

GOOS PUBLICATION



The Global Ocean
Observing System

Fifteenth Observations Coordination Group meeting (OCG-15)

Final Report

13-17 May 2024
Victoria, Canada (hybrid meeting)
[Meeting website](#)



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Executive Summary

The Fifteenth Observations Coordination Group meeting (OCG-15) was a strategically important session. It set the course for the global ocean observing networks and OceanOPS, with regard to working together towards an integrated, mature and fit for purpose ocean observing system that is understood as critical infrastructure.

The OCG discussed developing and communicating clearly observing network status and operational health, evolving and supporting the OceanOPS center in light of a growing number of OCG networks, working across GOOS towards identifying priorities for ocean observing investment, and working toward an integrated data/metadata infrastructure, as well as considering the current opportunities and challenges across the ocean observing networks, and the entrance of 'new' emerging networks into the GOOS. A summary of the key topics is below. The OCG extends our thanks to Ocean Networks Canada for hosting the meeting, and contributing towards key topics.



The GOOS OCG observing network [attributes](#), which define the key qualifications expected of OCG approved ocean observing networks have been an important aspirational benchmark or roadmap for the 'emerging' networks and helped other networks towards maturity. The [Ocean Observing System Report Card](#) regularly notes networks achievement against key attributes in data and best practices. OCG-15 decided to strengthen this framework by agreeing to work on defining pilot and mature network status, in line with the attributes and concepts outlined in the [FOO](#). Additionally, OCG decided to work on the development of an observing network health index, to provide a snapshot of the 'health' of each network.

The Fishing vessel Observing Network (FVON), SmartCables and Surface Ocean CO2 Reference Network (SOCONET) were all adopted as 'emerging' networks at OCG-15. This advances global ocean observing capacity as each of these emerging networks will deliver unique observing benefits within an integrated system. This designation means they commit to working with OCG and the other observing networks towards achieving a mature and integrated observing system. It is interesting to note that all 3 also use existing ocean

infrastructure - fishing vessels, submarine telecommunications cables and existing observing platforms - and so additionally represent efficient use of existing marine assets.

OceanOPS provided an update on its restructuring (necessary in part due to changing financial situation) and intentions to better position itself to better support the networks, OCG, GOOS and WMO, into the future - which is increasingly digital and federated. OCG made a key decision towards an improved management practice whereby OceanOPS will work with the ocean observing networks towards defining tiers of OceanOPS services, provided to the networks, and implementing service level agreements. These actions will support funding requests of the future.

The OCG also considered observing priorities from the GOOS Expert Panels. A clear priority noted by the Biogeochemistry Panel is to consider the viability of expanding oxygen observations across existing networks; near-term actions were discussed. The BioEco Panel prioritized working with specific existing networks in expanding their scope, e.g. Bio GO-SHIP, AniBOS (animal tracking) and FVON (as they develop into a full OCG network).

The [OCG cross-network Data Implementation Strategy](#) released earlier in 2024, catalyzed OCG-15 discussion on the networks individually and how to develop and leverage their implementation pathways. In addition, the launch of WMO's WIS2.0 system (replacing the GTS in 2027) is underway and a specific session focused on understanding the data and metadata connections between OceanOPS, networks and the the future WIS2.0 system which could help the OCG advance the cross network data implementation strategy and improve overall GOOS digital ecosystem planning.

Engagement with the [GOOS-MTS Ocean Enterprise Initiative](#), the evolution of the Dialogues with Industry was welcomed, and there will be further interaction between the networks, GOOS Panels, industry and government with this initiative.

The OCG will undergo a change in leadership as the current OCG Chair, David Legler, indicated his intention to step down. The IOC and WMO will put out a call for his replacement in 2024. David, from NOAA, has made a huge contribution to the OCG, to GOOS and many projects and people across his 10 years of OCG leadership. The OCG Leadership team will also lose Juliet Hermes of SAEON, who has served as Vice Chair of Standards and Best Practices and been the GOOS interface to the Ocean Best Practice System and had a major impact on developing best practices across the networks in her 7 years of work with OCG. Finally, the Team will also be replacing Zulfika Begg, who has been a voice for less oceanographically developed nations at the OCG, and Ting Yu, our support seconded from China Ministry of natural Resources. So the OCG will have an opportunity to bring in refreshed leadership and members in the coming year. GOOS offers a big thank you to all these great individuals for their contributions.

Below is a summary of the key decisions from OCG-15, the full report can be accessed [here](#).

No.	Summary	Priority
2	Create a new OCG Data Task Team, that will report on progress at OCG-16 (tasks discussed in the OCG-15 full report).	High
16	FVON, SmartCables and SOCONET join the OCG and are endorsed as 'emerging' GOOS ocean observing networks.	High
17	OCG commended the USV group in its progress and advances towards being an emerging observing network. OCG noted that the USV community can offer a unique contribution to ocean observing and encouraged the group to progress towards becoming an emerging network and present progress at OCG-16 in 2025.	High-Med
18	OCG Metrics Task Team is extended to continue their work, with guidance to develop definitions of pilot and mature, with reference to the FOO but based on the OCG Attributes, and to lead development of a draft network 'health index' and present it to OCG in 2024/5.	High
24	OCG to create an OCG OceanOPS Task Team to develop OceanOPS services concepts, network Service Level Agreements, and to help set priorities for OceanOPS. The Task Team is to report regularly on progress at OCG Roundtables in 2024/2025.	High
30	OCG Exec to develop and publish an authoritative list of GOOS OCG ocean observing networks, with a very brief explanation of the list.	High

Report

Note that this is an interactive document with links to presentations, and background and working documents. Click the blue underlined hyperlinks to reach those resources. The Report covers the discussions and follows the OCG-15 Meeting Agenda ([here](#)), the actions arising from these discussions are noted in the text and compiled in the Actions Table. The meeting was held daily (13th of June - 17th of June, 2023) in Victoria, Canada and hosted by OceanNetworks Canada with a virtual option for participation. Each substantive agenda item below captures a short summary, the main points of discussion and action items of each session. The opening session included orientation to the zoom tool and tips on meeting etiquette in the online format.

