

14th GOOS Steering Committee meeting (SC-14) | 19-21 February 2025 (Paris)  
Background paper

**Session:**

2 Observation system design and development

**Agenda item:**

2.4 RRR and Evolving GBON

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**Introduction/Background**

The Rolling Review of Requirements (RRR) is a systematic and transparent process within the WMO Integrated Global Observing System (WIGOS) framework that supports the design and evolution of WIGOS by compiling information on service (user) requirements for observations across various WMO Earth System Application Categories ([ESACs](#)). These are then brought together into a summary called a Statement of Guidance (SoG) document.

The RRR involves a review of service (user) requirements for a set of Application Areas (AAs) under each ESAC, assessment of current and planned observing system capacity, a critical review of gaps by AA, and development of the SoG across AAs and by variables for each ESAC. Finally the SoG recommendations are combined into a high-level guidance document for the evolution of global observing systems across ESACs.

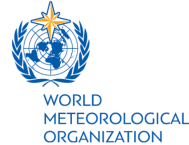
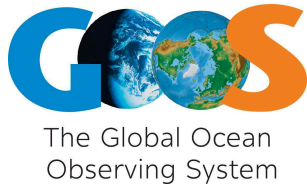
The RRR process is designed to be technology-free and unconstrained by specific types of observing technology. Each requirement is expressed quantitatively, including the geophysical variable to be observed, the domain, and the performance level quantified by criteria such as uncertainty, horizontal and vertical resolution, observing cycle, timeliness, stability, layer/s quality, and coverage quality. It is also designed to query the needs for existing and developing services, not future services. As the name suggests the RRR is undertaken regularly, and there have been 10 SoGs developed since 2011-2020.

<https://community.wmo.int/en/rolling-review-requirements-process-legacy-version>

Since 2023, the RRR process has included an Ocean category - Ocean ESAC - with 7 application areas (AAs), see below. Other key current ESACs are Atmosphere (considering the needs of global numerical weather forecasting, and the original 'ESAC' and purpose of the RRR), Cryosphere, and under development are Hydrology and Earth System Applications.

The Ocean ESAC application areas (AAs) are:

- Ocean forecasting and real-time monitoring.
- Coastal forecasting.
- Oceanic climate monitoring and services.
- Tsunami monitoring and detection.



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- Marine environmental emergency response.
- Maritime safety (ports to open ocean).
- Ocean Biogeochemical Cycles Application Area (not yet initiated)

Relevant Links:

- [ESACs](#)
- [RRR](#)

The Global Basic Observing Network (GBON) is a crucial component of the WIGOS framework, and was designed to identify the 'basic' requirements of global numerical weather prediction (NWP). GBON is mandated, in that WMO Members are responsible for establishing and managing the GBON for areas under their national jurisdiction and for ocean variables are requested to contribute towards maintaining a global network in high seas.

The design of GBON considers the Climate Monitoring Principles of the Global Climate Observing System (GCOS), particularly regarding the sustainability of uninterrupted historical climate observations. GBON requirements, like all WIGOS components<sup>1</sup>, are addressed through the RRR process, ensuring that it aligns with evolving needs and priorities.

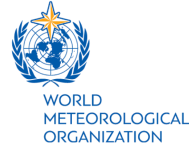
The Systematic Observations Financing Facility (SOFF) was established to enable WMO Members meet their GBON commitments by providing necessary financial, planning, and technical support to less developed countries and SIDs. Currently GBON considers only input from the Atmosphere ESAC, Hydrology is under development and a pathway for Ocean to be a part of GBON is in process. Some surface ocean variables (SST and SLP) are already in GBON as a result of inclusion in global NWP forecasting (Atmosphere ESAC), although there are as yet no ocean projects under SOFF.

The Joint Collaborative Board (JCB) is mandated to promote high-level collaboration and broad engagement of the relevant bodies of the IOC and WMO with the intent to work together to advance all aspects of the value chain related to observations, prediction capabilities, data management/access, research, global and regional services, and capacity building. At its previous session, JCB established two subgroups to work on Observations and Data, where the subgroup on observations will focus on a Global Basic Observing Network for the Ocean from a WMO and GOOS perspective. ToRs for the JCB subgroup on GBON Observations are available [here](#).

