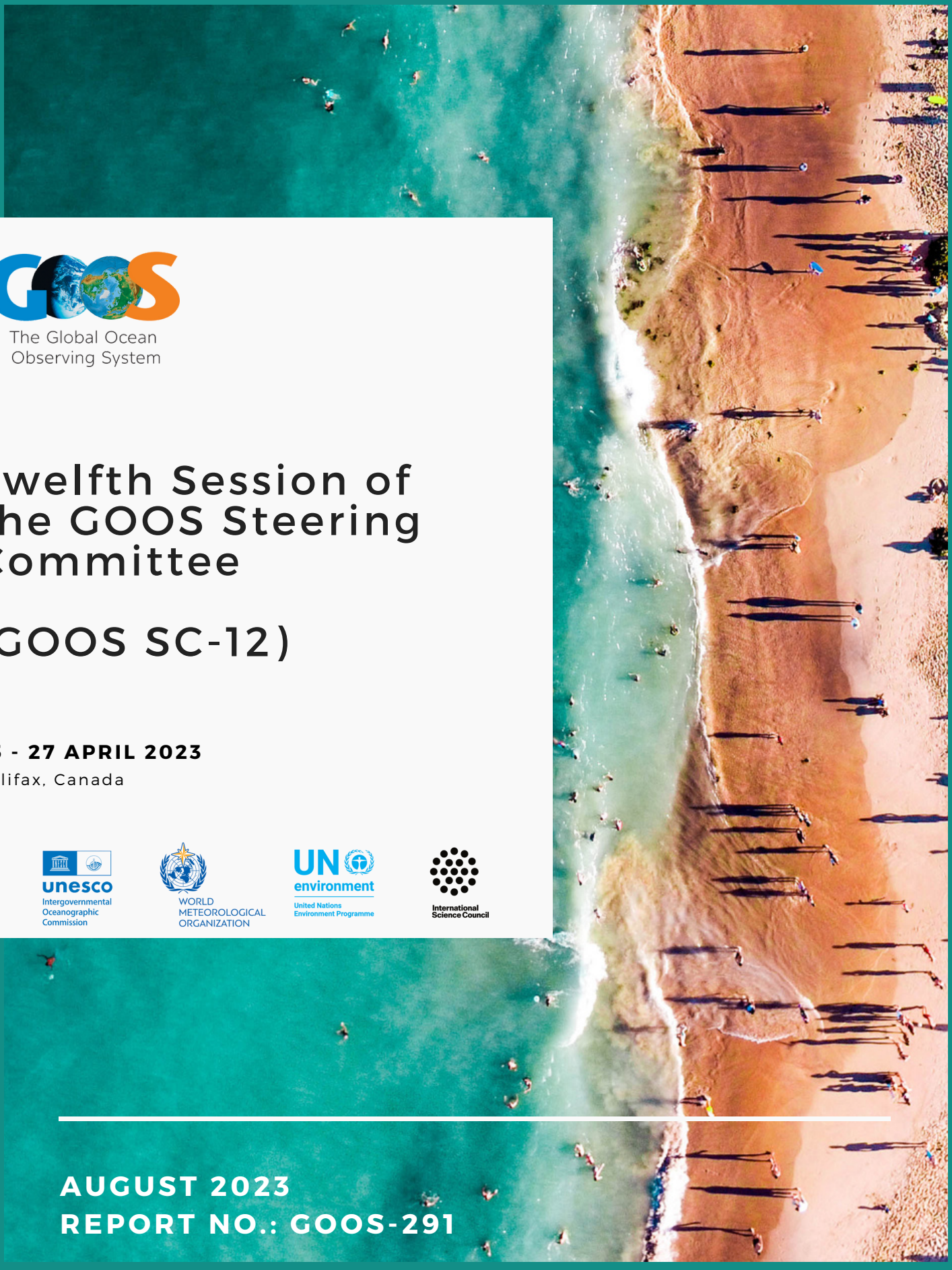
MEETING REPORT



The Global Ocean Observing System

Twelfth Session of the GOOS Steering Committee

(GOOS SC-12)

25 - 27 APRIL 2023

Halifax, Canada

unesco Intergovernmental Oceanographic Commission

WORLD METEOROLOGICAL ORGANIZATION

UN environment United Nations Environment Programme

International Science Council

AUGUST 2023

REPORT NO.: GOOS-291

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Executive Summary

The Twelfth GOOS Steering Committee (GOOS SC-12) took place from 24 – 27 April 2023, in Halifax, Canada, hosted by the Ocean Frontiers Institute at Dalhousie University. The meeting also included two important visits to marine technology incubation hubs, COVE (government funded incubator) and a PIER at Seaport (a port authority hub).

This was the first time the GOOS Steering Committee had met in person for 3 years, and was an important point for reflection and guidance from the Steering Committee on GOOS's progress towards its 2030 Strategy (GOOS-239) and within the UN Ocean Decade. For the first time the agenda was organised by GOOS's 11 Strategic Objectives, which proved highly successful and enabled the Steering Committee to provide advice across GOOS areas of action and assess achievements towards the 2030 Strategy.

The Global Ocean Observing System (GOOS) is delivered through coordinating the work of the GOOS components, regional and national systems towards achieving collective goals. The GOOS components are the three Expert Panels for physics and climate, biogeochemistry, and biology and ecology, ocean observing and forecasting coordination through the Observation Coordination Group, Regional Associations and the Expert Team on Operational Ocean Forecasting, and global ocean observing networks and systems, supported by the GOOS Office headquartered at IOC/UNESCO in Paris. The GOOS Office encompasses staff located in Paris, Geneva, Switzerland, Hobart Australia, Sopot, Poland, and Brest, France, through contributions from IOC/UNESCO, the US, WMO, the Scientific Committee on Oceanic Research (SCOR), France, Australia, China, Canada, Poland, European Commission, United Kingdom, Japan, Germany, Italy, India, New Zealand, South Africa, and Monaco. These components together coordinate the sustained ocean observing system made up of national contributions, and work to integrate, strengthen, advocate for, and develop a fit-for-purpose global ocean observing system. The GOOS Steering Committee oversees this function.

Considerable progress has been made across all 11 Strategic Objectives, highlights of which are noted in this report, however the Steering Committee advised that GOOS should focus on a more limited set of priority action areas, and adopt a more cost/benefit orientated approach to actions and partnerships. In essence, with guidance from the Steering Committee, to focus on getting the best return in achieving the 2030 Strategy from its limited resources.

The GOOS Steering Committee highlighted the following areas of high priority for action in the coming 2023-2024 intersessional period:

- Advocacy and communication: The Steering Committee welcomed the progress made in communicating the value of ocean observing and the role of GOOS in the last 18 months and emphasised the importance of this work. GOOS must continue to advocate for the need for sustained and coordinated observations, ensuring that ocean observing is visible at international fora.
- Regional Coordination: The GOOS Steering Committee highlighted this as a priority area, and welcomed the rejuvenation of PI-GOOS, the request by CIOOS (Canadian

Integrated Ocean Observing System) to become a GOOS Regional Alliance, and recent development of activities in IOCARIBE-GOOS and GOOS Africa.
- UN Ocean Decade: This continues to be viewed as an important opportunity for GOOS, and the work of the Ocean Observing Co-Design Programme was referenced as important across several of the GOOS Strategic Objectives.
- Evolving GOOS Governance: This was highlighted as a key action for 2023.
- Strengthening GOOS Core: GOOS has several points of weakness in its core support structures, identifying resources as a priority for these points of weakness, and more broadly increasing funding and/or other support for the GOOS Core is vital to achieving the 2030 Strategy and delivering effective global coordination.

Additionally identified by some Steering Committee members as a priority is the need for an integrated cross GOOS approach for data and metadata, and it was noted that data flow is at the core of implementing the value chain - from observations to users - that underpins the GOOS 2030 Strategy. The developing and deepening connections with the World Meteorological Organisation (WMO) were also welcomed, and working with the WMO Rolling Review of Requirements was highlighted as important.

The updated GOOS National Focal Point Terms of Reference, the proposal for the Integrated Marine Debris Observing System (IMDOS) to be GOOS Project, the Canadian Integrated Ocean Observing System (CIOOS) to be a GOOS Regional Alliance were approved, and the proposal to develop of a new Arctic Task Team under GOOS was also supported, subject to revisions in its implementation plan.

The Steering Committee noted that at present critical components of GOOS are under threat, and GOOS needs support from IOC Member States and its other Sponsors to make the case at national and international levels for strengthening the GOOS support structure.

Critical right now are:

- Core support staff for the BioEco Expert Panel and the Biogeochemistry Expert Panel,
- Support for OceanOPS to aid integration across networks and the onboarding of new networks and data streams,
- Increased support for data issues across GOOS, and
- The GOOS Paris HQ needs help to execute and link across the core GOOS components, as well as pulling in national focal points more effectively and communicating outwards to sponsors and supporters.

The actions from the GOOS SC-12 will be incorporated into the GOOS Implementation Plan, and the 2023-2024 work guided by the GOOS Steering Committee priority areas for action.

Summary of progress across the 11 GOOS Strategic Objectives

The GOOS SC-12 focused on assessing the challenges, opportunities, and progress achieved in implementation across the 11 GOOS Strategic Objectives towards the outcomes articulated in the GOOS Roadmap. Below is a summary and assessment of progress across the Strategic Objectives.

Strategic Objective 1: Strengthen partnerships for delivery. GOOS has strengthened its connections and partnership with World Meteorological Organisation (WMO), Intergovernmental Ocean Data Exchange (IODE), the Global Climate Observing System (GCOS) through the work of the Ocean Observing Physics and Climate Panel (GOOS Expert Panel) for the Essential Climate Variables and ocean component of the GCOS Implementation Plan, Division for Ocean Affairs and law of the Sea (DOALOS) on ocean observation in areas under national jurisdiction, Organisation for Economic Co-operation and Development (OECD) for the value of ocean observing work, Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) and UN Environmental Programme (UNEP) with regard to ocean plastic/marine debris, and the OceanPredict modelling community through work in the GOOS Co-Design and CoastPredict, the satellite community through CGMS, CEOS, NASA, ESA, and the Partnership for Observation of the Global Ocean (POGO) with an MOU. The next actions include continuing to strengthen connections with WMO and the Group on Earth Observations Biodiversity Observation Network (GEO BON)/MBON as a priority, strengthening some relationships with partnership agreements, establishing a focal point for satellite community connections, in the GOOS Steering Committee, mapping the GOOS partnerships by type, and to establish a regular review mechanism to ensure that partnership works, assess partner priorities and needs for engagement.

Assessment: this objective is on track.

Strategic Objective 2: Advocacy and communications. The efforts here have contributed to increasing recognition of GOOS and ocean observations in many events such as the UN Ocean Conference, COP27 and CBD COP15. GOOS is implementing its Communications Plan and in the last 18 months has published 20 original articles and 4 feature stories, these have also been shared via IOC and UNESCO news, CBS, Nautilus, ECO magazine, and Ocean Science & Technology News. GOOS flyers were developed with simple messages for target audiences, and they were distributed in international events. For the first time the Global Ocean Observing System Report Card 2022, is fully cross-GOOS, and GOOS is building a growing community of vocal partners, such as the Marine Technology Society, The Ocean Race, industry, and the OECD. Advocacy and communication was identified as a continuing priority area for action by the GOOS SC-12. GOOS will continue refining key messages and strengthening communication relationships with partner organisations, and UN advocacy work will be continued for upcoming events (e.g. UN ICP on maritime tech, COP28).

Assessment: this objective is on track.

Strategic Objective 3: Evaluate System to assess fit-for-purpose. The Report Card 2022 included a more robust calculation of the observing network status indicators, and this work continues in the Observations Coordination Group for 2023. The GOOS Expert Team on Ocean Forecasting (ETOOFS) is also assessing metrics for ocean forecasting systems. The GOOS Ocean Observing Co-Design Programme is working on exemplar projects which are

designed to promote assessment and requirements from user needs perspective, and towards developing system design and metrics at an EOV level through requirements. The work with the WMO Rolling Review of Requirements process, will also develop requirements for observing system assessment. Next steps include Co-Design exemplar projects implementation, ensuring GOOS Expert Panels are updated and integrated into the efforts, and engaging stakeholders in the observing system assessments.

Assessment: Some areas are on track; however some still require work. There has been progress towards the identification of gaps at local, regional, and global scales, through the Tropical Pacific Observing System (TPOS) and Co-Design Programme, but this is not yet consistent across GOOS and capacity and resources are required to support the development of assessment tools for the observing system.

Strategic Objective 4: Empower end user applications. The GOOS Expert Team on Operational Ocean Forecasting (ETOOFS) launched its guide on 'Implementing Operational Ocean Monitoring and Forecasting Systems' at the Lisbon UN Ocean Conference in June 2022. It is published as an online document with DOI. This is a comprehensive document and the fruit of cooperation between 80 expert authors from 18 countries worldwide. Work has been initiated in the GOOS Regional Alliances to develop product integration examples.

Assessment: Some areas are on track, but in general this strategic objective still requires development. The concept of users within GOOS is still ambiguous and dedicated resources are limited; we therefore only capture a partial picture. GOOS needs to clarify the provider/user interface that we want to improve (there are many, so priorities are important) and use the Ocean Decade framework. The ocean prediction centres should be a locus of this provider/user interface.

Strategic Objective 5: Authoritative guidance on design. The GCOS Essential Climate Variable (ECV) requirements were publicly reviewed and updated through cross-GOOS Expert Panel work, including 11 physical, 6 geochemical and 2 biological. A GOOS Essential Ocean Variable (EOV) paper and new (unified across-GOOS) EOV Specification Sheet are close to completion. In the last 18 months new EOVs have been accepted, Ocean Sound and Bottom Pressure, and Marine Debris is a pilot. The Ocean-Atmosphere Interface and Boundary Layers (OASIS), funded as a SCOR Working Group, is endorsed under the Ocean Decade, and has engaged a large multidisciplinary community to advance capacity. Several actions have now been folded into the Ocean Observing Co-Design Programme, where there has been significant mobilisation of communities around the 6 exemplars projects (Tropical Cyclones, Marine Heatwaves, Ocean Carbon, Boundary Currents, Marine Life, and Storm Surge), and work in the development of practice, process, and framework for co-design action. The Steering Committee recommended that GOOS enhances the visibility of the EOVs and ECVs to the operational agencies and ensure the selection criteria for EOVs is transparent (GOOS EOV Paper). Increased engagement with different operational services (not only ocean) and with the modelling initiatives around assessment of observing systems (SynObs Ocean Decade Project) is important.