Please refer to the action table ([Action Summary](#)) for the compiled list and additional information on the actions, including teams, identified priorities, and responsibilities.

DAY 1 - Tuesday 14 May 2024

1. Welcoming

Kate Moran (President) & Daniela Loock (Director, Corporate Services) gave a welcome and introduction to Ocean Networks Canada. Beyond a general introduction to their work, the following areas were introduced and linked to the work of OCG: Ocean science and data management, Data strategy, network readiness, and engagement, Ocean management and sustainability and Data accessibility, network optimization, and capacity development for sustainability management. It was emphasized that a coordinated approach to manage infrastructure and connect producers and consumers in the value chain is critical for success, the need for engaging further in the needs and goals and the importance of implementing strategies and technologies to advance the field.

2. Opening

David Legler, OCG Chairperson, welcomed the participants, reviewed the progress of intersessional work and highlighted the key achievements over the past year. David provided updates on key OCG activities and set the goals for enhanced engagement with the Networks and focusing tasks on network needs and priorities and highlighted topics/opportunities in which OCG should take action over the coming 2-3 years. ([Presentation link](#)).

3. GOOS Updates

Updates from the GOOS office on recent activities and developments, including an overview of the WMO rolling review of requirements (RRR) process, the establishment of Decade Coordination Office (DCO), Intergovernmental Oceanographic Commission (IOC) survey to capture examples of issues related to undertaking observations in states exclusive economic zones (EEZs) by networks and by IOC member states ([Presentation link](#)).

Resulting decision

1. *Networks/OCG Exec to read the Ocean Decade Challenge 7 white paper on expanding the global ocean observing system when finalized, networks will be notified, and consider reflections on recommendations that are critical and useful for OCG, GOOS. For Roundtable discussion later in the year*

4. **WIS2.0 workshop**

The Global Telecommunication System (GTS) is maintaining a continuous real-time exchange of essential data by providing observations to the Global Data Processing and Forecasting System Centres and disseminating processed information to National Meteorological and Hydrological Services (NMHSs). The WMO Information System (WIS) was implemented to enhance the GTS by providing discovery and data pull capabilities. The WIS and GTS limitations are well recognized and WIS 2.0 has been designed to overcome them. This workshop showcased and provided an in-depth overview of the WIS 2.0 system including 3 presentations on [WIS2.0 Overview](#), [WIS 2.0 Implementation](#) and [WIS 2.0 Drifter Pilot](#).

Other materials:

- WIS2 implementation / [WIS2 in a box](#) (All about the toolbox, functionalities, requirements to use, etc.)
- [WIS2 Background Paper](#)

Resulting decision

2. *Create a new OCG Data Task Team, that will report on progress at OCG-16.*
 - a. *Ensure that OCG works towards WIS2.0 architecture implementation, in line with the Data Implementation Strategy*
 - b. *Provide advice to networks on how to approach implementation and support WIS2.0, to plan transition from GTS to WIS2.0, etc.*
 - c. *Identify and map the metadata required for WIS (basic/extended), WIGOS, IODE ODIS and flow of metadata through OceanOPS and these routes*
 - d. *Consider appropriate locations for EDDAP connections*
3. *OCG Exec to inquire about WMO scheduling WIS2.0 Training session for the ocean community and OCG network experts*

5. **Data strategy and its implementation**

Kevin O'Brien revisited the [OCG Data Implementation Strategy](#) and discussed its implementation across the OCG networks. The connections and developments at IODE, UN

Ocean Decade Data Strategy, Open Access GTS update, WIS 2.0 were highlighted and next steps were identified for OCG implementation in the coming year.

Since the release of the Implementation Strategy progress across the networks - GO-SHIP, GLOSS, AniBOS, DBCP, SOT, OceanSITES, FVON, SMART cables, SOCONET have been achieved, Networks are moving towards more open and accessible data and utilizing OCG federated OCG / ERDDAP nodes, reducing the line of code needed to pull and explore the data ([Presentation link](#)).

Resulting decision

Addition to Decision 2: OCG Vice Chair Data Management to create a summary of actions for the new OCG Data Task Team based on the discussions across WIS2.0, metadata and metadata flow, M2M harvesting and metadata management.

6. Capacity Development

Capacity development activities were shared highlighting recent activities and plans for 2024. Addressed working towards increasing the ability of states with less developed observing capabilities to both take and use the needed observations. Report outs and recommendations from pre-OCG-15 Workshops were shared as well including: [Questionnaire for DBCP Capacity Building Feedback and Needs](#) , and news on [DBCP Training Workshop on Ocean Observations for Weather Forecast and Climate Prediction](#) (6-8 Aug 2024) ([Presentation link](#)).

Resulting decisions

4. *Encourage networks to invite local GOOS National Focal Points to their meetings*
5. *OCG Exec to ask GRAs (for example GOOS Africa, IOCARIBE-GOOS, PI-GOOS, and IMOS) about interest in having OCG contributing towards their CD activities, for them to ask their communities about OCG networks training or exchange that they would like to receive.*
6. *OCG Exec to reach out to Brian Arbic about potential for OCG to contribute expertise towards CD activities in regions where OCG has not had such activities recently (e.g. Africa, Caribbean, Pacific Islands, etc.)*

DAY 2 - Tuesday 14 May 2024

8. Best Practices at Ocean Networks Canada Workshop

Ocean Networks Canada (ONC) operates world-leading observatories in the deep ocean, in coastal waters, and on land to observe the Pacific, Atlantic, Arctic and Southern ocean.

