A general discussion on the role played by GOOS projects and GRAs and GRA pilot projects took place among the GOOS SC. The objectivization of the projects within GOOS is that projects bring resources, have specific timelines and outcomes, and provide visible products of immediate value to different stakeholders. Several views and recommendations were discussed, consolidating points made earlier in this agenda item.:

- Projects such as TPOS2020 or AtlantOS could take the function of a GRA, or a ROOS. The engagement of such regional projects with existing GRAs was discussed. Basin scale projects connect across a number of (often land region focussed) Regional Alliances.

- Variations in the level of support provided to existing projects and required for planned projects was discussed, with AtlantOS having a 20 million EUR budget, TPOS2020 on the order of 100,000s USD, and DOOS a fraction of that. As projects are organised differently, there is no set approach or budget formula for a GOOS project.

- Projects don’t need to be the size of AtlantOS or a new GRA. A GOOS project could be much smaller, regional or even national; could be focused on developing a single instrument, or an observing platform to deliver some new products in the context of GOOS.

- Projects within GOOS could act as catalysts to help initiate processes required for sustained observations; both in terms of scientific understanding of requirements, and in technology development.

- One of the principles of the FOO was to embrace a range of drivers for sustained observing, including research and operational applications. On high seas so many of our systems are funded as research activities but have a very large time scale. The Sargasso Sea given as an example of a probable first high seas Regional Alliance.

- An assessment of GRAs was carried out. Strengths and weaknesses were identified. Now pilot projects will help address those.
Topic E: Engagement and Capacity Development

11 GEO Blue Planet

Blue Planet is an initiative to bring together data/modellers/assimilators and to develop services (Flagships) to meet users needs that will perhaps taken over by someone else. GOOS fits in Component 2 (Sustained Ocean Observations). Blue Planet completed its first 10-year work plan and is developing a new strategy and updating its governance - one of the focii over the coming year is doing a better job, consulting plans, integrating with GOOS and reaching out to user groups. The next Blue Planet Symposium is likely to be in Europe, and they would like to engage EuroGoos / Copernicus demonstrate services.

It was noted that GOOS should be involved with GEO because of its focus on delivery is complementary to GOOS’s focus on design, fundamental coordination of observing systems; and its different audience (e.g., for funding). GOOS and GCOS are both identified as foundational tasks within GEO. The IOC (Albert) and GOOS (Erik Buch - EuroGOOS Chair) are both represented on GEO’s Program Board, and IOC is 1 of the 3 Participating Organisations elected to the Executive Committee. GOOS wants to ensure Blue Planet has strong governance. GOOS also recognises that it needs to continue engagement outside GEO and Blue Planet.

During the discussion a number of points, issues and concerns were raised: There have been challenges in the past in developing a constructive partnership between GOOS and Blue Planet, and respective roles and points of engagement still need to be clarified. GOOS is very much focused on the fundamental ocean observing system requirements, design and delivery, and there is potential for GOOS to partner with GEO Blue Planet to focus on the integration value added products and analyses development drawing on sustained ocean observations. This is potentially a useful pathway to impact, and delivery to societal benefit, and something GOOS. However, there are other routes to impact; for instance, climate, ocean assessments assessment exercises.

Ultimately, work in a complex space of programmes and acronyms, and a limited resourcing environment; this is a strong motivation for GOOS and GEO Blue Planet to work together to optimise the impact of sustained ocean observing, and articulate their niche roles. However, we must ensure there is a two-way collaboration. For example, there needs to be recognition GOOS contributions to GEO Blue Planet, contributions of sustained observing networks to Blue Planet products and analyses.

**Action 34**: Arrange a high-level meeting, between leaders in GOOS to clearly define roles of GOOS/IOC compared to GEO/Blue Planet, establish a plan to coordinate, where appropriate, funding mechanisms and outreach to end-users.
For: GOOS Co-Chairs, Director and GEO Director, Blue Planet leadership
By: September 2016.