Assessment: Progress has been made through the EOV process and building observing networks around EOVs, however an improved design does not always lead to implementation and more progress is needed in refining the essential global observations required for global

societal needs that maximise return on investment, and developing a modular design approach to guide and support implementation decisions at regional and national level

Strategic Objective 6: Strengthening and expanding the ocean observing system. GOOS achieved noticeable progress in network integration and 3 emerging networks are in their transition from pilot to mature status, (AniBOS, OceanGliders, HF Radar), and potential new networks are already interacting with the Observations Coordination Group (OCG) including SMARTCables, Ship based ocean time series, Uncrewed Surface Vehicles (USVs) and IMDOS for marine debris. The 12 EOV BioEco observing communities have also advanced, including a recent Nature Communications paper on zooplankton, supported by the GOOS BioEco Expert Panel and G7 Future Seas and Oceans Initiative (FSOI). GOOS-endorsed Best Practices are now available in the Ocean Best Practice System (oceanbestpractices.org). The multidisciplinary initiative VOICE (Multidisciplinary Observing in the World Ocean's Oxygen Minimum Zone Regions: From Climate to Fish - VOICE Initiative) is now integrated into GOOD (Global Ocean Oxygen Decade Programme) and for coastal observing and prediction, a key impact area, the Ocean Decade Programme CoastPredict has developed the Global Coastal Experiment to support implementation of a set of regional pilot areas. Next steps include increasing the opportunities for coordination between OCG and the Biogeochemistry and BioEco Panels. Enhancing current partnerships in the BioEco area through a new MoU between GOOS, GEO BON/MBON and OBIS, building on a 2016 partnership agreement. Work to catalyse studies for the WMO Impacts Workshop in 2024 and develop a process across GOOS to assess readiness and prioritise observing actions (e.g., new networks and to invest in advancing TRLs) is advancing, working more closely with GOOS Regional Associations. A crucial and ongoing task is addressing the global crisis in supply and distribution of seawater carbonate chemistry Reference Materials.

Assessment: Many areas are on track and/or making progress, but coordination towards achieving common goals across global, regional and national systems needs more work. This will require increased levels of coordination across GOOS and more resources to achieve this. The expansion into new areas based on requirements and solving global needs is likewise an area that requires increased resources.

Strategic Objective 7: Open Data. Mapping the data and metadata flow across the OCG networks has been completed and is available online (GOOS-278). These were used to support the development of an OCG Data Implementation Strategy. The aim is to improve discovery and access to data across the global ocean observing networks and will be adopted at the Fourteenth Meeting of the OCG in June 2023. OceanOPS has worked to harmonise metadata across networks for monitoring capabilities and efficiency, and this is also a contribution to data flow into WMO OSCAR systems. A GDAC was created for biogeochemical EOV data, but the implementation of this has stalled, and remains an area of concern. The BioEco Portal 1.0 was launched in collaboration with the IODE Ocean Biodiversity Information System (OBIS) to provide metadata and information on networks monitoring BioEco EOVs. In next steps the OCG Data Implementation Strategy will be published and implemented, this will be relevant and across the GOOS panels and needs work to implement across the observing system. The OCG strategy is also integrated within the WMO WIS 2.0 and IODE ODIS work.

Assessment: On track, although this area will require increased resources for the next stages of development and to increase integrated frameworks for data across GOOS. The GOOS

Roadmap foresaw EOV data products and in the biogeochemistry realm this is hampered by thee need for resources and the stalling of progress towards a GDAC.

Strategic Objective 8: Support innovation. GOOS launched the 'Dialogues with Industry', initiative, with partners the Marine Technology Society (MTS) and the National Oceanic and Atmospheric Administration (NOAA), as a forum for dialogue between public and private sectors to dismantle barriers and engage around opportunities towards achieving a mature, multi-sectoral ocean observing enterprise. In total 4 sessions were completed with panellists from industry, not-for-profit, NGO, and government. The draft synthesis report summarising across the 4 sessions is available (GOOS-282). This provides important information for science, industry and government regarding how to enhance private sector involvement in ocean observing, blue economy growth, and efficiency in the ocean observing system. A Roadmap from the Dialogues will be published in Q3 2023, and US resourcing for this important activity looks likely.

Assessment: On track, the Dialogues with Industry have opened an opportunity to mature the ocean observing and services 'market' with industry and represent an important route to speeding innovation for ocean observing. There are important steps that can be taken to develop ocean observing as a market, and to attract investment into the sector.

Strategic Objective 9: Guide capacity development. ETOOFS organised two online workshops on operational ocean monitoring and forecasting systems with over 270 participants from 65 countries. The Biogeochemistry Panel is also active in a BGC Sensors Summer Course (June 2023) and an online ocean acidification data tool. The Data Buoy Cooperation Panel supported a Workshop in Tunisia in April 2023.

Assessment: This objective is on track, although a more overarching approach across GOOS would benefit activities, and a clear strategy for work with IODE capacity development and greater work with partners.

Strategic Objective 10: Observe human impacts on the ocean. The first human pressure EOVs have been developed in strong partnerships with international expert working groups and projects, including the Ocean Sound EOV developed in partnership with the International Quiet Ocean Experiment (2022), and the Marine Plastics Debris EOV with support from EU H2020 EuroSea and EU4OceanObs projects and partners GESAMP WG 40, SCOR WG FLOTSAM, MSFD Tech Group on Marine Litter, IOCCG Task Force on Remote Sensing of Marine Litter and Debris. The Integrated Marine Debris Observing System (IMDOS) was publicly launched in June 2022, a strategic 3-way partnership of GOOS, GEO Blue Planet and UNEP Global Partnership on Marine Litter (GPML), and will play an essential role in establishing recommendations for sampling, co-design, and common protocols. IMDOS was accepted as a GOOS Project at the Steering Committee. IMDOS is positioned to support the newly negotiated international "Plastics Treaty" and will work with OCG global networks and BioEco observing communities for microplastics.

Assessment: There has been noticeable progress in EOVs establishment (ocean sound and marine plastic debris), around variables related to human activities. Our potential initial targets are (1) ocean noise, (2) marine plastic, and (3) harmful algal blooms. Pilot projects on ocean noise and marine plastic are on track in partnership with other organisations in each area. Notwithstanding, more dedicated efforts are required on the pilot project on harmful algal blooms, and resources are required to continue to develop IMDOS as a project

Strategic Objective 11: Champion effective governance. The Terms of Reference for an Evolve GOOS Governance Task Team were agreed in Q3 2022, and an open call for members was sent out via IOC and WMO Circular Letters in June 2023. The GOOS sponsors will be asked to support this important action, and the GOOS Office will seek governance experts to support this Task Team. In the last 12 months there have been several activities to reinvigorate regional coordination in the Pacific Islands, Caribbean, Africa, and the Arctic. There has also been action to develop the GOOS National Focal Points (NFPs), the updated Terms of Reference for the GOOS NFP were adopted at the Steering Committee, and there were at the time of the meeting 65 NFPs with more expected. GOOS has some success in obtaining new in-kind and secondment support and interest in the implementation of the Ocean Decade Programmes. The Ocean Observing Decade Coordination Office is supported by the Decade Coordination Unit, and GOOS National Focal Points work has been partially supported by the IOC. So there has been an increase in support to GOOS, however work on fundraising in the philanthropic sector and developing a funding plan has been slowed due to resource limitation. The GOOS Steering Committee highlighted evolving GOOS governance as a high priority action.

Assessment: The strategic objective is partially on track, the advances in GOOS regional coordination and NFPs are welcome. However evolving GOOS governance has now taken priority, and a focus in communicating on the sustainability of the ocean observing system and its coordination is required, including advocacy by partners.

Twelfth GOOS Steering Committee Meeting - Detailed Report

1. Welcome and Opening of GOOS SC-12

Presentation: Meeting Objectives Reporting by SO

GOOS Steering Committee Co-chair, Toste Tanhua, opened the Twelfth Session of the GOOS Steering Committee (GOOS SC-12) and invited GOOS Director, a.i, Emma Heslop, to orient the meeting participants to the session structure and objectives, with additional explanation around the updated approach of aligning the agenda with the GOOS Strategic Objectives.

Ms Heslop shared the meeting objectives which covered an assessment of progress towards GOOS objectives, identifying priorities, gaps and resource implications, collecting feedback and assessment of terms of reference and roles for various GOOS components, as well as assessing new projects and task teams, and planning for the evolution of the governance. She outlined the advantages of an agenda aligned with the Strategic Objectives, which allows for more effective evaluation of progress for the Roadmap, identification of areas needing improved integration across GOOS, and priority setting. She pointed out the actions tables that begin each item - noting that many actions have already been completed - as well as highlighting the important role of the the outcomes and assessments table for each item in evaluating progress.

2. GOOS Sponsors Perspectives

IOC

Presenter: Vladimir Ryabinin (remote)
Rapporteur: Mathieu Belbeoch

Presentation

Vladimr Ryabinin, IOC/UNESCO Executive Secretary, reported on the progress made by the IOC with regard to GOOS. He recalled the importance of the decisions to be taken by Member States during the 32nd session of the IOC Assembly in June 2023 with regard to: GOOS Work Plan 2023-2025, observations under areas of national jurisdiction, the GCOS Implementation Plan, the WMO-IOC Joint Collaborative Board, and the Ocean Decade.

He presented the IOC overall portfolio including: ocean research, observing systems and data management, early warnings, information for policy and sustainable management and governance.

The recent international key developments are raising the importance of the ocean: UNFCCC, Global Biodiversity Framework, ocean economy, UN Ocean Conference (Lisbon 2022) and the

upcoming UN Ocean Conference in 2025 (Nice, France). The IOC is developing a science-based framework for sustainable ocean management and will use the potential of the Ocean Decade to move this major global initiative forward. UNESCO carried out an internal survey on IOC strategic positioning, and as requested by its Member States, the IOC carried out an assessment of resources required for expanding IOC Services. The recommendations included an increase of the workforce from 60 to 90 and an increase of budget from 30M$ to 50M$. A final decision regarding IOC funding will be taken at the UNESCO General Conference in November 2023, however due to the action of Member States it will rise from 2% to 3% of UNESCO's Regular Budget for the next biennium.

The GOOS Steering Committee welcomed the dynamic work of the IOC on many fronts, despite challenging budgetary constraints. However it noted that the IOC Member States were not really taking steps to support the secretariat and asked what could be done to improve this, in particular with regard to GOOS.

The Steering Committee asked for feedback on the status of regional activities in the context of the GOOS, in response Mr Ryabinin highlighted the importance of GOOS National Focal Points and of building the capabilities of members for the management of their coastal zones, with regional specificities.

Mr Ryabinin noted the difficulties of GOOS implementers to reach decision makers and funding agencies, and acknowledged the challenge of reforming the governance of GOOS. He recommended that GOOS focus on development of the three Ocean Decade Programmes and on the creation of a coalition for sustainable ocean planning, including GOOS, with key new partners such as the World Bank.

WMO

Presenter: Albert Fischer
Rapporteur: Mathieu Belbeoch

Presentation

Michel Jean, WMO Infrastructure Commission President, remarked we were dealing with a chain of issues from global to local, and involving many different disciplines. One of the difficulties is that the national representations of these issues at the IOC, WMO, UNFCCC, etc. are often working in silos. Hence national governments do not see the benefits of a well thought out and consolidated strategic plan addressing their societal needs. The IOC Executive Secretary, Mr Ryabinin, welcomed the growing involvement of the WMO in the ocean system, and the necessity to move forward together, in particular through the sustainable ocean planning target.

Albert Fischer, Director of the WMO Integrated Observing System (WIGOS) reported on the WMO's support towards GOOS and demonstrated the level of interest through a strong

presence of six WMO staff and experts at the GOOS Steering Committee meeting. He recalled the history of the WMO and the very first observations (ship logbooks), and standards for data and information exchange back 150 years ago. The global meteorological infrastructure is based on three pillars: integrated global observing system (WIGOS), integrated information system (WIS), and integrated processing and prediction system (WIPPS). To succeed in developing such infrastructure the WMO set up recently major initiatives endorsed by its Members:

- The WMO Unified Data Policy, encouraging the free and unrestricted exchange of core data for earth system monitoring (including physical GOOS EOVs/ECVs - Member shall - and biogeochemical/biological - Member should).
- The Rolling Review of Requirements, basis to define core observational data in Technical Regulations and loop end users and implementers through requirements, gap analysis, and statement of guidance.
- The Global Basic Observing Network (GBON), supporting global numerical weather prediction and climate reanalysis, and analysing how Members are meeting their obligations and triggering the Systematic Observations Financing Facility to effectively address gaps.

While GBON/SOFF already consider some GOOS elements (e.g., ships, drifters in EEZs) there is a growing demand to include more ocean systems in this framework, which will need further work, for example through the RRR.

Mr Fisher concluded by reiterating the high interest of the WMO in ocean observations. There are a number of joint GOOS-WMO priorities (joint coordination structures such as IOC-WMO Joint Collaborative Board, a new Advisory Group - AG Ocean, shared structures such as OceanOPS, the Expert Panel on Ocean Observing for Physics and Climate, (OOPC) and other interactions that could be clarified within a review of GOOS governance and an updated MoU. The ocean observing and modelling community could then move forward with WMO infrastructure, regulatory, and guidance material. A clearer definition of requirements is needed, together with a strong advocacy and engagement for ocean observations, without omitting a more effective governance of the high seas. The WMO stands ready to support GOOS and endorse its co-sponsor role in all these areas.

ISC

Presenter: Martin Visbeck (remote)
Rapporteur: Mathieu Belbeoch

Martin Visbeck reported for the International Science Council (ISC), and how it supports GOOS in making the science voice heard more globally. ISC affiliated initiatives such as SCAR, SCOR, COSPAR, WCRP, and GCOS, are also important partner programmes of GOOS. ISC activities are also growing at regional levels including SIDS e.g. where there are opportunities for GOOS.