ONC collects ocean data that accelerate scientific discovery and make possible services and solutions that support life on our planet. ONC is a part of Canada's national Integrated Ocean Observing System (CIOOS), a GOOS Regional Alliance. ONC hosted a best practices workshop focused on three topics, Indigenous Ocean Observing, CIOOS (Canadian Integrated Ocean Observing System) and Ocean-based Climate Change Mitigation Solutions. The key takeaways are noted below.

Indigenous Ocean Observing

The workshop provided an overview of ocean monitoring and training programs at ONC conducted in partnership with Indigenous communities, and shared experiences and practices for building meaningful and sustainable partnerships. This included the topic of Indigenous data sovereignty in metadata, and the integration of FAIR and CARE principles into data standards. Key takeaways:

- Engage early and frequently to build meaningful relationships over time.
- Importance of secure funding, dedicated staff and organizational commitment.
- Focus on community priorities, co-designing programs, sharing resources equitably, and building on a foundation of respect for Indigenous knowledge systems.
- Finding ways to express Indigenous rights in data is important for community-driven partnerships.
- Empowering Indigenous data sovereignty and governance through metadata, licensing and policy.

CIOOS (Canadian Integrated Ocean Observing System)

This session focused on CIOOS, a GOOS Regional Alliance (GRA) established in 2019 to improve accessibility of ocean data and to coordinate Canada's ocean observing community efforts. Key takeaways:

- Critical real time and information services are expanding.
- Coordination with GOOS and engagement with the UN Ocean Decade will continue.
- Important to consider how the data framework can be compatible with the OCG's strategy.
- Filling data gaps (such as in the Arctic) is a continued priority.
- Consideration and discussion of the role that the Alliances play in the global GOOS landscape.
- Discussion of needs and opportunities to support new data types with the expanding interest in biogeochemical measurements.

Ocean-based Climate Change Mitigation Solutions: monitoring, reporting and verification

The final of the 3 sessions was centered on ocean-based carbon dioxide removal (CDR) technologies, and the path to using ONC's existing observatories for testing and monitoring

various approaches such as blue carbon, ocean alkalinity enhancement, and geological carbon sequestration in oceanic crust. Discussions focused on the questions of reliable and standardized monitoring. Key takeaways:

- The need for developing standards for the environmental baselines against which ocean carbon efforts are evaluated.
- Finding priorities for new sensor technologies, especially considering challenges around biogeochemical measurements.
- Expanded carbon and biological EOVs can help standardize monitoring efforts.
- Monitoring small-scale trials and experiments is a critical step before large scale deployments of CDR technologies.

9. BioEco, IOCCP, OOPC and GRAs

This session looked at the current priorities of the GOOS Expert Panels, where to better coordinate the work of the OCG with the work of the Panels, and parallels and differences between the OCG networks and the BioEco networks, and the priorities for observations that the Panels have identified and how we can address them.

The BioEco Panel ([Presentation link](#)): presented progress with data management, the BioEco Portal, and constructive discussions with OCG, OceanOPS, OBIS, ODIS. There were discussions with observing networks such as GO-SHIP (plankton, omics), AniBOS (tracks, connection with Megamove, ATN, Argo/Gliders (passive acoustics, UVP sensors). An expert is needed to engage with such partners routinely, exchange information and exploit low hanging fruits. AniBOS will follow up on specific actions discussed at OCG-15. It was noted that a logical next step of cooperation with OceanOPS needs some strategic thinking before initiation of technical work, given resource constraints.

The Biogeochemistry (BGC) Panel has highlighted two major priorities ([Presentation link](#)): oxygen and carbon.

- A clear recommendation was made that the relevant OCG networks concentrate on expanding and/or ensuring oxygen observations reach the federated end points. There was a suggestion for Argo to consider reaching 80% of floats with an oxygen sensor as a BGC Panel priority, considered by the Panel as technically feasible and a useful BGC win. Other networks including OceanGliders, OceanSITES, FVON and AniBOS all noted the need. AniBOS is increasingly attaching oxygen sensors on seals and will continue. OceanSITES confirmed the importance of intercalibration.
- The BGC Panel will be developing a cross-GOOS Carbon Plan and developing SOCONET (Surface Ocean Carbon Network) in consultation with OCG and the mature networks to fully explore possibilities, feasibility, costs, and practical issues such as intercalibration.

OOPC ([Presentation link](#)): presented its main activities in 2024-28 focusing on 5 task teams, EOVC/ECV requirements and GCOS status and implementation plan.

- OOPC described the GCOS accreditation process and certificate for networks, associated networks and recognized networks.
- OOPC highlighted several regional efforts including a 09 -13 September 2024 workshop on Co-Design for monitoring and services around the Agulhas Current, connections in Pacific (TPOS, OASIS), and expansion through the Pan Tropics observing system concept.

Resulting decisions

- 7. OCG to track outcomes of the connections between BioEco Panel and existing networks which were considered worth exploring, to support the development of BioEco observing across existing network structures and leverage learning into a systematic approach:
 - a. AniBOS (animal tracking data) - a plan on how to move forward with AniBOS existing data system as a pilot to the larger community was outlined between AniBOS and BioEco Panel*
 - b. BioGO-SHIP - plankton, omics*
 - c. OceanGliders - passive acoustics, GRAs, others, more complex maybe return to this later, but potential to work together to support/solve issues*
 - d. BGC Argo - new tests for imaging*
 - e. FVON - return to later with regard to sensors, catch data unlikely to be possible*
 - f. USV - return to later, as the network develops**
- 8. Relevant OCG networks to consider expanding and/or ensuring oxygen observations reach the harvestable end points, following the recommendations of the BGC Panel. In particular the oxygen requirements will be brought to Argo, OceanSITES, and other Steering Teams, with a report back to OCG on discussions at a roundtable in 2024/5*
- 9. BGC Panel will engage all OCG and networks to discuss implementation elements of the GOOS Carbon Plan*
- 10. OCG Exec to engage with OOPC to discuss priorities from the elements presented*
- 11. OCG to use the proposed cross-GOOS data meeting to create an overarching digital flow/infrastructure plan based around existing plans and components, and report back to OCG.*

10. WMO Session

This session looked at the WMO priority activities following the WMO Strategy 2024-2027, which are relevant to the OCG. This included GBON, Tiered Networks, RRR, and G3W. Discussions were based around where networks can benefit from certain activities (i.e. RRR, SOFF), expectations from the networks (i.e. GBON) and how the networks can contribute (i.e. G3W) to the priority activities ([Presentation link](#)).