The GOOS Ocean Observing Co-Design Programme and to a lesser extent the CoastPredict Programme, both under the Ocean Decade are working on the co-design of future services. WMO has invested in the Co-Design programme to support this work and explore the links

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<sup>1</sup> WIGOS identifies a number of components, (<https://community.wmo.int/en/activity-areas/WIGOS>) Global Observing system (ocean included here), Global Atmosphere Watch (GAW), Global Cryosphere Watch (GCW), WMO Hydrological Observing system (WHOS), GBON and RBON



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between this approach for developing observing system design requirements, and the RRR with its focus on global needs for existing services. For the ocean this will be important as the maturity of services in the ocean community is much lower than for weather. Ocean services will however be increasingly needed and the connection, often regional, between ocean and atmosphere influences weather, especially for extreme events. We see gaps in services and gaps in regional improvements that Co-Design is working on.

Both CostPredict and Co-Design are under the Ocean Decade and focused on transforming GOOS.

## Current status

For the Ocean ESAC, the team has:

- Created Application Area definitions - [here](#) - all except BGC Cycles foreseen for 2025
- Defined list of ocean variables, aligned with EOVs (as far as possible), and added into OSCAR (WMO database that houses requirements for all variables) - [here](#)
- Contacted and surveyed expert groups with knowledge of service needs to develop an understanding of requirements, and entered requirements in OSCAR by variable
- Developed gap analyses for each AA and variable

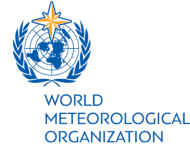
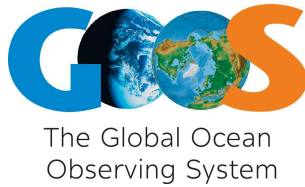
The Ocean ESAC Team is now developing the SoG, which summarises the gaps and the recommendations across the 5 more mature AAs, and assesses risk, impact and makes summary recommendations across the variables. Two application areas will be added later: the Coast AA is taking longer to develop as the community is less mature and more dispersed. The BioGeoSea EU Project has been funded and this has included funds for staff to support the Ocean Biogeochemical Cycles AA in 2025-2026.

The SoG will be completed at the end of February 2025 and shared with GOOS and other communities for review and comment. Before final sign off by the INFCOM President in June 2025.

Thanks are given to all the experts that lead the AA under the Ocean ESAC for their hard work and active contribution to this great progress, which will see an Ocean SOG published alongside Cryosphere and Atmosphere.

At the Expert Team on Earth Observing System Design and Evolution (ET-EOSDE) Meeting in December 2024, GOOS successfully requested that WMO consider the communications on the first 3 SoGs that will be completed for June 2025 (Ocean, Atmosphere and Cryosphere), including communication to the WMO Members, with focus on the new ESACs and how to use the SoGs.

The GOOS Ocean Observing Co-Design and CoastPredict Programmes are developing fast,



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see background report for Session 5b [here](#). The Co-Design Exemplar projects are working with modelling community, data, and services to understand user needs and what observing system and other value chain enhancements will deliver improved services. Exemplars include: Tropical Cyclones, Marine Heatwaves, Ocean Carbon, Storm Surge and Boundary Currents. The Exemplar projects are working to co-design observations and services together, sometimes where services do not yet exist and/or where the ocean impact is regional and subsurface data is required to improve forecasts. For example the Tropical Cyclones Exemplar project is working in a more mature area for services and is engaged in helping to define the WMO Regional Basic Observing System (RBON) requirements for WMO Region Association II with with Cyclone forecasting centres, and is also engaged with with Cyclone forecasting centres for region IV identifying how to work together in enhancing ocean observations. The Marine Heatwaves Exemplar is working towards defining what will be needed at regional/global level for services, and again this is of interest to the metservices. For the Boundary Current Exemplar fisheries, air sea search and rescue and the met office are all interested in supporting enhanced services and data - an ocean intelligence system.

The membership of the JCB GBON group is being developed and it will likely start its work after April 2025.