ISC can facilitate demonstrating the value and impact of the GOOS for society through science and policy activities (e.g. fisheries). Disaster risk reduction, data work, are other opportunities.

With regard to the role of sponsors for GOOS, the IOC and the WMO have clear technical capabilities, but the ISC can be used to mobilise the academic community to grow partnerships and budgets. The ISC is looking for inputs from GOOS to better prioritise and target its support.

UNEP

Presenter: Joana Akrofi
Rapporteur: Mathieu Belbeoch

Presentation

Joana Akrofi reported on the United Nations Environmental Programme (UNEP) activities and recalled again the importance of the partnership approach to deal with climate, biodiversity, and pollution challenges. She presented the UNEP GEMS ocean vision to deliver a global environment monitoring system that provides relevant open and easily accessible ocean and coastal data, analysis, and information guiding actions to protect and sustainably use marine and coastal resources. She noted the difficulties to easily access and interpret information and data, given their fragmentation. She introduced the World Environment Situation Room concept (WESR) based on GOOS data and resulting services. UNEP sees its role as bringing more users to have the skills to understand and analyse GOOS data and services.

The Steering Committee noted that GOOS included many observing systems already, and that we need one observing system, that is global and also with basin scale attributes, and that we should not set up any new components, but rather look towards a single system that has local expression to meet local needs.

Actions: GOOS Sponsors

0.1 GOOS join the ISC Symposium: in May 2023, Paris, GOOS to join a Panel of ISC Sponsored Programmes (action already completed)

0.2 Create a GOOS Resource Strategy Group: Set up a group to develop a strategy for resourcing GOOS work

a. How to identify the most important opportunities? How to engage the support of GOOS Sponsors IOC and WMO, How to activate and manage new resource discussions across different sectors of potential resource partners?

3. Goal 2: System Integration and Delivery

- **SO5: Authoritative Guidance Design**
- **SO6: Strengthen and Expand System**
- **SO7: Open Data**

SO5. Authoritative Guidance Design

Presenter: Sabrina Speich (remote), Belén Martín Míguez
Rapporteur: Artur Palacz

Presentation

Sabrina Speich (OOPC Co-Chair) & Belén Martín Míguez (OOPC Scientific Officer) provided a report on the Strategic Objective 5 (SO5) "Authoritative guidance design." The presentation highlighted an impressive number of achievements with regard to SO5, and outlined concrete future steps needed to address outstanding gaps and challenges.

An area that came up early in this session was fundraising, and although perhaps not a direct link to the authoritative design guidance, it is connected through GOOS's value to society. The Steering Committee Members agreed that GOOS needs greater bandwidth in order to approach new funders such as industrial partners (e.g. the reinsurance sector). One suggestion was to investigate securing a grant for GOOS to have the bandwidth/people for such a fundraising strategy. By comparison, NGOs are very good at amassing sources of funding. Some members have initiated conversations with the banking and reinsurance industry and are already some way down that road. The WMO is also engaging with the private sector, e.g. insurance industry as part of overall adaptation strategy. This could be an area in which GOOS and the WMO could work together to approach donors with a public-private partnership engagement strategy.

The importance of the ocean has grown and the IOC and GOOS should gain from this. A number of UNESCO Member States, led by the UK, have been lobbying for an increase to IOC funding, from 2% to 3% of UNESCO Regular Budget [note this was passed at the IOC Executive Board in May 2023 - see Item 44]. However, although an increase will be welcome, GOOS will still need to seek funding beyond UNESCO. The WMO noted that funding some people to sit with GOOS would make sense from a programme perspective. In a GOOS commissioned report by Neville Smith[1], a direct convening of funders was suggested to understand their needs and discuss GOOS issues/needs. These comments also prompted a discussion around elements of the structure of funding, e.g. considering a subscription model

[1] In 2020 GOOS commissioned a report by consultant Neville Smith on the support structures for sustained ocean observing systems, including but not limited to support for the GOOS Core Components. As part of this work he conducted a survey of major stakeholders of GOOS (major funders of support structures and major users). Recommendations include a GOOS focus on sustained ocean observations with the establishment of a distinct value chain including an information system, and a data processing, modelling and forecasting system; rejuvenating national engagement; planning user engagement and showcasing; and the development of a rejuvenated, investable, hub and spoke model for global and regional support.

such as used by ICOS and EuroGOOS. It was noted that GOOS needs to take a cost/benefit approach to convincing investors and be clear that the cost of inaction is in the trillions $. It was suggested that a cost/benefit analysis of the observing system should be a priority action for GOOS.

A user-engagement plan was also proposed as important for GOOS; however as user-engagement is embedded in the Ocean Observing Co-Design Programme, this is where GOOS could initially focus. The Co-Design Workshop in 2022 indicated that this was an area that was generally not resourced under the usual research funding mechanisms, and thus was often not done, or not resourced to do thoroughly. Under the Co-Design Programme user engagement is at the core of all the exemplar projects. Developing a global user-engagement plan would be difficult at present, however GOOS has 1) delivery partners (WMO, UNEP, CMEMS etc.) to interact with, and 2) Co-Design to learn for those areas where delivery partners (sometimes called intermediaries) are not yet well developed. However it was noted that the next step demands of the WMO Rolling Review of Requirements and Co-Design are already placing additional strain on the GOOS core which is currently understaffed.

The Steering Committee agreed that GOOS needs to have the role of ocean observing and GOOS's role as critical decision making infrastructure recognised, and that we need our sponsors and delivery partners to publically recognise this role and show the value of our work for society. This will increase our chances of opening doors to funders, beyond those to whom we already. At the moment, services take this infrastructure for granted, and in fact the need is growing with climate impacts on the ocean, geoengineering, and carbon credits all requiring an effective monitoring system in place. It was noted that the evaluations that GOOS and CLIVAR have undertaken are about societal requirements, then translated into ECV and EOV requirements, and that this has always been the philosophy of GOOS and that we should highlight this.

It was noted that for some of GOOS's existing sources of research funding, in some countries, societal benefit does not help attract funding. It is scientific excellence and innovation that count, e.g. in the UK and in Japan. However, it was also noted that in Europe, in general, this is changing and funders are moving beyond 80's thinking of only scientific excellence, so that funding is not only for science, but about research infrastructure and building this for a more permanent system, a more positive outlook, e.g Mazzucato and mission oriented research. However in funding discussions it is important to be aware of these different drivers.

Another point raised is that GOOS needs to better focus its efforts and resources. GOOS has a reduced budget (2021-2023), and a large number of goals and objectives which we cannot fulfil. GOOS needs to be much more critical in prioritising its actions and to not add new elements without sufficient support, to prevent adding elements without resources to properly integrate the innovation. Also we must consider how to do more, with less, to be more efficient. One element is to focus more on what we can control, not on what we cannot. Another is to leverage support from institutes like Ocean Frontiers Institute for alignment with messaging, but also more

broadly. It is however important to recognise the nations and institutes that support GOOS and to have this as a part of our pitch/information.

There was support for the Co-Design Programme, as an integrator across GOOS. With funding, the Co-Design Exemplar projects would be ideal for inclusion of innovation and engagement of stakeholders. These are built for very clear societal benefits, e.g. tropical cyclones, marine heatwaves, ocean carbon, etc. The exemplar projects were suggested as the best tools to convince funders that we can achieve what we say we want to achieve, although it was suggested that the Co-Design Programme reduce the number of exemplar projects in order to better focus.

There was a discussion around using the narrative of EOVs for investment or end user impact. The suggestion was that EOVs are what GOOS can use to indicate the strength of our coordination and to 'prove' money well spent, but to drive investment with end user and societal impact initiatives.

We have a common direction, but insufficient resources to reach all of our goals. GOOS, with the support of the Steering Committee, needs to narrow our priorities and develop with more broad initiatives for funding.

Actions: Authoritative Guidance on Design SO5

5.1 Develop GOOS fundraising plan/strategy

a) Seek funding for a dedicated fundraising support.
b) Work with sponsors: WMO might have some areas that they could provide assistance on, for example working with the Public-Private Partnership Secretariat at WMO to explore connection to insurance etc.

5.2 Undertake a GOOS cost/benefit analysis: IMOS has a study around cost/benefit, and also WMO has some work in this area that might support such an initiative. Craig McLean (SC Member) volunteered to help the GOOS Office with looking at cost/benefit analysis (of the system/GOOS).

5.3 Track existing support to GOOS:

a) Including funding, experts time and in-kind support, to the GOOS coordination structure, from nations, sponsors, partners and institutes
b) Existing investment in GOOS can be made visible in communications and/or fundraising activities as an encouragement to others.
c) Nations/sponsors/partners/institutions who are providing specific support and funding to GOOS Core Office should be acknowledged in communication materials.

A. **Track user-engagement through sponsors and partners,** and the Ocean Observing Co-Design Programme, develop visibility of these connections.

Recommendations: Authoritative Guidance on Design

B. Encourage GOOS Sponsors and partners to highlight the need for ocean observations - connection to communications plan

C. Recognise Ocean Observing Co-Design as an important cross GOOS Programme

SO6. Strengthen and Expand System

Presenter: David Legler
Rapporteur: Artur Palacz

Presentation

David Legler, Chair GOOS Observations Coordination Group (OCG), reported on the 12 actions identified by GOOS under the Strategic Objective 6 (SO6). Mr Legler highlighted the significant achievements and provided an assessment of the current status of delivery with respect to anticipated outcomes under SO6. It was noted that many outcomes are not really measurable, and that it would be better to take an integrated approach across GOOS in many areas.

Apart from a continued erosion of resources, which started during the COVID pandemic and has been exacerbated by recent inflationary pressures, other major challenges for the implementation of SO6 were noted as follows:

- Lack of guidance or process to prioritise observing activities (and OCG/OceanOPS time/attention) that serve different requirements and standards.
- Insufficient dialogue and coordination around a shared organisational vision among GOOS OCG and the Expert Panels
- Slow progress on developing an integrated, interoperable and highly functional data management framework that provides discoverability and access to metadata and data of known quality across a broad range of communities and stakeholders.
- The need to engage and guide private sector interests and resources - following the GOOS MTS Dialogues with Industry.

Discussion

The Steering Committee reiterated the importance of developing a data strategy across GOOS, following the recommendations from GOOS SC-11. As one example of better integrating data management activities coordinated by the GOOS Biogeochemistry Panel, the SC requested

access to information about and outcomes of the series of workshops on surface ocean pCO2 observations, synthesis, and data management organised by ICOS Ocean Thematic Centre in November 2023, at VLIZ in Belgium (workshop announcement here.)

Other recommendations for action included;

- Revitalising the 2016 partnership agreement between GOOS, OBIS and GEO, in a more formal construct with GEOBON/MBON.
- Encouraging GOOS Expert Panels, UN Decade Programmes, and others in GOOS to work with modellers to catalyse studies for the WMO Impacts Workshop in 2024.
- Identifying a process across GOOS to assess readiness and prioritising observing actions (e.g. new networks, invest in advancing TRLs). This includes performing more meaningful impact assessments, for example tracking the usage of written best practices as opposed to reporting the number of written best practices; or the number of users of the BioEco Portal rather than the number of projects metadata engaged. There is a need to track meaningful advances.
- Working closely with regional organisations, national governments, and local communities to develop an integrated observing strategy, for example through OCG and BioEco Co-Chairs attending GRA meetings.
- Considering a mechanism to report/highlight issues in the observing system and how we might fix them to the Steering Committee and to the IOC Assembly. For example, across the observing enterprise where are there still challenges in integration? Are there opportunities lost, e.g. ocean carbon, where a lack of dialogue and interaction is limiting GOOS ability to develop a strategy for observing local and global scale? Can GOOS ask the IOC Assembly to endorse GOOS priorities, e.g. actionable priorities for within national systems? GOOS needs to give confidence that action would have value and would make a difference.

Actions: Integrated system SO6

6.1 Cross GOOS Data Strategy: Work out what in needed in terms of a data strategy/plan across GOOS, following the OCG Data Strategy, and in consideration of other strategies that have already been articulated, IODE Data Policy and Ocean Decade Data Strategy - *see action in SO7*

6.2 Use WMO Impacts Workshop: Encourage GOOS Expert Panels, UN Decade Programmes, and others in GOOS to work with modellers to catalyse studies for the 2024 WMO Impacts Workshop (highlighted via GOOS mailing list)

6.3 Revitalise GEOBON/MBON Partnership : Revitalising the 2016 partnership agreement between GOOS, OBIS and GEO, in a more formal construct with GEOBON/MBON.
Connection to actions in SO1.

6.4 Assess GOOS advances. Assess observing system network/EOV community readiness and tracking meaningful advances in the context of the FOO (Concept, pilot, mature / sustained)

6.5 GOOS consider a process for setting actionable priorities for national systems. How would we highlight priorities for national systems? Consider reporting/highlighting issues in the observing system and how we might fix them to the Steering Committee and to the IOC Assembly.

SO7. Open Data

Presenter: Mathieu Belbeoch
Rapporteur: Ting Yu

Presentation

Mathieu Belbeoch, OceanOPS Manager, gave the presentation on Strategic Objective 7. He briefed the Steering Committee on achievements regarding the Data Flow Mapping of OCG networks, and metadata standardisation (harmonise metadata). He noted that the creation and maintenance of a GDAC for BGC EOVs is a first step towards making BGC data available, open and FAIR. The OCG Data Implementation Strategy (proposed for adoption in June 2023 at the OCG-14 meeting), the establishment of an Open-GTS Prototype, the release of the Guide on Ocean Forecast evaluation and metrics, the launch of GOOS BioEco Portal (where the location of sustained BioEco observing programmes can be visualised and the metadata explored – akin to OceanOPS), are also key achievements, and noted that BioEco data still has some issues with being open, and noted the work towards BGC data product creation.