Resulting decisions

12. WMO to continue ongoing consultations and input with OCG for GBON, RRR, G3W etc.

DAY 3 - Thursday 16 May 2024

11. Network issues and opportunities

This session focused on networks addressing requests for assistance with issues or opportunities related to networks plans for implementation, instrumentation, data management, testing, new sensors, coverage, capacity development, etc. An overview presentation provided feedback on network input on this topic. Much of the conversation centered around data, quality control, standard operating procedures ([Presentation link](#)).

Some specific points raised were:

- The QC Flags that Argo places in the metadata are ignored by some modeling centers, Argo has been working on highlighting the issue, however this could be amplified.
- A GOOS Webinar to highlight HF Radar and also FVON would be useful, they have not had a focus on their network.
- WMO (new) Data Policy. Members have a commitment (“shall”) to share the data, perhaps some parts of the observing and data infrastructure are just not aware of this commitment
- What is the best functional connection between GRAs and observing networks and between NFP and observing networks? A strategic discussion between GOOS, NFP, and regions would be useful
- Can GOOS OCG raise some of the critical issues that networks face at a higher level - to gain attention and action. How do we define critical and how do we raise?

Proposed decisions

13. WMO to discuss GTS data and GDAC connection directly with SOT and others that are interested [DBCP, OCG Vice Chair Data and OceanOPS] to develop a plan or recommendation for action [Real-time vs delayed mode data]
14. OCG Exec, through exchange with networks, to identify the key products (and services) that network data are contributing to for network stories
15. OCG Exec to advance development of a framework for an observational network risk assessment, based on existing risk frameworks, to enable OCG to assess the relative risk of problems reported by networks. The aim is to have a means of producing a short list of problems that can be raised in appropriate GOOS fora

12. Emerging Networks

This session covered brief updates from the emerging networks that have requested OCG membership - Fishing Vessel Observing Network (FVON) ([Presentation link](#)), SmartCables ([Presentation link](#)) and the Surface Ocean CO2 Reference Network (SOCONET) ([Presentation link](#)) and Uncrewed Surface Vehicles (USV) ([Presentation link](#)).

FVON, SmartCables and SOCONET were adopted as ‘emerging’ GOOS ocean observing networks at OCG-15. This advances global ocean observing capacity as each of these emerging networks will deliver unique observing benefits within an integrated system, and that they commit to working with OCG and the other observing networks towards FAIR data flow, best practices, and achieving a mature and integrated observing system. It is interesting to note that all 3 also focus on using existing ocean infrastructure - fishing vessels, submarine telecommunications cables and existing observing platforms - and so additionally are making efficient use of existing marine assets. The still developing USV network was invited to continue to interact with OCG, to further mature along the lines covered in the discussion, and encouraged to return at OCG-16, where the OCG could overview progress and re-visit the question of endorsement as an ‘emerging’ network.

- FVON: delivery of real time data was discussed, that would be possible for physical parameters, but would not be possible for catch data. Vessel names are also likely not part of the real-time data transmission. However this is generally handled through unique identifiers.
- SMART Cables: noted that data should be flowing in 2026/2027 - but some sample data may be available soon for testing
- SOCONET: as an EOVS-based network it has the power to leverage existing platforms that are measuring carbon. One of their early goals is to make the carbon data from OceanSITES more visible, for example.
- USV network has built a strong community of multidisciplinary scientists with a mission to fill observing system gaps with autonomous observations. Many commercial companies are a part of the networks, and the governance structure is not yet clearly defined. It is clear that USVs community have developed plans in some areas of the [OCG Network Attributes](#), however some areas were identified that need more work or clarification.

Proposed decisions

16. FVON, SmartCables and SOCONET join the OCG and are endorsed as ‘emerging’ GOOS ocean observing networks. OCG looks forward to seeing the governance of SOCONET and FVON networks initiated in the coming months.
17. OCG commended the USV group in its progress and advances towards being an

emerging observing network. The OCG considered that the USV community has the capacity to offer a unique contribution to ocean observing and encouraged this community to continue to work towards becoming an emerging network, and to continue to engage with OCG and to present on progress in 2025 at OCG-16.

- a. The OCG Exec will provide specific feedback via a letter based on the comments raised at OCG-15 as guidance.*
- b. The OCG recommends exchange with other networks and the OCG Exec to aid development.*
- c. USV are asked to return to OCG-16, addressing the comments made during OCG-15, to be re-considered as an OCG emerging ocean observing network.*

13. Metrics Task Team

The Task Team on Metrics was established upon the action of OCG-14 and reported on progress in the intersessional period. The Task Team took the network attributes as the base from which to develop metrics for maturity of the OCG networks, it has met 6 -8 times and discussed several of the attributes with regard to potential metrics. The task team has discussed a range of issues and seeks guidance from the OCG on key issues, before continuing with its work ([Presentation link](#)).