### Work/Project plan

Including Deliverables (e.g. Activities/Actions/ KPIs) and Budget / Resource needs

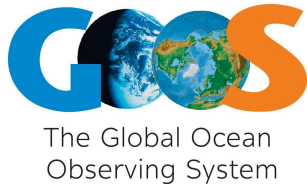
→ 2025

→ 2026-2027

2025

- February complete the Ocean ESAC SoG
- March GOOS and other communities review Ocean ESAC, with Atmosphere and Cryosphere ESACs, as appropriate, e.g. OCG, 2 GOOS SC members, OOPC, ETOOFS
- April Expert Team on Earth Observing System Design and Evolution (ET-EOSDE) reviews the 3 SOGs
- April-May initiate the JCB TT GBON
- June President of INFCOM signs off the completed SoGs - they are released and WMO undertakes communication
- July survey to ground truth the utility of the outcome and consolidate learning from the RRR process - what role should this play in the future of GOOS
- October hire resources to support the BGC Cycles AA
- October GOOS SC Session to discuss GBON as input to JCB GBON TT - GOOS analyse the output of RRR, the co-design process (as known) and others such as CMEMS - towards an forming what could constitute an Ocean GBON, and considers issues

2026



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- JCB GBON TT works on WMO GBON and Ocean GBON
- GOOS establishes some early global basic observing system requirements
- WMO GBON expands to include Ocean ESAC
- C Plan (focused on mandates/services) and B Plan (focused on ?) requirements considered in Ocean GBON context

2027

- First SOFF ocean projects

#### Resources

RRR: WMO supplies secretariat resources. The AA communities have all contributed their time, and GOOS has led the ESAC. The work can be completed for this round of the Ocean ESCA SoG (mid 2025) and survey and analysis can be supported from Paris HQ and EU Project Support (ObsSea4Clim). The Biogeochemical Cycles AA work will be supported with EU Project funding over 2 years (BioGeoOcean). As the RRR continues into 2026 an ocean leader from the community should be selected to free resources at HQ. Need some minimal communications resources to announce the SoGs release.

Co-Design: WMO is providing resources to support programme and exemplar development and connection to WMO components and RRR processes. This is foreseen to end 2025.

The JCB GBON needs careful thought and resources to develop this work. Suggest HQ resources can be allocated after the SoG are published and as the RRR work reduces.

### Expected outcomes for GOOS

1. WMO Statements of Guidance for Ocean, Atmosphere and Cryosphere completed - providing a condensed set of information on requirements for existing services in these areas, that are communicated to WMO Members
2. WMO to expand GBON to include the Ocean ESAC (2026?) - with support from JCB GBON work, including defining EEZ and open ocean national responsibilities
3. GOOS develops a model for an Ocean GBON - with support from JCB GBON work, including defining EEZ and open ocean, and a generalised approach for requirements setting that leverages existing processes
4. Ocean included in SOFF (dependent on more funding arriving, 2027?) - funding for SIDs and less developed countries

### Considerations for the GOOS Steering Committee

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- Working with WMO to communicate the outcomes of the RRR work - connected ocean, cryosphere and atmosphere SoGs - recommend
- Working with WMO on a timeline for GBON expansion - set an action
- A GOOS 'GBON' what could this look like? What would it represent? What are the national responsibilities? Special SC session to consider this topic as input to the JCB GBON TT
  - Based on existing global ocean observing system (now)
  - Considering recommendations for global existing services from RRR (2025)
  - Considering enhancements from co-design processes (2026)
  - Considering output from B and C Plans (2026)
- Does the SC accept an Ocean GBON as a concept that GOOS will commit to defining through the JCB GBON TT work, towards GOOS GBON = critical infrastructure
- Consider Co-Design as performing an essential role connecting processes like RRR to consistent, user orientated, service co-design

### Proposed decisions/recommendations

- Recommend continuing GOOS engagement with RRR process through to production of Statements of Guidance and ensure that the SoGs are communicated to WMO and GOOS, other communities
- X and x, members of the SG, volunteered to review the SoGs when available in March 2025
- Undertake analysis of RRR process and utility for GOOS Q3/Q4:
  - Assess resource commitment
  - Assess how SoGs are viewed through survey to GOOS communities
  - Consider initial impact in WMO
- Support the work of the JCB GBON TT as the method of developing a scope and process for GBON. Including a special session of the SC to provide input into the process (Q3 2025)
- Continue to work with WMO to include Ocean ESAC in GBON and SOFF, report back on specifics and progress