He briefed the Steering Committee about progress towards the SO7 outcomes listed in the GOOS 2030 Strategy, as well as some additional new outcomes that came out of the process of implementation. He pointed out that the outcome of data products based on EOVs and ECVs, available in a timely manner and with appropriate quality, is slow in progressing and that the work on this area needs to be clarified. He also raised the major challenges faced when implementing the SO7, which include, the non-uniformly implemented FAIR data principles; lack of resources and support for data management activities, the depleted BioEco resources, which are of particular concern, and metadata management gaps across the networks and panels. He proposed potential actions to be carried out for the next intersessional period, including expanding the data flow mapping, and publication of the OCG Data Implementation Strategy with an invitation for adoption across GOOS.

Key questions posed for this Objective for discussion were:

- How do we leverage and bring together global and coastal data challenges across all GOOS disciplines?

- How do we incentivise publicly open data sharing among the community and improve adoption of data management best practices, and what resources would be required?
- How do we incentivise support for data activities [processing, metadata, etc.] or collaboration with other initiatives?

*Discussio*n

It was noted that some general challenges are that FAIR data is not uniformly implemented, and it is not clear that GOOS has sufficient resources to support coordination for its part of the data flow/management. In short, GOOS needs more resources to support data flow. Some of the most successful networks have invested in data flow/management, but across the networks in general not enough is invested in data. In addition, OceanOPS needs support to start deeper work to integrate BGC and BioEco data, beyond what was committed to be shown in the Ocean Observing Report Card. Data is core to the whole value chain of ocean observation. Could GOOS combine the data needs from OCG, and BioEco and BGC Panels to form a bigger integrated data resource ‘ask’?

The Steering Committee discussed the BioEco Portal as an important resource for the BioEco community that is already being used. However it was created and launched without a long-term resource plan, and it now has no dedicated support [with recent news on EU Project and IOC funding the Portal has some support, however it still requires a long term plan and integration with other GOOS elements]. The BioEco panel would welcome perspectives from OCG and OceanOPS about the portability and the sustainability of this BioEco Portal prototype. In addition, there needs to be a conversation with OceanOPS on the BioEco data flow. The BioEco community works with OBIS (Ocean Biodiversity Data System hosted by IODE), but is the BioEco Portal doing what we want and what we need? What should we do about resourcing the Portal?

Not many of the commercial/private companies that are using the GOOS data, to turn them into products that they can sell, understand that there is a huge amount of national funding to generate the data product. Can GOOS connect to these communities (hundreds of start-ups, new companies), with a message? How do we get beyond the scientific community? What does the service market want? Is it possible to make money out of our data? [Note:ocean observing is generally publicly funded so it is difficult to see how the data could be a source of revenue, however value added products could perhaps be self-sustaining. This would also require a market and value assessment, but, for example, assessing the market for paid data products is some distance from GOOS core mission].

It was noted that there is a lag in the operational status of marine data compared to the weather data. From some of the GOOS networks 99% of the data goes on to the GTS, for others this is very small, and there are more challenges on the horizon, for example around citizen science data and moving from FAIR to CARE.

Data is an area in which GOOS currently needs investment of resources to resolve integration issues across data domains. GOOS should also seek to define the role GOOS plays in the value chain for data, for example assessing the market for paid data products is some distance from GOOS core mission. GOOS needs primarily to undertake integration work for data and metadata and flows, from OCG – BGC – BioEco Panels - getting the data flow/management functioning across GOOS is vital to connection along the value chain.

Actions: Open data SO7

7.1 Resourcing a cross GOOS Data Strategy: Data is an area in which GOOS currently needs investment of resources to resolve integration issues across data domains, and GOOS should also seek to define the role GOOS plays in the value chain for data, as well as look critically at the role and value of BioEco Portal and EOV Data products. GOOS currently needs investment of resources to resolve integration issues across data domains, considering the points raised at the SC. The following actions were suggested:

a. Collect the needs of OCG, BioEco and BGC in a cross-GOOS data strategy, integrate them as a bigger 'ask' so that this can be addressed more efficiently.
b. Consider how we could communicate/incentivise support for data activities for GOOS, get institutes, people to do some work for the system.
c. Create an acute resource gap and needs and value assessment for the BioEco Portal.
d. Leverage and use advances in the Horizon Europe projects "MARine COastal BiOdiversity Long-term Observations" (MARCOBOLO) and "Blueprint for Integrated Ocean Science", and others to advance data delivery, data flows, and metadata specifications of biological data.
e. Assessing the value and role of GOOS in EOV Data products.
f. Assess the outcomes for SO7, what is GOOS role and what is role partners?

Recommendations: Open data

7.2 OCG Data Work:

The following were suggested:

g. OCG data flow mapping to expand to include products and national data centres.
h. OCG Data Implementation Strategy - publish, implement, and socialise this across the OCG networks, WMO WIS 2.0 and IODE/ODIS, and consider if the approach could function cross-GOOS.
i. Consider tracking OCG observing network implementation of data flow policy real-time and delayed mode - to identify and highlight where investment and action is required.

4. Goal 1: Deepening Engagement and Impact

SO1. Partnership for Delivery

Presenter: Toste Tanhua
Rapporteur: Mathieu Belbeoch

Presentation

GOOS Co-chair Toste Tanhua introduced this item and recalled the numerous partnerships that GOOS entertains with other initiatives, and good progress in some specific cases. However, there is no clear picture of those connections, the resources they entail and their ultimate benefits. In certain cases the partnerships would benefit through a clearer delineation of the responsibilities through agreements or MoUs.

The charge of leading and maintaining these partnerships relies mostly on GOOS Core Office but resources are not currently sufficient to support relationships with all partners, and this hinders developing closer functional and strategic connections.

Discussion

The SC recommended that a more strategic approach to partnership should be pursued, with a cost-benefit analysis of the partnerships. Presently, there are several partnerships of which GOOS not fully taking advantage, such as the ISC, UNEP, and the FAO. There was, however, also a word of caution regarding the return on investment in certain connections. For example, for OceanOPS, GOOS and the IOC, the sailing community has taken a lot of time and the return on this investment towards GOOS objectives is not large. Therefore a regular review of partnerships, even with sector and long standing partners, is important. In terms of prioritising partnerships, it will be important to connect with those partners who can help GOOS accomplish its objectives, where it lacks resources or expertise.

There was some comment that perhaps SO1 should not be considered a GOOS Strategic Objective, since it is not an objective per se, but a means to reach the goals.

An additional discussion area took place around acknowledging the support of partners/institutions to GOOS. It was suggested that partners/institutions who are providing specific support and funding to GOOS Core Office should be better acknowledged on the communication materials, GOOS web page, etc. (see action under SO5).

Actions: Partnerships SO1

1.1 Regular cost/benefit assessment of partnerships:

a. Document the strategic approach and cost benefit analysis for each GOOS partnership, to provide something against which partnership success can be evaluated.
b. Start with current partners, and then identify what would be the next priority targets. *See also action on specific partners suggested in SO6*

1.2 Map GOOS Support. In order to acknowledge support to the GOOS components, map GOOS partners, GOOS Members (GRAs), GOOS contributors (funding GOOS Core Office), other in-kind of contributors (e.g. funding the observing system/networks coordination, support for platforms is tracked through OceanOPS. *See similar actions in SO5 and GOOS Office Actions*

SO2. Communication & Advocacy

Presenter: Anya Waite, Laura Stukonyte (remote)
Rapporteur: Mathieu Belbeoch

Presentation

Laura Stukonyte, GOOS Junior Communications Support, provided an overview of the GOOS Communications Plan, the target audiences and the channels for communication, and showed highlights from the last year of implementation of the plan. Including the Ocean Observing Report Card and other activities supported by OceanOPS. She also highlighted the focus on advocacy into the UN, with messaging for panels, sessions, and presentations at COP 27 and CBD COP 15, the DOALOS managed Informal Consultation Process in New York, and the UN Ocean Conference in Lisbon.

The Steering Committee commended Laura and the GOOS Office Team on the work, and recognised the positive steps taken by GOOS in terms of advancing GOOS communications capability and visibility. It was supportive of the achievements and planned development.

The Steering Committee had the following comments and observations to aid this development:

- Many GOOS Regional Alliances are not recognisable as GOOS related, as they have no GOOS logo or information on their web pages, and this should be addressed. In addition, all GOOS Components should be branded and feature the connection to GOOS on their websites. The UN Decade is perhaps a good example in this respect with its guide to use of the Decade branding etc.

- The Communications Plan implementation should also focus on expanding our contact base, not just on the content. One area to work on could be through expanding our media contact list, and to make use of our connections with the IOC and other sponsors. Could we develop more features together with the WMO and UNEP communications?
- Targeting funders: The emphasis is perhaps not sufficiently pitched or targeted towards funders. The GOOS advocacy work needs greater focus on fundraising to reduce the fragility of GOOS core components – it needs to go beyond where we are now and advocating into the UN.
- GOOS should seek to highlight the value of coordination in communications. Could this be a specific feature story? In the Neville Smith Report there was the suggestion that a percentage of observing investment should go into observing coordination.
- Should GOOS seek a decision from the IOC Assembly at some point that forces other agencies to note attribution if GOOS observations are used in their services?

Actions: Communications and Advocacy SO2

2.1 Develop a media contacts list

2.2 Connect with the WMO and UNEP communications teams, perhaps seek to develop at least one joint feature story with GOOS Sponsors.

2.3 Ensure GOOS components and GRAs reference GOOS. Survey websites of GOOS components, networks, GRAs, etc. and make sure they clearly refer to GOOS (e.g. logos), create guidelines, suitable text, links, etc. that should be used to show the connection.

2.4 Ensure all sponsors of the GOOS Office are clearly acknowledged on GOOS website. *Linked to actions in SO5, SO1, and GOOS Office Report sessions*

SO3. Evaluate Impact

Presenter: David Legler
Rapporteur: Mathieu Belbeoch

Presentation

David Legler, GOOS Observation Coordination Group Chair, introduced action towards Strategic Objective SO3, “Evaluate Impact”, based on 6 core activities led by OCG, OceanOPS, ETOOFS, and the BioEco and OOPC panels. Progress includes the regular production and consolidation of the GOOS Report Card and robust calculation of regular metrics and KPIs for network status by OceanOPS. Some plans were developed by OCG and OceanOPS to provide gap analysis tools, EOV/ECV based versus applications in the context of the WMO RRR but not implemented yet due to a lack of resources.

A guide was developed and released by ETOOFS for Ocean Forecasting, together with some KPIs (Key Performance Indicators) to assess performance and compare each simulation in a consistent way. Mr Legler also noted the launch of the BioEco Portal 1.0 developed in cooperation with OBIS. A number of actions are in play within the GOOS Ocean Observing Co-Design Programme to develop performance monitoring tools, and system assessment and requirements from user needs perspective through exemplar projects.

Mr Legler noted the remarkable and unique monitoring capacity operated by OceanOPS, and the role in delivering integrated and quality marine metadata to the WMO and other parties for most of the OCG ocean observing networks. This capacity will have to be gradually extended to all GOOS components including BioEco and new emerging networks.

However, with regard to an overall gap analysis capacity across GOOS, although progress was made, further work within Co-Design and WMO RRR (Rolling Review of Requirements) context, including carrying out OSE/OSSE design experiments and engaging further with teams producing observing system assessment (e.g. Ocean Predict/Synobs), is needed. Capacity and funding will be required to support such important developments which remain a challenge within a continued erosion of resourcing of ocean observations and a persistent lack of funds to engage with stakeholders.

Members noted the European Project EuroSea has developed learnings that can be made use of in setting such pathways for impact, and that GOOS should make more use of the readiness level concept of the Framework for Ocean Observing (FOO). It was noted also that there are potentially three core elements triggering a major assessment of the system: a crisis (e.g. TPOS where parts of the observing capacity were failing), major technological advances (e.g. Argo), and demand for new societal applications (e.g. coupled NWP models).

OceanOPS confirmed that the lack of IT workforce was the main reason for the slow progress of the EOV based monitoring capacity but that there was confidence to make progress by 2025, i.e. by the end of OceanOPS 5-year Strategic Plan.

Actions: Evaluate Impact

3.1 Support Co-Design and WMO RRR initiatives as a priority. GOOS needs an expanded resource base to work more effectively in this area. Co-Design to consider the following:

a) Focus efforts on a subset of Co-Design exemplars to advance further before SC-13 and UN Decade Conference
b) Revisit and refresh the Co-Design strategy and action plan in light of available resources; better describe anticipated intersections with GOOS processes and bodies
c) Seek new resources to carry out this work and engage with a larger base of stakeholders.
See related SO6 and SO5 actions.

SO4. Empower End-User Applications

Presenter: Pierre Bahurel (remote), Carl Gouldman
Rapporteur: Maciej Telszewski

Presentation

Pierre Bahurel, Chair of the Expert Team on Operational Ocean Forecasting (ETOOFS), gave a presentation on Strategic Objective 4. He briefed the Steering Committee on the publication of the comprehensive Guide on Implementing Operational Ocean Monitoring and Forecasting Systems by ETOOFS, and now wants to progress its endorsement with the WMO.

Work on data integration to pave the way for a more general GOOS Regional Alliance approach, and a GOOS Product and Services Portfolio for Ocean Prediction Centres, will be a part of the work of the Ocean Decade Collaborative Centre for Ocean Prediction (DCC - Ocean Prediction). He pointed out that the outcome of making the ETOOFS Guide available will be case study examples drawn across GRAs on data integration and delivery. He also noted that the uptake of GOOS data by operational ocean forecasting centres is dynamic, real, and that there is more activity in this regard than is perhaps currently visible to GOOS.

He suggested that GOOS needs to bring together the users and modellers that are currently not involved with GOOS. He also raised the gap between the overall motivation and the reality of the possible action by GOOS for this Strategic Objective and offered the following recommendations to deepen engagement and impact by prioritising and focusing on what can be done by the GOOS Team:

- Decide on a limited number of areas that require coordination of the ocean prediction by GRAs/ETOOFS, choose one area and focus on achieving this, then move onto the next.
- Clarify the provider/user interface that GOOS wants to improve, reduce the scope, choose the users, then develop the interface to get to them, and focus on achieving this before moving onto the next.

Mr Bahurel suggested 2 next steps in this area, 1) focus on ocean prediction centres (as users) and 2) focus on biogeochemistry as a strategic priority (GOOS products).