The issues, ideas and schema presented were discussed. Two clear threads emerged:

- This cannot be made too complex, and the FOO now looks a) out of date for networks and b) too linear, not all the elements can be achieved in the TRL level order and/or a network might take steps forward and back, c) there are too many levels to track effectively. The suggestion was to focus on the defined observing network attributes, they have functioned well thus far, and define what we mean by mature and emerging, what would be the thresholds for each category.
- caution was urged with regard to KPIs associated with maturity levels, as what we want to know is if the network is in a healthy state, a network might be healthy but emerging, and face critical issues even if it is mature. Therefore rather than KPIs a 'health index' approach was suggested.

This dual focus would enable OCG to make assessments of both the operational maturity of the networks and their relative 'health'.

Proposed action/decision

18. OCG Metrics Task Team is extended to continue their work, with the following guidance:

- a. To develop definitions of pilot and mature, with reference to the FOO but

based on the OCG Network Attributes, for agreement with the networks at an upcoming OCG Roundtable

- b. With input from the OCG Exec to lead development of a draft network 'health index' and present it to OCG Roundtable in 2024/5. The aim of this 'health index' would be to describe the 'health' of a network and is primarily to help the OCG and the network to see trends in 'network health' in order to take action or request targeted support (eg. it might be mature, but be declining in some areas such as coverage).

14. OceanOPS restructuring

This session covered a brief update on the OceanOPS Restructuring process, the reasoning, background and decision. It briefly covered the impacts to the networks. A brief presentation and discussion was conducted on structure/proposal for Service Level Agreements with OceanOPS ([Presentation link](#)).

During the discussion the OC discussed the long-term sustainability of OceanOPS, its services and the need for clear messaging around the value of OceanOPS and the GOOS integrated capacity, which OceanOPS supports.

Concerns were expressed about the funding contribution of IOC and WMO, such that not all the responsibility for funding OceanOPS should be on the ocean observing networks. In that respect it was highlighted that WMO and IOC have contributed more funds to support OceanOPS in 2023 and 2024, and this is not expected to decline. However, there has been a slow decline in the funding from networks.

The need for a dual approach to resourcing OceanOPS was noted, in seeking additional funding and also seeking in-kind support, and how we prepare OceanOPS structure for in-kind support, what form could this take and how would it be managed.

The potential structure for Service Level Agreements was outlined, with input from the observing networks sought. The structure proposed was seen as complex and an example from the MetOffice was suggested as an alternative. This would be to focus on 'core' (cross-network services) and 'direct' (specific and individual services for networks). This approach was adopted and the networks will be surveyed to provide input on which services they consider core and/or direct, and which services they value.

An OceanOPS Task Team will be set up to continue the work after OCG-15 across the networks in defining the structure for OceanOPS core and direct services, Service Level Agreements, and developing messaging to express OceanOPS value for fundraising.

Materials:

- [OceanOPS restructuring](#) / [OceanOPS service level agreement draft V1](#)

Resulting decisions

19. *OceanOPS to develop the concept of service levels into 1) core and 2) additional/or direct services, to form the base to develop the SLAs:*
 - a. *Core services are common baseline services between all networks that use OceanOPS and are to be agreed with the networks collectively.*
 - b. *Direct/or additional services are also to be agreed with each network specifically.*
 - c. *Extra roundtables are envisioned to discuss and agree the service levels.*
20. *OceanOPS Fundraising:*
 - a. *OCG Exec/OceanOPS management team to develop messaging on OceanOPS value proposition, and core services, to aid networks with finding support - based on the work above*
 - b. *OCG Exec to support networks in trying to develop collective in-country action and support, to be determined how or what would be effective*
 - c. *OCG and the networks ask IOC and WMO to define how they will support fundraising effort*
 - d. *OCG Exec / OceanOPS management team to give some guidance on what is expected from the networks in regard to fundraising activities*

15. Observing Implementation - Requirements implementation workshop + Co-Design

This session aimed to look at the current requirements processes (EOV, WMO Application Areas under the WMO Rolling Review of Requirements/RRR, GCOS etc.) that are existing and how these are connected to the networks. There is a need to define processes to distill the needs into a global ocean observing system design. During the conversation, participants discussed the need to reassess the requirements and implementation processes for ocean observing systems. The importance of defining problems and prioritizing requirements were stressed, and the need to assess feasibility. Other comments emphasized the importance of an integrative approach to achieve efficient outcomes, and the need to understand value, not just requirements. ([Presentation link](#)).

The discussions covered the following points:

- Highlighting that GOOS OCG and the ocean observing networks work to advance the global ocean observing system all the time, what we are seeking is to advance or adapt the system to better fulfill demands for information for societally relevant issues and priorities. In general terms the idea for a framework or process is supported, for example, we no longer observe Sea Level rise, but how to adequately cover flooding risk and prediction. for example global risk indices can help us refine our view of what is important

- Noting that a plan that tries to do everything is not a plan and a process to achieve everything is just not realistic, so how do we set priorities? For example 'climate' is not a plan, it is again everything
- GOOS EOVs and specification sheets currently not sufficient to advance system design
- the ocean information value chain is really effective, the real value is how to work through the FOO process. Observations are only one point in the value chain, and if elements in the value chain are missing the observations will not reach the desired value/impact
- In engineering this sounds like an optimization problem, you need to start with deciding weights and go through a process about what we think are the fundamental problems we need to solve with more observations, and set weights for the optimization. Weights could also be seen as expressions of value.
- For OCG and GOOS, the benefits of defining such a process would be to work in an integrated fashion - funders and implementers looking for the same outcomes. It also shows the power of an integrated system if approaching from priority needs e.g. need key platforms working together. However, need input from GOOS Panels and high level forum to help set the priorities
- Initiatives that could be used:
 - GOOS Panels are looking at a Carbon and a Biodiversity Plans (work across 2024-2027), aspects of these efforts converge with this discussion
 - OCG could look at each of the networks and see what the priority areas for advancement are as a map - what are our common intentions? Can this be organized into patterns? What is the GRA map of priorities? Could be a helpful way to get us started, as these are funded and networks/gras are connected to a multitude of stakeholders.