**Action 35:** All GOOS members raise the profile of the GOOS activities within national GEO programs (ongoing).
**For:** GOOS SC Members
**By:** Ongoing

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12 **Capacity development**

Peter Pissierssens (IODE and IOC-Capacity Development coordinator) introduced the new IOC Capacity Development Strategy 2015-2021.

Capacity development has always been a major element of IOC’s activities. The main delivery mechanism has been the regional sub-commissions and regional committees. Over the past 55 years the three sub-commission have themselves defined strategic plans or statements addressing capacity development. Also global programmes have also focused on capacity development. GOOS developed Regional Alliances, IODE its Ocean Data and Information Networks and its OceanTeacher programme; HAB adopted its principles for capacity development; the tsunami programmes regularly organizes training courses, as does the Marine Policy and Regional Coordination section. However, IOC as an organization, did not have a strategy that was all encompassing and addresses more than just training. So the new CD strategy requires each regional subsidiary body should prepare a capacity development work plan that is based on the strategy and based also on a needs assessment. In addition, we will need to create projects that will lead to building capacity. This will require funds as well as human resources, especially at the national level. Finally IOC also needs to make sure that it has efficient and mutually reinforcing collaboration between its global programmes and regional subsidiary bodies.

A new IOC CD web site has been developed (http://www.ioc-cd.org). It contains the full strategy and will gradually also include details on how IOC has implemented the strategy. But it will also contain a lot of practical valuable information such as opportunities for training and education, participating in research cruises, opportunities for funding. A second new development is the establishment of an IOC Capacity Development fund. This will enable global programmes, regional sub-commissions and regional committees to submit small scale proposals (<100K$) for funding by IOC Member States. However this will not be the only fundraising mechanism that IOC plans to develop. While it receives funding from UNESCO this is far from sufficient to fulfill the needs of our Member States. IOC will therefore need to develop a strategic, long-term and substantial fundraising mechanism that will bring IOC in a very different level. But IOC also needs to focus on the short-term and that is where the IOC Capacity development fund comes in. You can find the list of submitted proposal also on the new IOC CD web site.
Glenn Nolan then outlined a potential joint JCOMM-GRAs activity, focused on capacity building within the GRAs. There are 13 GOOS Regional Alliances (GRAs) that coordinate regional ocean observing system capabilities around the globe. Some GRAs have very well developed infrastructure, forecasting systems and services. These include US IOOS, IMOS Australia, EuroGOOS and MONGOOS (Mediterranean Sea). In other areas such capacity is being developed but challenges remain in terms of securing sustainable funding for ocean observing and attracting appropriately trained personnel. GOOS has been heavily involved in training and capacity development, primarily through activities led by the GOOS project office and the IODE. Recent examples of this include the African summer school in 2014 run by GOOS Africa and some training initiated through the EC MyOcean and JERICO projects. He proposed that future GOOS capacity building activities in ocean observing and forecasting should include securing funding and appropriate partnerships for a number of targeted fellowships in ocean observing. In addition, a small task team could work with GRAs in developing project proposals and helping shepherd these to potential donors such as DG DEVCO (European Commission) and others.

**Action 36:** GOOS Secretariat and Glenn Nolan to activate a small task team to work with the GOOS Regional Alliances to develop project proposals and to help in connection to potential donors.

**For:** Secretariat and G. Nolan (EuroGOOS), in communication with the GRA chairs

**By:** ongoing, report back to SC-6

13 OceanObs’19

Eric Lindstrom introduced the plans for the OceanObs19 conference. He first provided background on the previous two conferences in 1999, and 2009. The first conference followed the World Ocean Circulation Experiment (WOCE) and the Tropical Ocean Global Atmosphere (TOGA) project, and its main outcome was what we largely know now as the sustained ocean observing system for climate. The main outcome of the second conference was the Framework for Ocean Observing and the decision of incorporating biogeochemistry and biology observation into the system. Eric anticipates that Ocean Obs 19 will be double the size of the ’09 conference (~1200).