Discussion

Mr Bahurel was asked by the Steering Committee about the motivation behind collaboration on carbon tracking between the BGC and ocean prediction communities. He noted that understanding the ongoing developments in both the ETOOFS/BGC communities had been initiated and the next step is to enhance the interface of biogeochemistry datasets with ocean modelling and prediction centres. Although BGC was suggested as an area of focus, it was noted that BGC forecasting systems are not yet very user orientated, and that with a focus on

an integrated observing and prediction systems, there remains a question as to the role of GOOS in steering prediction systems towards user needs, for example for coastal, fish and flood forecasting. Mr Bahurel suggested that working on interoperability was key. The BGC panel noted that it is looking forward to further engagement with ETOOFS in this regard.

Identifying the current ocean prediction centres as the primary users of GOOS data was regarded as a sensible approach, noting that the ocean community is inclusive of both innovative and operational aspects of information creation and that GOOS should protect this heterogeneity.

Some prediction centres are in early stages of development (e.g. developing countries), however overall the existing ocean prediction/forecasting centres are prepared for operational services. It is essential to work on increasing interoperability, sharing of data, and best practices, across ocean prediction centres to effectively deliver the services to the users and support prediction centres that are developing. Some prediction elements are more developed than others (physics vs BGC). Coastal areas are challenging and we are in the development phase rather than operational. For the BioEco area, there are indicators and assessments, so there might be other routes not yet covered by operational ocean forecasting areas.

The Indian Ocean was noted as an active area for innovative work and the opportunity of using GRAs/national systems such as IMOS and IOOS to understand how to expand best practice in empowering end user applications to other GRAs was noted.

Connecting the GRAs and ETOOFS was viewed as a great idea. The BioEco Panel noted that it is highly interested in contributing to this conversation around GOOS connection to operational centres, ETOOFS and GRAs, and that this is an opportunity for GOOS to engage in some cross-panel cross-element activity. It was also noted that with the UN Ocean Decade there is a great opportunity to work together in this area.

The WMO also noted its interest in collaboration with ETOOFS.

Actions: Empower end-user impact

4.1 Enhance GOOS connection with operational ocean prediction centres: Taking ETOOFS guidance, GOOS to consider the best way to strengthen connection of the observing system to the operational ocean prediction centres:

A. Connection of ETOOFS to the GRAs, BGC and BioEco Panels.
B. Decide on a limited number of actions around these connections which require coordination, and aim to work on these step by step in priority.

4.2 GRAs expand connection from observing to operational ocean: Explore the opportunity of using IMOS, IOOS and INCOIS to understand how lessons learnt and expand

the connection of observing to operational ocean forecasting/empowering end-user applications across GRAs.

5. Goal 3: Building for the Future

- **SO8: Support Innovation**
- **SO9: Develop Capacity**
- **SO10: Human Impact Observations**
- **SO11: Evolving GOOS Governance**

SO8. Support Innovation

Presenter: Emma Heslop
Rapporteur: Maciej Telszewski

Presentation

Emma Heslop, Director, a.i., GOOS, gave a presentation on Strategic Objective 8. She briefed the steering committee on achievements regarding the Dialogues with Industry initiative, which has now completed 4 successful online sessions, each with a session report. There is also a background paper and now a Dialogues with Industry Synthesis Report, summarising the findings from across all the sessions. In terms of the outcomes of the strategic objective, she noted several recommendations derived from the Dialogues with Industry that have the potential to speed technological development and increase scope and collaboration with the private sector. For example, aggregating demand and targeting investment to reduce risk, as well as the need for more systematic testing of new technology – such as protocol, sharing of results, targeted testing, comparison, and having standards developed for new technology to meet. She also noted that there are gaps in targeting new technology development to meet needs of the observing system users/policy. The Dialogues with Industry team will continue to work on prioritising the recommendations for action through discussions in various fora through to September 2023, and from this develop a Roadmap for Implementation, that will create the finalised output for addressing the issues encountered in the Dialogues and creating a beneficial collaboration towards an expanded public-private Ocean Observing Enterprise.

Discussion

The Steering Committee was supportive of the idea that in order to achieve a market response towards growing our ocean observing capacity, we need to interact with the private sector across a variety of issues. It also recognised the importance of working with governments in terms of the Blue Economy. Although the action was questioned by some, the role of GOOS in the Dialogues with Industry was generally supported by the Steering Committee, and it was

suggested that GOOS should work on the specification/guidance for the ocean observing systems, playing a role in developing standards for industry, and in developing focused demand for technologies.

Ocean carbon was taken as an example of an area that is research driven, and therefore where there is a heterogeneity of instruments leading to challenges in the current system. The Steering Committee suggested that an operational system should include standardisation of instruments. If so, how we quality control/utilise the data is where GOOS could develop stronger collaboration with industry, i.e. for GOOS to work with industry to guide them with specification of technical aspects of instrumentation needed or targets to achieve in terms of delivered data.

Low cost sensors are both needed and also come with challenges. Quality control is a challenge with low cost sensors and large scale use of these could be a challenge to our understanding of the ocean status and properties. We also need high quality sensors that can survive in tough environments. However, there are possibilities for low cost sensors for use where high accuracy is not required, coastal environments being such a case in point.

Within the US, collaboration with the private sector is more well developed and pushed on multiple scales. Collaboration with governments on policies to speed up the process is one of the aspects for GOOS to address. Science, technology and societal drivers need to be addressed together to achieve results.

Actions: Support Innovation

8.1 Support Dialogues with Industry: Continue to collaborate with MTS and NOAA to explore the next steps towards implementation. Take the Dialogues with Industry Roadmap forward with GOOS as close partner, noting the key areas discussed where GOOS can support the implementation.

SO9. Develop Capacity

Presenter: Gabrielle Canonico
Rapporteur: Ana Lara-Lopez

Presentation

GOOS BioEco Panel co-Chair, Gabrielle Canonico, reported on SO9 activities/actions and achievements to date, noting this Strategic Objective had many activities/actions. From an efficiency perspective, it would be good to consolidate some of the actions under this Goal. For the BioEco Panel engagement on indicators will be an active topic that will be followed up.

Discussion

Capacity development, particularly training courses and teaching, which take considerable effort and resources (human and monetary), was not viewed as within GOOS core business. For training and teaching, GOOS would be better placed to build connections to regional and global programs whose main activity is capacity development. For example IODE has a Capacity Development Group of Experts/Committee.

There were some suggestions to also use the Ocean Decade, for example the Ocean Decade programmes have to identify the capacity development they would be undertaking, and therefore there is information already available. Can GOOS leverage the activities going on within the UN Ocean Decade on capacity development?

In addition it was noted that if GOOS wants larger Member State participation in the global ocean observing system, then it needs to identify capacity development requirements that Member States require to participate in GOOS. That idea GOOS could develop or improve existing mechanisms to strengthen links and communication among all GOOS components, including GRAs to understand and identify capacity development needs and inform on activities that are taking place (e.g. OCG webinars and capacity development activities), was highlighted. These could include routine support for cross-talks, activities, or workshops among GOOS components.

To build capacity within GOOS, the GOOS Office and components should be encouraging early career practitioners to join our teams and to monitor geographic diversity within the components and networks.

The importance of developing a strategy for engaging external groups not only in capacity development but also in a broader context was noted. GOOS should identify what support would be required to develop a strategy across GOOS to achieve this.

Actions: Capacity Development SO9

9.1 Identify the resources to support capacity development across GOOS, to link together existing GOOS initiatives and undertake the following suggestions:

a) Link with other groups specialising in capacity development: GOOS should appoint a representative to be part of the IOC/IODE Capacity Development group of experts, to create links and convey relevant information to IODE about the capacity development needs of ocean observing communities, including systems, networks and nations.
b) Request the UN Ocean Decade (DCU) to provide consolidated information on capacity development activities on ocean observing identified through Ocean Decade Programmes.

SO10. Human Impact Observations

Presenter: Artur Palacz (remote)
Rapporteur: Belén Martín Míguez

Presentation

GOOS BGC Expert Panel (IOCCP) Scientific Officer, Artur Palacz, reminded the audience of the origin of Strategic Objective 10 at the GOOS SC-7 (GOOS SC-7 Report), and the desire to evolve the global ocean observing system to be capable of addressing human impacts in the ocean. He reported on a major action under this objective, which is the remarkable progress achieved by the Integrated Marine Debris Observing System (IMDOS), a fruitful partnership between GOOS, GEO Blue Planet and UNEP, with funding from the Horizon 2030 European Project EuroSea. This included progress in governance aspects of IMDOS, organising several international meetings and reports, as well as the development of Marine Plastics as a new pilot EOV, the Specification Sheet for which is now near completion. The IMDOS community is not yet well linked to the Global South, and so how could we best capitalise on GOOS regional structures to support this, and marine debris monitoring standards have not been developed yet, however there is a lack of observing communities to build this practice on, and there is also the risk going too soon into standardisation and not benefiting from advances in technology and community knowledge. These are however two areas for future work.

There have also been advancements on incorporating Ocean Sound as an EOV, while the EOV on Harmful Algal Blooms is on hold. One of the suggestions highlighted was that the IOC should lobby for IMDOS to become the technical coordination component of marine plastics monitoring in support of the Plastics Treaty (United Nations Environment Assembly (UNEA-5.2)), once it becomes clear for parties that operational monitoring is needed to support the Treaty. There are no other global coordination entities for marine plastics monitoring. While there are many activities that could be undertaken (evolving best practices into standards, integration of IMDOS in OCG, participation in the GOOS Report Card 2023…), there is uncertainty in terms of resources for IMDOS moving forward. The need is to now establish a broad and active IMDOS community for which a minimum of 0.5 FTE (Full Time Equivalent person) resource is needed, while 3 FTEs would be ideal to develop the work of IMDOS fully and to ensure success. A question posed to the SC is, can we risk launching a broad effort without sufficient resources?

IMDOS Proposal to be a GOOS Project is presented in Item 7 (SC Oversight and Governance).

Discussion

During the discussion, the specificities of new EOVs related to human impacts were highlighted: not all of them may need to be incorporated in OCG as networks, it may instead be a matter of highlighting which networks could support the observing of such pilot EOVs, the Marine Debris EOV has been particularly intensive to develop in terms of forging new partnerships and defining a global standard between many entities, not all EOVs may need the same level of effort to develop the EOV, and the monitoring or data sharing best practices. Does ETOOFS have information on what EOVs are most relevant/missing?

Oil pollution was noted as a potential next pilot EOV in this space, although there is already a community developed around this, so it would need to be understood what value the GOOS EOV process would bring.

First it would be more important to secure funding for IMDOS, as this work is not yet complete. As next steps, IMDOS will connect with the OCG global networks through a workshop etc., and from the GO-SHIP observing network perspective it was noted that adoption of new EOVs, with protocols for assessing and adopting new EOVs and parameters (e.g. methane and nitrous oxide), data systems and sampling requirements, etc. currently operates through stimulation by the community that wants to make these observation, i.e. groups approached GO-SHIP for methane and nitrous oxide, and it was suggested that the same could be requested for marine debris.

IMDOS is a good example of collaboration between UN agencies, however, better alignment could be achieved. UNEP has presented several resolutions on plastics pollution, and the MoU between UNEP and IOC has expired and should be renewed to better define who does what. UNEP and IOC cooperate for GSAMP.

Plastics and micro plastics are important for Member States, and so this is an important area for GOOS to develop. Perhaps a pilot could be considered with regard to supporting the development of protocols, integrating satellite data, and combining crowdsourcing and *in situ* observations, etc.

Currently the human impact EOVs have been in collaboration with partner organisations (e.g. marine debris) or developed mainly by an external partner community (e.g. ocean sound), and Marine Debris was much more work than Ocean Sound to develop. Currently with limited numbers of such EOVs, the existing Expert Panels have functioned as custodians, but there could be a need in the future to have a Human Impact Expert Panel. Notwithstanding, it would be good practice for the future to introduce all new EOVs to the ocean observing networks (OCG/BioEco), as is already planned for OCG and marine debris.

Actions: Human Impacts SO10

10.1 Renew IOC partnership with UNEP: GOOS Office to contact UNEP and the IOC to discuss revising the expired MoU between IOC and UNEP, and to revise to properly reflect the respective responsibilities in the framework of IMDOS and other areas GEMS Ocean, etc. *See similar actions in SO1 and SO5*

10.2 IMDOS Resources: Identify the resources for IMDOS, a minimum of 0.5 FTE is already secured to the end 2023, for full operation from Jan 2024 3 FTE are required across GOOS and other IMDOS partners. GOOS should contribute 1 FTE that should be included in the overall GOOS needs assessment. *See connected action under SO11.*

SO11. Evolving GOOS Governance

Presenter: Emma Heslop
Rapporteur: Belén Martín Míguez

Presentation

Emma Heslop, Director, a.i., GOOS, reported on the status of the Governance Task Team, which is a priority, long-standing action. The ToR were agreed upon in Q3 2022, but the Task Team has not yet been constituted. The WMO has offered support to hire a consultant. The regional governance revised policy is also delayed, with activity being supported in specific regions: Pacific Islands, Caribbean, Africa, etc. as a priority.

The work to revitalise the National Focal Points, a response to a GOOS SC-8 request (2019, Kiel), is making progress, as GOOS has been able to hire a consultant to assist with the development of this activity.

Some new funding has been attracted in kind, with support from China and Korea, MTS and NOAA for the Dialogues with the Industry, EU grants, and the Ocean Decade Coordination Unit, and the IOC funded the work on the National Focal Points. But in general, progress on governance is slow and GOOS is far from being funded in a sustained way.

Discussion

GOOS SC commented on the Governance Task Team, insisting on the need to get donors involved, with some recalling Neville Smith's report as an important reference for this process of evolving and focusing GOOS governance. Some SC members considered the process could be handled internally, without hiring a consultant and questioned whether the formal process through the IOC would bring suitable candidates. It was agreed that the Circular Letter for membership of an Evolve GOOS Governance Task Team could also be distributed to the WMO members, as well as through any other suitable distribution channel, such as the GOOS newsletter, etc. It was stressed that this will be an open call with members being chosen on their individual capacity as well as taking into account other considerations as described in the ToR.