Resulting action

- 21. OCG Exec to take the session discussions and highlight/discuss with GOOS Panels (initially) and then across GOOS, the discussion on how we might approach this area of providing guidance/identifying priorities for system optimisation for achieving societal needs*
- a. Using the GOOS delivery areas as an overall frame, but probably more specific*
 - b. Ask Panels (and networks?) what application areas they are prioritizing and potentially use this list as a starting point for integrated planning*
 - c. Consider the 'oxygen' call from the BGC Panel at this meeting as an example of an articulated need, that is mature for action and where tangible impact could likely be achieved*

DAY 4 - Thursday 16 May 2024

16. Best Practice

This session delivered a status update on recent developments on and activities of OBPS, assessment of OBPS purpose for networks, and elevate importance of OBPS to the ocean observing community and beyond. The importance of best practices in marine science observations and data management was discussed and the need for reproducible and interoperable data. The challenges in coordinating efforts to standardize and adopt best practices across different stages of the operating cycle was highlighted and the need for a centralized repository and technology to move forward best practices was also stressed. Speakers agreed on the importance of creating visibility and need for best practices, and suggested endorsing and certifying networks to establish a standardized process ([Presentation link](#)).

Resulting decisions

22. OCG to suggest BGC and BioEco Panel to consider volunteering representatives to take on BP liaison roles within their communities.
23. OCG Exec to develop a job specification for a new Vice Chair of Standards and Best Practices and to disseminate through the GOOS Community. Networks to disseminate the upcoming BP posting for a best practices coordinator, to consider volunteering representatives to take on that role.

17. OceanOPS Work Plan

Priorities and budget allocation were discussed. The need for diversification and incremental funding increases and the importance of prioritization and suggested a task team to work on SLAs. The group discussed the importance of planning for the future and allocating resources strategically, while addressing concerns about the sustainability of the network's current funding model. There is a need for a new dynamic in the relationship with the host country and a potential web-based, decentralized development workflow to facilitate easier collaboration and faster development ([Presentation link](#)).

Resulting decisions

24. OCG to create an OceanOPS Task Team to develop OceanOPS services concepts, and Service Level Agreements, and discuss and help set OCG priorities for OceanOPS. See OCG-15 Decisions 19 and 20, which form part of the work.

18. Public / Private partnerships

Emma Heslop provided an overview of the Dialogues with Industry Roadmap and the final output from the series of Dialogues with Industry. The work of implementing the Roadmap will be taken forward under a new name - the [Ocean Enterprise Initiative](#), with the Dialogues still part of the tools that will be used to develop topic oriented collaboration. The importance of ocean observation and collaboration between the public and private sectors was discussed and the need for industry engagement and standards development emphasized. Greater visibility and engagement with the industry sector is needed and targeted discussions key to standardization and collaboration in the sensor industry. The Ocean Enterprise Initiative remains a joint collaborative project between GOOS, Marine Technology Society, and NOAA, with MTS receiving approx. 4 M \$ to support the work. The next steps include, outlining the work plan, creating an Advisory Board, and developing new Dialogues targeted at specific areas, including Carbon, Biodiversity and HABs, and continuing to create opportunities for OCG and the networks to interact with this process ([Presentation link](#)).

Resulting decisions

25. OCG Exec to send out the website links and announcements for seeking members for the Ocean Enterprise Initiative new Advisory Board.
26. OCG recommended Ocean Enterprise Initiative consider how these initiatives (dialogues) will evolve from the sessions, there are many instances of failure after intervention, so may require monitoring and intervention or re-assessment. Additionally look into opportunities to get engaged in the met industry group to link them better to the ocean world
27. Networks will collaborate to define some topics that could be appropriate for dialogues or other Ocean Enterprise initiative work, Brad De Young will act as a focal point.
28. Emma Heslop (IOC) to follow up with Reyna Jenkins (World Data System) regarding a pilot/case study for industry sharing data that arose from a blue cluster, data center, tech developers discussion - aqua couture share data (global/local), access data, AI tools to develop services, data centers interested in supporting

19. Advancing OCG networks perspective

The motivation of this session was to consider the future of OCG networks and OCG. As links are forged with the BioEco Panel, what is the nature of BioEco vs platform based networks, does this impact how we look at interoperability. The conversation revolved around the importance of understanding and managing OCG networks' attributes, including responsibilities, consistency, and clarity. It was emphasized that there is a need for criteria to establish OCG networks and effective network management. The discussion addressed

the distinctions between networks and communities, with a focus on clear definitions to avoid confusion in communication ([Presentation link](#)).

DBCP was requested to assess internally what are considered separate observing networks, in particular if Tropical Moored Buoys are to be recognised as a separate network, also understanding that this is shared infrastructure with OceanSITES. Currently DBCP recognise moored and drifting buoys and tsunami buoys, as distinct networks. Tropical Moored Buoys need to be assessed against the OCG attributes, start to report, and consider representation if this is the case.

Proposed decision

29. DBCP to discuss internally the network status and positioning of its sub-networks and report back to OCG Exec. SOT is also going to discuss surface carbon under SOT, GoSUD, and ASAP.
30. OCG Exec to develop and publish authoritative list of OCG networks and organization hierarchy along with a very brief explanation of the list
31. OCG to discuss how to better support coordinating observations in support of GOOS:
 - a. how to support increasing emerging networks
 - b. how to support networks that will not become emerging networks, for example regional networks. Can OCG principals/standards be useful in a regional network context, for example data/metadata, and attributes.
32. OCG Exec will discuss harmonization of network attributes with BioEco Panel and report back to the networks

20. OceanOPS 3 and OCG Leadership

OceanOPS has demonstrated value, crystallized an operational component of the GOOS observing system, and enabled efficient management of expensive ocean observing activities. This session started to identify some of the issues/questions about a future OceanOPS and steps necessary to appropriately support its future functions ([Presentation link](#)).