The main target for the OceanObs19 is to build on the process in the last decade and to focus on the value chain of bringing ocean observation products through the various societal and scientific users of the information.

Under the tag line “Oceans of Change”, some ideas for themes are: (1) Blue economy, (2) Ocean hazards, (3) Water quality, (4) Food security, (5) Ecosystem health and biodiversity, and (6) Ocean acidification.

Proposed structure of the meeting will:

- Organise the sessions around the six themes
- Apply the Framework (focusing on requirements, observing network coordination, products, data management)
• Solicit white papers that address the relevant EOV networks, products connecting the six themes (white papers to be presented as posters and published electronically not peer reviewed)
• Build into plenary papers to be presented at the conference (2-4 papers/theme = 12-24 papers in total) assembled prior to the conference
• Bring keynote speakers for each of the papers - papers to be published and peer reviewed

Some ideas proposed for the organization of the meeting includes contacting (convincing) NASA to be the host, have an executive committee conformed by 3 people including Eric Lindstrom plus 2 conference co-chairs, have a patron committee with representatives of conference sponsors (~12 organizations represented last time), a science and society organizing committee (composed of 4 members per theme to solicit the white papers and to commission the plenary papers for the meeting), and a local organizing committee (TBD). Hawaii is a potential venue to be used given its closeness to the Asian community.

Requests / Recommendations:

• Remove “lists” of projects and programmes from the diagram (restrictive), and to have a separate diagram with sponsors, etc…
• To have clarity on what we want to obtain from the meeting: better connections from the observing community to the users, from the production of data to the requirements, and how the products delivered connect to the users.
• In the call for input, we should emphasise new technologies and developments in addition to the application of the FOO
• Guidelines for Whitepapers should draw on FOO concepts.
• Include capacity building / coordination among themes.
• Need to articulate the business plan soon

**Action 37**: Secure venue for OceanObs’19, sponsorship from NASA, identify chairs of key committees
**For**: Eric Lindstrom, Albert, GOOS Secretariat.
**By**: end 2016.

**Action 38**: Develop a prospectus to engage potential sponsors, GRAs, etc. including a revised diagram.
**For**: Eric Lindstrom, Albert, GOOS Secretariat.
**By**: Early 2017.

14 Revisit GOOS Strategy and Implementation Plan

Tim Moltmann provided an overview of the Implementation Plan (IP), which will be a sister document to the Strategic Plan, which will speak to the high level relationship of GOOS to other
bodies. The IP is designed to guide GOOS through the next phase of planning and implementation of the Framework processes.

It is desirable to get comments on the Plans under consideration in time for the Panel meetings in September. The Plans should be relatively complete in time for the cross-cutting workshop in February. Shortly after the February session the GOOS SC Exec plans to meet and ideally approve the Plans.

The IP is structured to align with the Framework document. A section titled “Defining requirements and specifying the expanded EOVs to be measured” provides a status for each panel and articulates recommendations on implementation activities for the 2016-2021 timeframe, giving an overview of associated strengths, weaknesses, opportunities, and threats. A percent FTE level of effort estimate is provided for each set of recommendations.

The Report also contains a section on “Expanding observing networks and systems based on an assessment of their readiness” which outlines the need to assess and mature, and in some instances develop, network elements to ensure fit-for-purpose across EOVS and the scientific disciplines. Similar to the content in the previous section implementation activities for the 2016-2021 timeframe were presented in the context of their strengths, weaknesses, opportunities, and threats. This was accompanied by an estimate of required FTE.

A third section “Enabling and promoting transformation of observational data into information products and services” provided a focus on the importance of adhering to an open data policy, coordinated data management activities, and stronger linkages to operational oceanography. Once again implementation activities were outlined for the 2016-2021 timeframe along with strengths, weaknesses, opportunities, and threats. It was suggested that the level of effort required by the GOOS office exceeds their current capacity.

An outline to a final section on governance/oversight, implementation, development, and capacity building was prepared and will be further developed.