More concerns were raised around the efficacy of the National Focal Point mechanism, questioning the capacity of the focal points to deliver. This may be particularly difficult for the countries with less resources, as typically one single person must report to multiple bodies on different topics. Ms Heslop reminded the GOOS SC that this had been a demand from SC members who firmly believed that reporting through the National Focal Points could be an effective way of getting attention and recognition for ocean observing activities, and that it was important to start the process. She offered to review the mechanism in a couple of years, once implemented.

Actions: Evolving GOOS Governance

11.1 GOOS Office to develop a resources assessment in 2023: This assessment should include core structure/office and in-kind resources to get an idea of the actual running cost of GOOS. *See similar actions in SO5, etc.*

11.2 Initiate the Evolve GOOS Governance Task Team as a priority: An IOC/WMO Circular Letter sent out to solicit members for the Governance TT, also diffused through the GOOS mailing list.

6. GOOS & Ocean Decade

CoastPredict

Presenter: Joaquín Tintoré
Rapporteur: Belén Martín Míguez

Presentation

Co-Design

Presenter: Ann-Christine Zinkann
Rapporteur: Belén Martín Míguez

Presentation

Observing Together

Presenter: Kim Currie
Rapporteur: Belén Martín Míguez

A series of presentations noted progress achieved across the three GOOS Ocean Decade Programmes: CoastPredict (Joaquin Tintoré), Observing Co-Design (Ann-Christine Zinkan) and Observing Together (Kim Currie).

Discussion

The GOOS SC reflected on the current balance of the investment of resources that the Ocean Decade programmes entail. Some members expressed great concern about the frustration that

the lack of funding to support the activities, and which was an incentive to join the Ocean Decade, is generating in the ocean observing community. It is a risk for the continuation of their involvement with Ocean Decade activities, and it may be necessary to end some of the initiatives. For Ocean Observing Co-Design it was suggested that the Programme could limit itself to 3-4 exemplars, instead of the current 6. It was also noted that work on Ocean Carbon is already happening outside the exemplar, hence, a better alignment should be sought across the community, instead of duplicating work.

Some GOOS SC members indicated that, even without funding, the GOOS Programmes had been very successful in improving engagement with users and with coastal communities. The Observing Co-Design exemplars, if well utilised, could be helpful to raise funds for ocean observing by providing clear and punchy synthesis of projects where nations could invest.

There was also a general remark on the convenience of being more inclusive and adding the marine life perspective in many of the activities that Observing Co-Design was promoting. The loss of biodiversity is a result of the physics/climate processes in the ocean and it may help to raise awareness and interest in ocean observing in general.

Ocean Integration and breaking silos

Presenter: Joaquín Tintoré
Rapporteur: Belén Martín Míguez

Presentation

Joaquín Tintoré gave a foresight talk based on a paper from Révelard et al. that considers a possible way forward to achieve an effective coordination within the ocean observing system, encompassing, working towards a collective impact organisation, reaching sustainability and promoting a culture shift, with several intermediate steps.

Joaquín Tintoré noted that one size does not fit all, so they are trying to implement this vision now in the Western Mediterranean region.

GOOS SC members provided some feedback on the presentation, mentioning that this integration is supposed to be the core business of GOOS, to the shift from multidisciplinarity to true interdisciplinarity.

DITTO

Presenter: Toste Tanhua
Rapporteur: Belén Martín Míguez

Presentation

Toste Tanhua introduced this item and gave an overview of this Ocean Decade programme, led by GEOMAR and Kiel University, and progress achieved so far. DITTO (Digital Twin of the Ocean) will establish and advance a digital framework for marine data, modelling and simulation, as well as AI tools, to enable shared capacity to access, manipulate, and visualise marine information, and create scenarios around issues such as energy, mining, fisheries, tourism, and nature-based solutions.

Discussion

A large part of the discussion considered the benefits of such an ambitious approach versus the likelihood of the full accomplishment of DITTO goals. An ambitious approach can act as a catalyst of many developments and a marketing opportunity to attract funds. However, it was also recognised that a full accomplishment would require extremely high performance models and high resolution and quality data that are not yet available.

GOOS SC can recognise the opportunities that DITTO can bring, and insist on the importance of ocean observations as a fundamental pillar for its success. However, formal endorsements need to be considered carefully, as there are many Ocean Decade programmes potentially worth supporting.

DCO Decade Collaboration Office

Presenter: Emma Heslop
Rapporteur: Belén Martín Míguez

Presentation

Emma Heslop, Director, a.i., GOOS, presented this item and provided an update on the current status of the DCO whose ToRs were approved in 2022 by the GOOS Steering Committee and IOC Executive Council. The DCO Ocean Observing will be coordinating 10 Programmes and the Decade Coordination Unit has provided funding ($100K) to support a DCO Lead for the first year of operation. The DCO Lead is in process of being recruited and will start towards the end of Q2.

There is also a request to participate in shaping the Ocean Decade Vision 2030 with goals for 2030 in the field of Ocean Observing. GOOS has been asked to take care of organising this process of goal setting for Challenge 7 around Ocean Observing. The Decade Coordination Unit has defined a process, which can be found in the presentation and comprises analysis of user requirements, priority needs and how they are covered by the different Ocean Decade Programmes/Projects, in close connection and consultation with stakeholders.

Discussion

GOOS SC discussed how realistic participation in this exercise related to the Challenge 7 as part of the Ocean Decade Vision 2023 is for GOOS, given that resources are already stretched.

Some members indicated that GOOS should leverage efforts already being done by countries themselves, as they are following the Ocean Decade programmes closely and assessing their progress, and also leverage what GOOS has already produced, e.g. the GOOS 2030 Strategy, GOOS 2030 Strategy Implementation Roadmap, and OceanObs'19 Papers.

The GOOS SC considered that it was important for GOOS to respond to this request, but at the same time making clear that there are limits to the support available and so to the approach taken for delivery.

Actions: Ocean Decade

13.1 Carefully support the Ocean Decade Vision 2030 Process: Support this initiative for setting the Ocean Decade goals ocean observing (Challenge 7), using existing work already developed for this purpose, and assessing or revising in the light of broader Ocean Decade needs. Set a method that is cognisant of resource limitations.

7. GOOS SC Governance Items

ETOOFS Evolve Role and ToRs

Presenter: Pierre Bahurel (remote), Denis Chang Seng (remote)
Rapporteur: Maciej Telszewski

Pierre Bahurel, the Chair of the Expert Team on Operational Ocean Forecasting Systems (ETOOFS), noted that the Terms of Reference of the Expert Team require revision, as they were developed under JCOMM which is now disbanded. In addition, the Ocean Decade and the development of the Ocean Decade Collaboration Centre (DCC) for Ocean Prediction also presented an opportunity to have implementation support for operational ocean forecasting systems. He noted that ETOOFS will develop a process, including review, to update ETOOFS Terms of Reference. This will be completed so that they can be presented to the next GOOS Steering Committee (GOOS SC-13) for adoption.

GOOS National Focal Points (NFPs) Terms of Reference

Presenter: Ramasamy Venkatesan (remote)
Rapporteur: Maciej Telszewski

Presentation

The GOOS Steering Committee requested an update to the GOOS National Focal Point (NFP) Terms of Reference (ToRs), to help GOOS better serve Member States' ocean observing activities and help Member States contribute to the implementation of a sustained global ocean observing system. The resulting updated draft Terms of Reference reflect the importance of the National Focal Point role in the implementation of the GOOS 2030 Strategy.

The updated ToRs are structured as (1) Description (2) Terms of Reference - Specific responsibilities of the GOOS NFPs (3) GOOS support to the National Focal Points (4) Benefits of the GOOS National Focal Point Role - to Member States & to GOOS with Annexes 1: Guidance for National Hub / Committee and 2: National Focal Point list of potential connections.

The draft of the updated NFP ToRs was completed in February 2023 and then communicated to Member States by IOC Circular Letter (CL 2931) for comment, this Circular Letter was also successfully used as an opportunity to solicit additional NFP nominations.

GOOS is increasing the number of National Focal Points and now has 74 (July 2023), and plans an 'all hands on deck' virtual meeting in Oct 2023.

Decision 1: GOOS National Focal Point Terms of Reference

The GOOS Steering Committee adopted the updated **GOOS National Focal Point Terms of Reference** with minor modifications - the new GOOS NFP ToRs can be found here.

IMDOS Project

Presenter: Artur Palacz (remote)
Rapporteur: Maciej Telszewski

Presentation

Artur Palacz presented the proposal of Integrated Marine Debris Observing System (IMDOS) to become a GOOS project, and explained the benefits to IMDOS and the ocean observing system of considering IMDOS as a GOOS project (see also Strategic Objective 10 for discussion about IMDOS).

Although the Steering Committee members were 100% behind the work that has been undertaken in developing IMDOS and recognised it as important, there was some discussion around whether GOOS should accept further GOOS Projects at this time. The GOOS Core Team is already overloaded and the Steering Committee should be seeking to prioritise and reduce that load. The idea is that GOOS Projects should bring something new to the ocean observing system and that they should have some time limit. There was support for this approach to develop a new activity outside of the permanent structure, but at the same time enabling advice and recommendations from GOOS provided to the project, with a pathway to be

'plugged' into the system. Projects should perhaps only last 3-5 years, and then be integrated or become a permanent structure of some sort, for example DOOS has now been in existence for some time and is perhaps approaching becoming a permanent structure; there is a parallel with the ocean acidification network (GOA-ON) which after 10 years is a successful independent project with 3 organisations supporting it and 5 staff, and coordination through the IOC Ocean Science Section. IMDOS could follow a similar path or perhaps after 5 years it will be embedded within GOOS, as it relies on the GOOS networks. There was also some question as to the naming, with a suggestion that it was not a system per se, but actually a network.

OceanOPS noted that resources would need to be provided in order to support the integration of the marine debris metadata into an integrated system view.

There was a request for some clarity on the timeline and deliverables for IMDOS, and how this structure should evolve, once the project is underway. Plus a need to tailor the proposal to 5 years and work on the transitioning to GOOS or other permanent structure.

There was general consensus for this approach and that IMDOS represents a very good example of a GOOS projects and that it should be endorsed; however that a review of the portfolio of GOOS Projects was required, including their governance from a GOOS perspective.

Decision 2: Integrated Marine Debris Observing System

The GOOS Steering Committee endorsed the Integrated Marine Debris Observing System (IMDOS) as a GOOS Project, on the understanding that it will have its own secretariat support from 2024.

IMDOS is asked to provide some more clarity on the timeline and deliverables, and how this structure should evolve with GOOS, once the project is underway. Using a timeline of 5 years and considering the transitioning of the project to become a part of GOOS or some type of permanent structure.

Actions: GOOS Projects

13.2 Undertake a review of the portfolio of GOOS Projects: including their governance from a GOOS perspective.

Ocean Observing Physics and Climate Panel (OOPC) Updated Terms of Reference

Presenter: Belén Martín Míguez
Rapporteur: Maciej Telszewski

As OOPC's ToR was created some time ago, and reference to JCOMM, which no longer exists, appears many times, the OOPC Terms of Reference (ToRs) have been updated. OOPC, as well as GCOS, have three parent bodies respectively, and both OOPC and GCOS must fulfil all parent bodies' needs and follow their instruction. GCOS had suggested revisiting the ToRs for all its panels, which included the co-sponsored OOPC. Considering the situation, an update was made to OOPC's ToRs.

- JCOMM was removed
- Observations Coordination Group (OCG) was included when appropriate.

There are some additional potential pending items to be addressed as well, however, these are not a priority and will be considered in time:

- Eliminate or rationalise some of OOPC's tasks and/or responsibilities, as at least three are similar to OCG's ToRs.
- Membership control; membership has grown and some lines were not well-structured.
- The chairs of the panels have always been selected by GCOS, making other sponsors' roles look less important; therefore, it is recommended to include 'and with the other sponsors' in the document.

Action: OOPC Updated ToR

13.3 OOPC to address the pending items of OOPC ToRs for the next Steering Committee Meeting, GOOS SC-13.

a) Eliminate some of OOPC's tasks and/or responsibilities
b) Improve membership control
c) Assess the appointing of chairs, previously always from GCOS, and use the term 'and with the other sponsors' in the narrative.

SC Membership Renewal

Presenter: Toste Tanhua
Rapporteur: Maciej Telszewski

Presentation

The membership period of GOOS Steering Committee Expert Members is 3 years, with the possibility to renew one additional term. Some members are reaching the point of completing the maximum of 6 years service and additionally some members are leaving due to changes in their roles. There will be a call in Q3 2023 for new Steering Committee Members, with complementary skills and knowledge to enhance the strength, breadth and diversity of Steering Committee Membership, including expertise in satellite observing, to enhance connection to this

community through a suitable expert. This call will be sent out via IOC and WMO Circular Letters.

Actions: SC Membership

13.4 Call for new SC Members: GOOS HQ with GOOS Co-Chairs to assess SC membership and create a list of expertise that is sought. Call to be sent out in Q3 2023 for new Expert Members of the GOOS SC, so that they can start in 2024, with the new regional representatives [appointed at the IOC Assembly in June 2023].

8. GOOS Office

Presenter: Emma Heslop
Rapporteur: Denis Chang Seng

Presentation

Emma Heslop, Director, a.i., GOOS, presented updates and key suggestions for the GOOS work from the GOOS Office perspective.

Discussion

The GOOS SC discussed lessons learned and how to balance GOOS efforts against outcomes. Questions were raised regarding whether ocean observation in the EEZ is a realistic endeavour for GOOS. How can GOOS increase its focus and what are GOOS new priorities? Other questions raised revolve around continuing evolving GOOS Governance; focusing on identifying resources; strengthening GOOS integration across networks and platforms; lifting the observation system in key areas; and continuing working on communication and advocacy. Many of the key elements discussed by the Steering Committee will need support from the GOOS Office HQ.

As a short term action, the Steering Committee suggested exploring opportunities to influence budget discussions and highlight GOOS needs at the IOC Assembly in June 2023. This involves engaging actively with national delegations, and asking how GOOS can support them. GOOS needs to have budget numbers and demonstrate that these activities can only be achieved by GOOS.