The OCG networks were asked to identify what are the most unique and valuable services that OceanOPS provides? The following bullets encapsulated the feedback provided, many networks noted concurrence with comments of others and added their own specifics:

For Argo

- Argo notification scheme is fundamental, a legal requirement related to commitments in the IOC resolution, and vital to network function/viability

- Collecting metadata, monitoring the health of the array, assessing gaps, age, and management of the array, are all important for cost efficiency and value for money to funders of Argo
- Critical for deployment planning to reduce duplication
- Statistics, mapping and reporting provided to funders and WMO/IOC, gives justification of investment, visibility of contributions/or not, satisfies reporting to IOC/WMO

For DBCP

- Integrated dashboard, provides platform status, and ability to visualize the network, and to know what to do (network management)
- Aggregation of metadata, this is a reduction of work for DBCP, and is a cost saving at each network level - efficiency for the 'system' overall

For SOT

- providing unique IDs is critical for function and fundamental to operation
- metadata
- Documentation and system memory, providing centralized place for documentation, historical knowledge, system memory. this saves reinventing the wheel, saves costs and brings efficiency
- Enabling countries to utilize the system and use existing platforms/processes to contribute data

For OceanGliders

- Visibility of the network through the dashboard, in contributing to a global program, this means investment for people deploying the gliders, as funders realize that they are part of global system, and confirms safety of investment

For AniBOS

- AniBOS is not as well engaged with OceanOPS as other networks, visualization and accessibility to real time observations is a big benefit and facilitates guidance of operations in the field that are reliant on other programs and activities. The benefit is visibility to other programs of the validity of the AniBOS work - validation of the network to others.

For FVON (new emerging network)

- Provide critical guidance and lessons learned, the benefit is in this strategic/practical advice, knowledge sharing.
- Knowledge and visibility of the data that is provided and accessible in different regions, the benefit is in validation of need for FVON observations, due to gaps

For GO-SHIP

- OceanOPS Technical Coordinators are the point person for adding additional data points to the network, the benefit is in being the focal point for the network and for organization
- Unique IDs are fundamental to operational service, and a big and necessary benefit
- The maps and visualizations are also useful
Reporting on status of the network from a centralized point, cruise tracking, etc, is vital for management

- Coordination of meetings and direct network organizational support is a benefit

For GLOSS

- GLOSS has no specific/direct services with OceanOPS, however OceanOPS has an important role in providing reporting, for example on network status and the centralized reporting of what 'GOOS' wants to know about the system.
- GLOSS is currently working on metadata which could lead to increased needs/benefits, knowing what GLOSS needs to report would be useful.

The OCG networks were also asked a follow-on question regarding OceanOPS Services. Are there services that you would like to see OceanOPS provide - networks and GOOS? Would you be willing to pay for them? The following bullets encapsulated the feedback provided:

- Info on data use and statistics
- Integrated EOV view of what is observed, Argo for example struggles to report on network contributions on EOVs. A tracking tool to enable this capability would be very valuable
- Information services, for example projections of characterisation such as Marine Heat Waves that impact many sectors. A suite of information services, which could be integrated with GRAs who might do this already and scale up from GRAs to global. OCG members thought that there are funds out there for this type of activity, starting with test cases (low hanging fruit), however others thought this was too far into the data product space and would need careful consideration. There was agreement that this is something nations might be willing to pay for, but understood that this would be a significant change and would be OceanOPS 2.0. The sentiment was expressed that GOOS needs some services as others do not do what is required, whether OceanOPS does it, GOOS needs it.
- Support to rebuild WIN software, need collaboration between countries and to help be a central point and to help broker this is important for SOT
- Improve coordination between network representatives and IOC/WMO, to help make connections from bottom up and top down, with connection from the IOC and WMO requirements, to help/aid the networks in understanding these requirements and to help connections
- Coordinate OONJ observations, might make it easier and ease regional collaboration in this space

Finally the networks expressed the need to improve our communication about OceanOPS - to enhance understanding of OceanOPS and its work (in order to support and help fundraising), both OceanOPS, IOC, WMO and the networks highlight what OceanOPS do with consistent messages. A notional timeline for the OceanOPS restructuring work was presented, as below.