The GOOS SC needs to agree on what it thinks are its strengths and weaknesses and to build foundationally on these strengths and work to address its weaknesses. The IP needs to develop a process through which GOOS community members and stakeholders get input and feedback on Project, Network, EOV system design and redesign activities. This may include network specification sheets, review and approval/endorsement processes, along with an articulated outcome or physical response. The role of the panels and the SC should be clearly articulated. Each year the Panels should invoke a process by which they articulate a prioritized set of things they will review and mature. The IP should articulate a process that fosters cross-panel coordination and a focus on phenomenon when appropriate. This increased cross-Panel communication should mature over the period of the IP such leading to a set of actions and outcomes that clearly demonstrate GOOS value within the community. (A potential target is a demonstration by OceanObs’19.). The IP should provide guidance on which national structures
should be part of GOOS coordination processes and how to tie their outcomes to the capacity and evolution of the observing system.

The actions in this item are found in Section 6.

**Topic F: GOOS Business**

**15 Review of GOOS governance, Office, fundraising**

John Gunn raised the issue of the need of a new co-chair to fill Eric Lindstrom’s vacancy. Jose Muelbert stressed out the importance of institutional support of the co-chair (e.g. John Gunn from AIMS).

Profile (requirements) for the position should consider: support from affiliated organization, the capacity to bring support (including funding) to GOOS, international experience, and diversity in terms of disciplinary scientific background (physics or BGC, as John Gunn already provides the biological component), geographic location (not from Australia), and gender (if possible). Eric Lindstrom will continue to be involved with the community through his commitment in the organization of the OceanObs’19 conference.

Albert informed that some SC members had reached their appointment time and new nominations were needed. Jose Muelbert informed he would be stepping down. Albert also informed on panel leadership and there will be the need to replace the vacancy left by Mark Bourassa in the physics panel. Sam Simmons raised the issue that both Biology chairs were appointed at the same time and maybe they should plan for different times to step down to maintain continuity.

Albert informed on office and budget issues, and the need of quantifying in kind contributions (e.g. including time of chairs, etc), website redevelopment, self travel support, meeting hosting support) that currently support the secretariat and the GOOS office. The GOOS office is working on replacing the position of Tom Gross who is retiring.

There were discussions about the constant pressure to raise funding for the secretariat (e.g. John Gunn especially for the Biology panel), and the potential of having the support from China (which cannot send funds overseas). Venkat mentioned the agreement between IOC and India, and that he would consult about the possibility of India providing support to GOOS activities.

Eric Lindstrom also stressed out the importance of the projects to channel some funding to support secretariat time. A large size community is more attractive to be funded than a small one, which backs up the idea of having projects.
Other ideas discussed on support included asking governments for more money to the IOC (making the case of what the money is used for, not just to “run GOOS”), to know how much we are spending now to have a precise idea of what is needed (produce an informative brochure), replicate a model based on “championship” that could be channeled through the community of users that can access funding sources, and asking for an increase in the contribution from the IOC. Andrea McCurdy explained that for TPOS 2020, there is ‘canned’ presentation that explains to potential funders:

- what the exact role is and how they will meet that role
- What the reporting needs are
- What the measure of success
- How it benefits the home institution

and provides confidence that the contribution will be a success.

**Action 39**: Propose a process to select a new co-chair for the SC  
**For**: John Gunn, Eric Lindstrom, Secretariat  
**By**: end 2016

**Action 40**: Develop a profile of expertise, geography, and time served on the Steering Committee to identify gaps, develop a call for new SC members to the broad community, propose new SC members, and seek approval of GOOS sponsors  
**For**: Secretariat, in consultation with SC  
**By**: early 2017

**Action 41**: To report a GOOS Programme budget that fully includes in kind contributions to the secretariat, to travel support to panels, and to the projects  
**For**: Secretariat  
**By**: report to SC-6

**Action 42**: Develop additional prospectae for funding for GOOS projects or secretariat support  
**For**: Secretariat, in consultation with co-chairs  
**By**: ongoing
Annex 1: Agenda

Annex 2: Participants list