Some discussion took place around a pragmatic view to articulate what is needed across the ocean observing system - first simplest view is adding up all the ambitions of all the networks - a pragmatic approach. Space community has the baseline of all the voluntary commitments of all the networks.

Actions: GOOS Office

13.5 Advance on funding and resource mobilisation: The GOOS SC made the following suggestions:

a) Continue exploring staff loans and secondments.
b) Philanthropic support and engagement in green and blue fund opportunities.
c) Assess GOOS budget problems and explore opportunities to articulate needs at the IOC Assembly
d) GOOS Office to create a strategy list and engagement plan for top 10 potential donors for BioEco Panel support (EC, Australia, philanthropists, foundations?)
e) GOOS needs stable funding support from Europe, explore the options.

13.6 Articulate GOOS unique core value proposition. Identifying GOOS unique core values and inspiring ambitions that can be achieved and measured, while galvanising collaboration.

9. GOOS Components

- **OOPC Panel**
- **BGC Panel**
- **BioEco Panel**
- **OCG**
- **GRA**
- **Task Team to advance development of an Arctic GRA**
- **CIOOS**
- **ETOOFS**

Ocean Observations Physics and Climate (OOPC) Panel

Presenter: Weidong Yu (remote)
Rapporteur: Denis Chang Seng

Presentation

The GOOS SC recalled that GCOS had decided to focus on emphasising the qualitative targets for ocean observation on the premise to facilitate and advise actionable recommendations and guidance and outcome. However, there is a need to strengthen the quantitative description of targets. The WMO Rolling Review of Requirements also supports a comprehensive, systematic, and quantitative way to capture observational requirements to meet the needs of all WMO programmes. It was emphasised that new dialogues with the G7 are required concerning co-designing and defining targets of ocean observation. Application is a keyword, and the

Co-Design Programme works in this direction but it may take several years. Could the GOOS Exec discuss the pathway and the interim?

Biogeochemistry (BGC) Panel

Presenter: Kim Curie
Rapporteur: Denis Chang Seng

Presentation

There is a need to prioritise and identify what are the most important GOOS Strategic Objectives, as well as activities, funding resources and develop a strategy to raise funds. System integration was identified as a key element to help better understand the availability of existing products (i.e., Argo, satellites, etc.). The BGC needs guidance on system integration and more engagement with the other GOOS Panels. A key challenge is sharing biogeochemistry data within countries.

GOOS SC members discussed whether the GOOS community knows the cost and economic value of having a robust global observing system. It was suggested to develop a pragmatic approach and present what we know from baselines as a first estimate concerning targets and cost due to the lack of an overall integrated view of GOOS. India pointed out that they have an operational value of the cost of their ocean observing system.

The International Ocean Carbon Coordination Programme (IOCCP) of the BGC

Key questions raised include what is the time scale to set up the Certified Reference Materials (CRMs) hubs. The time scale will be approximately 5 years. IOCCP has multiple sponsors (e.g., SCOR and IOC UNESCO) and works on its plans and priorities. The IOCCP plans and priorities align with GOOS, but not exclusively.

BioEco Panel

Presenter: Gabrielle Canonico
Rapporteur: Denis Chang Seng

Presentation

BioEco activities (healthy functioning of the Panel, Essential Ocean Variables (EOVs) development, data coordination and observations) are of high priority to GOOS. Ms Anya Waite, Co-Chair of the GOOS Steering Committee, reflected that activities of the BioEco Panel on EOVs for reporting and decision-making are the best example of GOOS observations having a direct role for management and that GOOS should message BioEco Panel efforts accordingly.

Due to limited GOOS funding, prioritising how best to support and sustain the Panel is key. Mechanisms are needed to assist the panels to work collectively across disciplines and therefore interact effectively. This requires sustained staffing for supporting the core functions of each panel (at a minimum, a full-time IPO for each of the three panels). It is also important to evaluate possible gaps and opportunities for improving integration across all of the GOOS components, beyond just the panels, and develop a collective view of what are the actions/resources needed to facilitate integration to ensure effectiveness.

The BioEco Panel encouraged discussion of a strategy for ensuring long-term support for the Panel. Funding for the IPO position is currently unavailable to provide full-time support for the work requirements of the Panel and has not been for the last three years. During the SC discussion, the other Panels emphasised that sustained support for the BioEco IPO is critical to their effectiveness, given overlaps of BioEco observing with climate and BGC observing efforts. The BGC Panel stated that the IPO should be the highest priority for GOOS funding.

It will be important to identify the users of BioEco observations and data and design metrics that provide measures of impact. These could include sharing user statistics for the BioEco Portal or documenting the use of BioEco best practices and whether these have increased. A specific suggestion was that GOOS create a map of which countries are collecting BioEco EOVs and which are not (this visualisation would be a useful tool with IOC members and may help GOOS target needs/opportunities for capacity development). In addition, GOOS should continue to engage with the Convention on Biological Diversity on the development of indicators for the Kunming-Montreal Global Biodiversity Framework and ensure GOOS is engaging with groups that have reporting and other requirements for biological observations.

(Note that a working group for developing these indicators has been established and a monitoring framework agreed upon. See Ad Hoc Technical Expert Group on Indicators and Monitoring framework for the Kunming-Montreal Global Biodiversity Framework)

The SC also discussed the need for a strategy for long-term support for BioEco data coordination. OceanOPS indicated a need for funding support to ensure they can engage with the BioEco community, attend BioEco meetings, understand BioEco data sources and needs, support data flow mapping, etc. This should also include a discussion of how OceanOPS can interact with the Ocean Biodiversity Information System (OBIS) and/or the BioEco Portal (the group acknowledged that BioEco Portal funding ended in March 2023 and further development work has stopped).

Presenting a unified message is essential. There is a need to look across the Panels for support needs and develop a coherent picture of the ask for the GOOS support structures.
The SC suggested that the GOOS Office create a strategy list of the top 10 potential donors for BioEco Panel support (IOC-MSP and Member States, EC, Australia, philanthropists?).

To provide visibility within UNEP, would it be worthwhile to have GOOS work visible at the UNEA, emphasising importance for CBD, BBNJ? UNEP noted that they would be happy to have a conversation about this.

Discussion

It was brought up that GOOS needs to strengthen the quantitative description of ocean observation targets, and initiate new dialogues with G7 concerning co-designing and defining observation targets. Additionally it could be useful to prioritise how best to support and sustain GOOS panels, and identify what are the most important GOOS Strategic Objectives, as well as activities and funding resources. GOOS could develop a strategy to raise funds and initiate a conversation of a strategy for ensuring long-term support for the panels, and provide sustained support for the BioEco panel due to overlaps with climate and BGC observing efforts. It was noted that BioEco support (IPO) should be considered one of the highest GOOS priorities for funding. Further comprehensive mapping of which countries are collecting BioEco EOVS could be carried out to coordinate more effectively with implementers and others, including OCG and WMO stakeholders. It was suggested to identify who are the users of BioEco observations and data, and design metrics that provide measures of impact. Finally discussion brought up the idea of developing a first estimate concerning targets and cost of global ocean observation and evaluating possible gaps and opportunities for improving integration across all of the GOOS components, beyond just the panels as well as developing a collective view of actions and resources needed to facilitate integration to ensure effectiveness.

Actions: BioEco Panel

13.7 Develop an operational and high-level engagement with UNEP - *see other similar actions*.

13.8 Identify resources for the BioEco support role as a priority

OCG

Presenter: David Legler
Rapporteur: Denis Chang Seng

Presentation

David Legler, GOOS Observation Coordination Group Chair, presented on the OCG. He noted that the networks are still recovering post-covid and gaps remain, noteably in RAMA, Argo floats and drifters in the Indian Ocean, which will partially be helped by the US commitment to replace last RAMA/PIRATA moorings and new incoming TAO TPOS buoys. Mr Legler highlighted the significant accomplishments of the OCG over the last year, including leading substantial GOOS engagement with the WMO Rolling Review of Requirements process, SC approval on GOOS

request to be considered in GBON, engagement with potential new networks and 3 existing ones transitioning to mature status, progress on metadata standard across networks, endorsement of 6 best practices and an additional three underway, GOOS report card being incorporated into GOOS with OCG/OceanOPS leading, publication of the OONJ Workshop Report, continued capacity development with a webinar series and in-person workshop in June, and positive progress on the OceanOPS strategic plan.

Mr Legler shared future plans for the OCG with the steering committee, which include implementation of the OCG data strategy to move towards seamless, integrative, and equitable data access, development of metrics for OCG network maturity, lowering of barriers and increased industry partnership with the GOOS/MTS Dialogues webinar series, further consideration of ocean networks in WMO GBON, evolution of the system through observing technology development, assessment and infusion across networks, improved engagement and interaction, and an OCG-14 Meeting and 2 workshops.
Mr Legler concluded with several asks and issues to raise to the Steering Committee including:

- Defining the ocean observing system: OCG would like to work with other panel networks to refine observing system attributes and maturity standards/attributes
- Observing Costs on the rise: GOOS should improve and increase messaging on importance of ocean observing and impacts of constrained resources, SC - do we need a strategy to seek additional support directly from funders?
- Requirements and WMO: across GOOS need better understanding of/engagement with WMO RRR and SoG processes (SC - need more GOOS clarity on its roles in defining/use of “requirements”)
- Priorities: SC - What are the most important strategic activities and connections?
- OceanOPS: operating on tight budget with little room for growth to fill growing gaps and needs from the community

GRA

Presenter: Carl Gouldman
Rapporteur: Denis Chang Seng

Presentation

Mr Carl Gouldman, Chair of GRA Council updated the steering committee on the status of the GOOS Regional Alliances Council, including the launch of a new Sanctuary Soundscape Monitoring Project Web Portal, the near real-time publication of Quick Bulletin of Ocean Conditions with data on the ocean current (Kuroshio etc.) and sea surface temperature around Japan, highlighting of the Pacific Science and Traditional Knowledge at the UN Ocean Conference Side Event, recovered IMOS Southern Ocean long-term air-sea flux and biogeochemistry mooring, the European Ocean Observing System Strategy 2023-2027, and the improvement of the visualisation of sea level through digital tools. He further shared some opportunities such as development of the Ocean Observations Catalogue and the benefits it

would deliver, revitalization of GRA's including PI-GOOS, IOCARIBE-GOOS and GOOS Africa, participating in developing actions for implementation of GOOS 2030 Strategy and GOOS UN Decade Programmes. Finally, he shared future plans which include coordinating the next GRA Forum, an update to GOOS regional policy with a refresh to the Societal Benefits of GRAs Paper, and GRA capability assessment.

Actions: GRAs

13.9 Understanding benefits and limits of national systems versus regional (GRA) coordination: If we assume that national systems are easier for some nations to fund and not for others, and regional ones take more coordination effort and have fewer $ for implementation, then perhaps we focus conversation on what project level coordination is best for both frames regional and national. GRAs with NFPs are invited to discuss with GOOS Office at next GRA meeting. Has resonance with notions of subsidiarity and the GOOS SC-11 discussions around assessing Regional Policy, could help with that process.

Task Team to Advance Development of an Arctic GRA

Presenter: Craig M. Lee
Rapporteur: Denis Chang Seng

The GOOS SC appreciated the sharing of the concept document for the creation of a Task Team to advance the development of an Arctic GRA. GOOS key issues of concern, in order of importance, are Indigenous people engagement, members of the Task Team with a balanced diversity and set of skills, and Canadian participation. The SC also noted this is a challenging time for such discussions, given that the Arctic Council is pausing all official meetings of the Council and its subsidiary bodies until further notice. In addition, there are major legal implications to engaging in discussions and reaching an agreement with Indigenous communities in countries such as Canada. Last, but not least, the ongoing conflicts in Europe pose a challenge and, overall, there is a risk of potential political pushback.

It was noted that while several members of the GOOS SC are supportive of the initiative, the challenges mentioned need to be addressed before the TT endorsement.

Decision 3: Arctic GRA Task Team

GOOS SC appreciated the concept document for the creation of a Task Team to advance the development of an Arctic GRA, and supports the concept.

GOOS SC recommended the Arctic GRA team strengthen the proposal by addressing the following issues, and submit a revised proposal to the SC, whenever it is ready:

1. Indigenous Engagement: More details required on planned indigenous engagement activities, including a timeline and needed resources that reflect a strategy for early engagement and inclusion.
2. Canadian participation in the Task Team: This would help to strengthen the TT and GOOS support, noting that the Canadian Integrated Ocean Observation System (CIOOS) has just been formally accepted by GOOS SC as a GOOS Regional Alliance. It was also recommended that CIOOS play a role in the discussions with the Indigenous communities in Canada.
3. Balance: Geographical, balance of discipline and expertise in marine biology, international science communication and updated list of Task Team members that reflects GOOS priorities, including:
    a. integration of biology and ecosystem observations in addition to BGC and physics/climate, including participation from networks engaged in biological observing (e.g., MBON, DBO, others) as well as Hydrological Observing System level; and
    b. a representative from the Global Cryosphere Watch (GCW) Programme and the Panel on Polar and High Mountain Observations, Research, and Services, both at WMO. The GCW leads the ice/snow-related activities globally (e.g., ice charting working group, ice nomenclature development).

    4. Alignment: Task Team membership should align with GOOS principles and expectations.

The Canadian Integrated Ocean Observing System (CIOOS)

Presenter: Shayla Fitzsimmons
Rapporteur: Denis Chang Seng

The Canadian Integrated Ocean Observing System (CIOOS) was established in 2019 to address siloed ocean data and the lack of a formal coordination and collaboration mechanism for the ocean-observing community in Canada. CIOOS engages locally, connects regionally, and coordinates nationally to elevate Canada's ocean monitoring to the global stage. CIOOS is not directly engaged in ocean observation. It was clarified that CIOOS does not itself collect data, but rather work with other people and organisations who do ocean observation. CIOOS is associated with three regional associations of CIOOS that have strong existing networks of ocean observation. It aims to provide users with an online platform to discover, access and visualise high-quality open data and interoperable systems. It is a single-point access that generates information based on a bottom-up approach, and data also flows to the WMO.