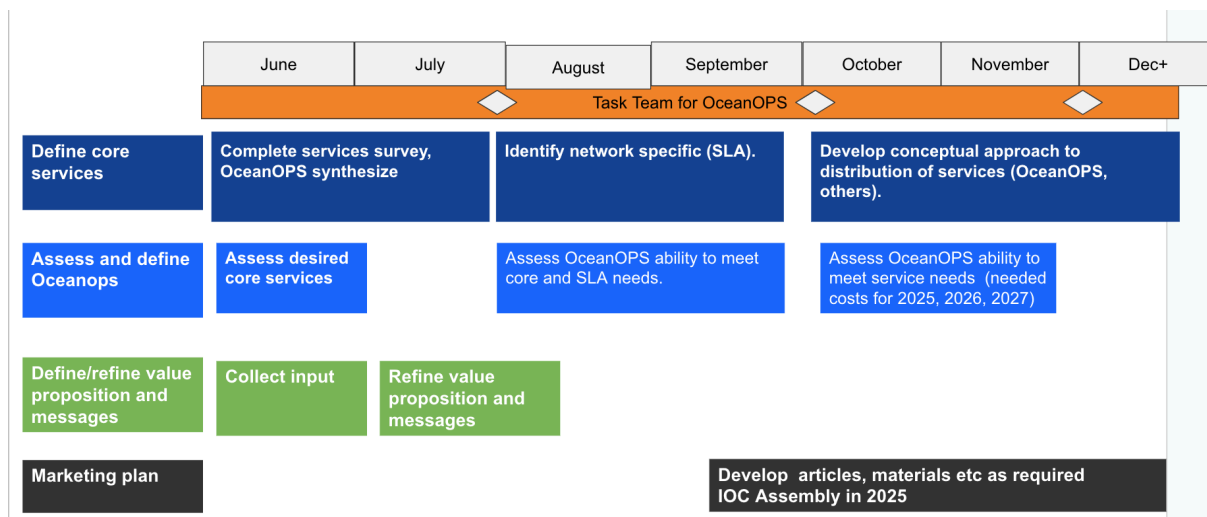


Figure 1: Notional timeline and elements for OceanOPS restructure.

Finally, changes in membership were considered. In the next intersessional a new Chair for the OCG will be sought, as David Leglar (NOAA) steps down after many years of committed service. The OCG, IOC and WMO thanked him for his leadership and significant contribution to the advancement of OCG and of GOOS. A new chair will be sought via circular letter to IOC and WMO Member States and Members and by notifying the GOOS community. The GOOS Steering Committee will appoint the next OCG Chair as per the OCG ToRs ([here](#)).

A new Vice-Chair for Standards and Best Practices will also be sought, as Juliet Hermes also steps away after many years of supporting the development of a consistent practice of best practice within each network, such that we now have 10 GOOS endorse Best Practices from across the networks, and knowledge that networks need to work on having their methods documented and agreed. Juliet has also been instrumental in supporting the development of the Ocean Best Practice System (OBPS). A new Vice Chair will be sought through a GOOS mailing to the o serving community.

In addition a new ECOP voice for developing ocean observing systems will be sought to replace Zulfika Begg, who is also stepping down this year.

Finally the OCG discussed creating a new Vice Chair - *Vice Chair for Early Career Ocean Professionals (ECOPs)* - the TORs for this role in the OCG Executive will be defined in the intersessional period.

Proposed decision

- 33. OCG to create a Vice Chair for Early Career Ocean Professional
- 34. OCG Exec to consider whether a Vice Chair for Emerging Networks could be a useful addition, after the other Vice Chairs are recruited/re-recruited.

Annex 1: List of participants

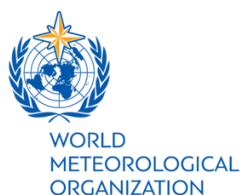
Name	Role	Affiliation
IN-PERSON		
David Legler	OCG-EXB	NOAA
Jon Turton	OCG-EXB	UK MetOffice
Kevin O'Brien	OCG-EXB	NOAA
Champika Gallage	OCG-EXB	WMO
Emma Heslop	OCG-EXB	IOC/UNESCO
Mathieu Belbeoch	OceanOPS / OCG-EXB	WMO
Ann Christine Zinkann	OCG-EXB	NOAA
Ting (Julia) Yu	IOCG-EXB	OC/UNESCO
Huai-min Zhang (John)	SOT	NOAA
Joel Cabrie	SOT / VOS	BOM
Breck Owens	Argo	WHOI
Howard Freeland	Argo	Uni. San Diego
Brad DeYoung	OceanGliders	OceanGliders
Clive McMahon	AniBOS	IMOS
Gary Mitchum	GLOSS	Uni. of South Florida
Lance Braasch	DBCP	Scripps
Bruce Howe	SMART Cables	Uni. of Hawaii
Ruth Gwynneth Patterson	USV OASIS	Elysium EPL
Cooper Van Vranken	FVON	FVON
Maciej Telszewski	GOOS BGC Panel	IOCCP
Adrienne Sutton	GOOS BGC Panel	NOAA
Gabrielle Canonico	GOOS BioEco Panel	NOAA
Tom Kralidis	WIS2.0	ECCC
Daniela Loock	Host	ONC
Ella Minicola	Host	ONC
Tricy Aquino	Host	ONC
Manman Wang	Workshop speaker	ONC
Maia Hoeberechts	Workshop speaker	ONC
Sean Tippet	Workshop speaker	ONC

Kohen Bauer	Attendee	ONC
Kate Moran	Host	ONC
William Wilcock	Smart Cables	ONC
Reyna Jenkins	Observer	World Data System
ONLINE		
Juliet Hermes	OCG-EXB	SAEON
Weidong Yu	GOOS Physics & Climate Panel	Sun Yat-Sen University
Belén Martín Míguez	GOOS Physics & Climate Panel	WMO
Veronique Garçon	GOOS BGC Panel	
Karen Evans	GOOS BioEco Panel	CSIRO
Appeltans, Ward	GOOS BioEco Panel	IOC/UNESCO
Lotta Fyrberg	IODE	SMHI
Paula Sierra	IODE	INVMAR
Leticia Barbero	GO-SHIP	NOAA
Long Jiang	OceanOPS	WMO
Martin Kramp	OceanOPS	WMO
Victor Turpin	OceanOPS	WMO
Emanuela Rusciano	OceanOPS	IOC/UNESCO
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Raquel Somavilla	OceanSITES	
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Leticia Barbero	GO-SHIP	
Rachel Jiang	DBCP	National Center of Ocean Standards and Metrology
Joel Cabrie	VOS	BOM
Darin Figurskey	SOT	NOAA
Tamaryn Morris	SOOPIP	SAEON
Hassan Haddough	Expert WIS 2.0	WMO
Albert Fischer	OCG-Exec	WMO
Patrick Gorringer	GOOS National Focal Point	SMHI
Ken Johnson		MBARI
Christopher Cusack	FVON	Environmental Defense Fund

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