CIOOS funding is available and committed to the foundation activities, however, more long-term funding is required.

The GOOS SC noted that CIOOS with its three national systems contributes to GOOS. CIOOS recalled being a member of the Commonwealth Blue Charter, for which a lot of synergy and cross cooperation is achieved.

Decision 4: Canadian Integrated Ocean Observing System (CIOOS)

The GOOS SC:

Welcomed and endorsed the CIOOS proposal to become a GOOS Regional Alliance.

Recommended that CIOOS cooperate with other GRAs, and establish connections with the Arctic GRA Task Team to advance the development of an Arctic GRA, and other open ocean initiatives.

ETOOFS

Presenter: Enrique Alvarez Fanjul (remote)
Rapporteur: Denis Chang Seng

Presentation

One of the roles of ETOOFS is to support the forecasting world. This connection between observations and forecasts 'flows' in two directions; first, what is needed from the forecasting point of view and how forecasting can highlight the importance of observation and benefit institutions that are looking for funds to do ocean observation.

There is a clear connection between ETOOFS and the Ocean Decade Programmes, for example through the Decade Collaborative Centre for Ocean Prediction, however, the way ETOOFS is going to serve and benefit from these Programmes is not clear yet. Overall, ETOOFS will need to explore and show potential relationships with other Ocean Decade programmes. ETOOFS activities in the future should also focus on data integration and exploring connections with WMO, ForeSea, as well as OceanPredict among others.

Concerning the Guide published by ETOOFS, it is fundamental to also clarify that forecasting is the integration of observations and models and is not a synonym for modelling. The observational part is an essential component of the forecast. Mr Alvarez, Vice-Chair ETOOFS, pointed out that a large section of the Guide is on observations describing the different observing systems and how these observations should be integrated into the forecasting system.

The WMO expressed its interest in Operational Ocean Forecasting Systems (OOFS) highlighting that OOFS is important to the realisation of the National WIGOS Implementation Plan (N-WIP). WIP is considered to be an important tool for the implementation of the WIGOS at the national level by the WMO Members to identify and address the gaps and challenges, to meet the observational data requirements for national and international users, to design fit-for-purpose observing networks with the capability of the expansion for future requirements, to operate and maintain the observing networks sustainably, and to support the decision-making processes of all application areas with required observational data.

WMO suggested establishing a joint IOC-WMO Team on Operational Ocean Forecasting System consisting of GOOS and WMO INFCOM, specifically the Standing Committee on Data Processing for Applied Earth System Modelling and Prediction. The joint effort is expected to avoid duplication and attract additional resources for OOFS. Mr Alvarez emphasised that it is very important for the WMO to finalise the review process and endorse the publication of the OOFS Guide already published as a GOOS document in June 2022. He welcomed the proposal for a conversation on the joint IOC-WMO OOFS.

Action ETOOFS

13.10 WMO and the OOFS Guide. WMO to finalise the review process to facilitate the joint IOC-WMO publication of the OOFS Guide (Guideline), already published as a GOOS document in June 2022.

13.11 ETOOFS TORs. ETOOFS to develop a consultation process for the ETOOFs ToRs, including a conversation with WMO on OOFS and connection to ETOOFS. ETOOFS to report back to the SC in Q3 with an outline of the process and to GOOS SC-13 with revised and reviewed ETOOFS ToRs

10. GOOS Projects

- **TPOS 2020**
- **AtlantOS**
- **DOOS**
- **OBPS**
- **SMART Cables**

TPOS 2020

Presenter: Billy Kessler (remote)
Rapporteur: Belén Martín Míguez

Presentation

In response to the recommendations for system redesign proposed during the TPOS 2020 review, this project has undertaken significant steps to implement them. Billy Kessler put strong emphasis on the interaction with stakeholders and international cooperation.

Key aspects of the project include:

- Addressing the Exclusive Economic Zone (EEZ) in the West Pacific with the WMO's support.
- Development of a Pan-Tropical System:
  The GOOS Report commissioned from Neville Smith was referred to in order to highlight two main triggers that underline the importance of such a regional system: the occurrence of significant meteorological phenomena at the regional level and the needs of users within those regions.
- David Legler stressed some important key concepts to be considered: Steering Group, Resources Forum, offering guidance, and the value of having many people in deciding the future.
- The project also needs support for coordination.

The SC recognised the necessity of having distinct regional systems to address specific phenomena occurring at the regional level, and acknowledged the importance of fostering connections between countries at a regional level.

AtlantOS

Presenter: Jessica Snowden (remote)
Rapporteur: Belén Martín Míguez

Presentation

AtlantOS has been working on looking into the project's composition after Covid-19. AtlantOS has been re-invigorated thanks to NOAA's funding. This financial boost has allowed AtlantOS to rebrand the project. Jessica Snowden emphasised that AtlantOS's primary role is to explore opportunities for interactions. AtlantOS has held and been preparing several workshops: (1) low cost technology, (2) boundary current, and (3) integrated EOV based ocean obs system.

Despite these positive strides, AtlantOS faces challenges in making its governance clear. Jessica stressed that AtlantOS is aligned with GOOS work and open to conversation with GOOS to find a way for AtlantOS to efficiently support GOOS.

Within the Atlantic, AtlantOS can add value in establishing connections, such as leveraging best practices from one country to another. The project also wishes to connect with the Caribbean. For those seeking assistance or engagement with AtlantOS, Jessica Snowden encouraged interested parties to reach out.

AtlantOS conducted gap analysis using GOOS national focal points and national priorities around the Atlantic. They also carried out analysis on the UN Decade regional workshops, paying attention to what was highlighted in those documents.

DOOS

Presenter: Leslie Smith (remote)
Rapporteur: Belén Martín Míguez

Presentation

The Deep Ocean Observing Strategy (DOOS) has been making remarkable strides in the past year. particularly thanks to the funding received, which is projected for 4 years. The project has grown into a highly active initiative in diverse meetings, events, data work and documentation. Noteworthily, ocean bottom pressure has been newly included in EOV.

A special appreciation goes to the Deep Ocean Observing Researchers (DOERs), a group that consists of many researchers in their earlier career from all over the world. Some DOERs researchers are from countries that do not usually get a lot of representation as well as from places without enough money for research.

DOOS has been actively engaged with GOOS including the EOV panel and DCO Ocean Observing. Leslie Smith appreciated the previous participation of Toste and Belén in their annual meeting last year, and invited GOOS SC members again for their annual meeting in 2023.

OBPS

Presenter: René Gerello (remote)
Rapporteur: Belén Martín Míguez

Presentation

The Ocean Best Practices System (OBPS) supports Ocean Decade and works with developing nations and Indigenous Peoples. They also commit to promote young professionals by involving Early Career Ocean Professionals (ECOPs) in OBPS leadership positions and roles as ambassadors.

Some questions around the usage of OBPS were also raised: Is there any document which is more popular than others? Who are the users? Pauline Simpson, OBPS Project Manager, responded and pointed out that OBPS have statistics and records, which allow them to assess popularity and usage trends. Ocean acidification and well-known titles are very popular, but there are some unexpectedly popular documents as well. Regarding the interest in

understanding the user demographics, it is noted that while there was a remarkable numeric figure, it would be necessary to track the users and how they have implemented the best practices to understand impact.

OBPS has developed training videos and they have their own YouTube channel. However, OBPS indicated that they still try to have written material in case the videos become inaccessible.

SMART Cables

Presenter: Bruce Howe (remote)
Rapporteur: Belén Martín Míguez

Presentation

The SMART Cables main accomplishment is the coverage of the mid-Atlantic Ridge and Portugal connected to Madeira and Açores, which is 154m far from Portugal mainland. The project is funded as follows:

1. Portugal is funding the SMART Atlantic CAM cable system: Lisbon-Azores-Madeira ring/triangle, 3700 km, 50 SMART repeaters (ocean bottom temperature, pressure, seismic acceleration), operational 2026, €154 million. SMART part about 10%. Will cover the eastern north Atlantic from the Mid-Atlantic Ridge to the Continent. Cost is analogous to a ship with sensors and data for 25 years.

2. EU DG CONNECT issued an RfT for €153 million, for international cable connectivity to outlying territories. Support for environmental sensing (e.g., SMART Cables) is included; results to be announced. Outlook positive for future such calls.

The sensors that are used for the project cost about 15,000 US dollars per year, and its lifespan is 25 years. Usually, platforms cost 90% of the budget, but SMART Cable uses others' platforms, saving significant money for the project. Recently, the EU digital connectivity section closed up a request for proposals of 100 million euros for international cable connectivity to outlying territories, and they explicitly included smart capability as an item to fund.

SMART Cables expects to have a senior SMART officer (consultant) for the secretariat support at the IOC headquarter.

Portugal or New Caledonia will be the first country to use SMART cables for early warning centres. Portugal's main driver to cooperate with SMART Cable was the threat of tsunami. SMART Cable is closely working with the IOC Tsunami Resilience Section. OCG has also engaged with the project already, and SMART Cables will be considered as an emerging OCG network.

11. Priorities

A general overarching theme for SC comments was around focus, this had two components; firstly that GOOS needs to reduce the number of actions and focus on the most important priority actions/areas, secondly that that GOOS seeks to improve internal cost/benefit analysis of actions and partnerships, and ensure the unique input or position of GOOS that is making this a GOOS action is understood.

The GOOS Steering Committee identified the following areas as priorities for action in 2023-2024.

- **Advocacy and Communication:** is a clear high priority, including better 'selling' of GOOS to funders and external audiences.

- **Regional implementation:** and GOOS connections to regions. GOOS needs to work to improve regional implementation.

- **Leverage the Ocean Decade:** we have good activities and this is a way to attract funding and recognition and lobby the IOC. Co-Design was highlighted as a cross-GOOS Programme.

- **Evolve GOOS Governance:** is a high priority, move forward open call Circular Letter to IOC and WMO.

- **GOOS Core resource work:** Define what we need as Core Resources and a resourcing plan. An initial focus in defining an 'ask' for the IOC Assembly.

Additionally identified by some Steering Committee members as a priority is the need for an integrated cross GOOS approach for data and metadata, and it was noted that data flow is at the core of implementing the value chain - from observations to users. The developing and deepening connections with the World Meteorological Organisation (WMO) were also welcomed, and working with the WMO Rolling Review of Requirements was highlighted as important. Finally, there was also a suggestion to increase the rigour of internal evaluation, such that GOOS should bring more rigour as to how a GOOS Project, GRA, EOV, network, etc. is accepted and considered the GOOS structure.

A final review of the 3 top priorities from each SC Member, confirmed that these were 1) resources for GOOS (BioEco Panel, BGC Panel, Data, GOOS Office, etc.) 2) advocacy and communication, with some focus on the unique core values and functions of GOOS, 3) Partnership and work with the WMO (including the RRR), 4) The Ocean Decade and GOOS Decade Programmes as an important core element, and 5) Data integration across GOOS.

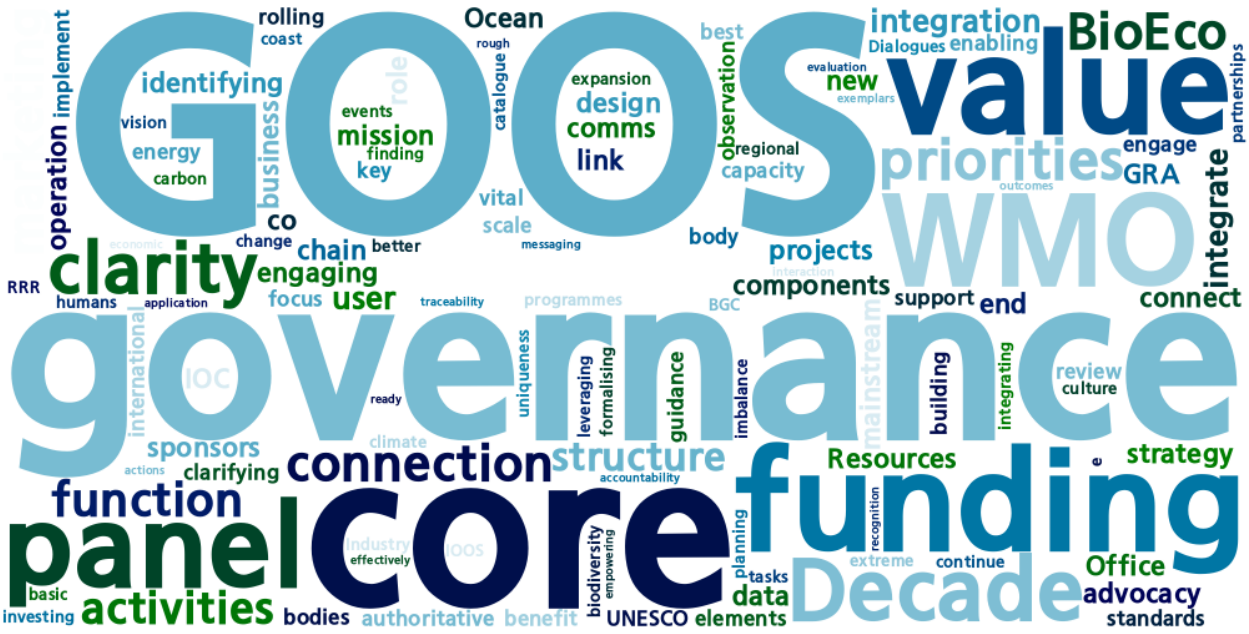

Figure 1: A word cloud of the top priorities exercise.

DIGITAL ANNEXES

List of Participants

Agenda

Presentations and Documents

ACKNOWLEDGMENTS

The Global Ocean Observing System

unesco Intergovernmental Oceanographic Commission

WORLD METEOROLOGICAL ORGANIZATION

UN environment United Nations Environment Programme

International Science Council

Published by the Global Ocean Observing System Programme under the Intergovernmental Oceanographic Commission of UNESCO, 7, Place de Fontenoy, 75352 Paris 07 SP, France

Editorial Team: Emma Heslop, Yeaji Baek, Forest Collins

For bibliographic purposes, this publication should be cited as follows: Final Report of Twelfth Session of the GOOS Steering Committee (GOOS SC-12), GOOS Report No.291