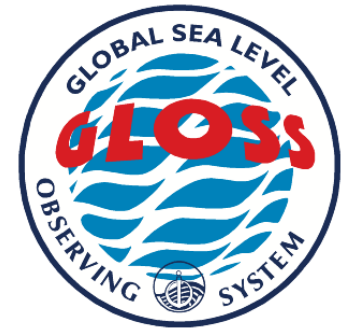


The Global Ocean Observing System



Observation Coordination Group (OCG) & GLOSS a mature GOOS network

Dr. Emma Heslop

Programme Specialist for the Global Ocean Observing System (GOOS)

Intergovernmental Oceanographic Commission of UNESCO

18th Session of the Group of Experts of the Global Sea Level Observing System (GLOSS), Panama, 11-14 March 2025

GOOS: A critical infrastructure for ocean observing

VISION: A truly global ocean observing system that delivers the essential information needed for our sustainable development, safety, wellbeing and prosperity.



36 Essential Ocean Variables (EOVs)

Physics



Sea state*



Ocean surface stress*



Sea ice*



Sea surface height*



Sea surface temperature*



Subsurface temperature*



Surface currents*



Subsurface currents*



Sea surface salinity*



Subsurface salinity*



Ocean surface heat flux*



Ocean bottom pressure



Turbulent diapycnal fluxes

Biogeochemistry



Oxygen*



Nutrients*



Inorganic carbon*



Transient tracers*



Particulate matter



Nitrous oxide*



Stable carbon isotopes



Dissolved organic carbon

Cross-disciplinary



Ocean sound



Ocean colour*



Marine debris

Biology & Ecosystems



Phytoplankton*
biomass & diversity



Zooplankton*
biomass & diversity



Fish
abundance & distribution



Sea turtles
abundance & distribution



Seabirds
abundance & distribution



Marine mammals
abundance & distribution



Hard coral*
cover & composition



Seagrass*
cover & composition



Macroalgal canopy*
cover & composition



Mangroves*
cover & composition



Invertebrates
abundance & distribution



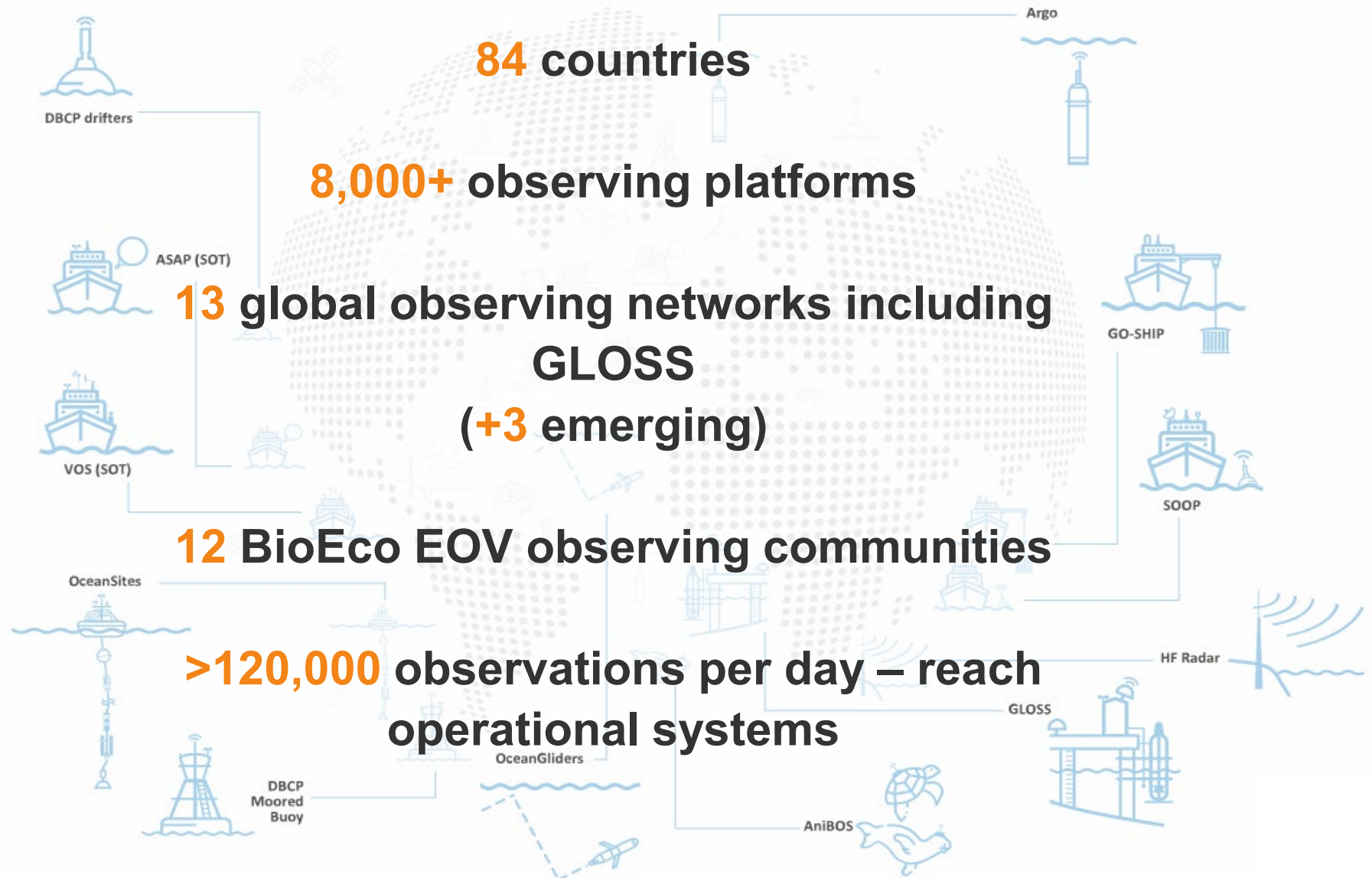
Microbes
biomass & diversity

*Also identified as Essential Climate Variables (ECVs)



Pilot EOVs

Growing & increasingly integrated system

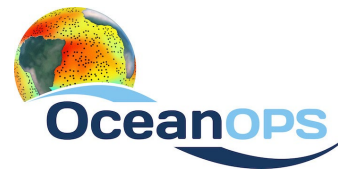












Observation Coordination Group (OCG)

OCG works with and across the GOOS networks, developing frameworks to strengthen implementation, looking at the system with the networks to find operational alignment, highlighting and working on issues raised, and engaging with 'emerging' networks.

KEY FOCI:

- Responding to requirements & needs
- Data management
- Standards and best practices
- Metrics & tracking - network health
- Integrating observing advances
- Environmental stewardship
- Capacity building



	Global in scale - Greater than regional, and as far as feasible, intention to be global.
	Observes one or more EOVs or ECVs - Contributes to meeting requirements through observing one or more of the GOOS Essential Ocean Variables or GCOS ¹ Essential Climate Variables.
	Observations are sustained - Sustained over multiple years, beyond time-span of single research or experimental projects, undertaking routine, systematic and essential ocean observations
	Community of Practice - Has an identified governance structure that provides a means of developing a multi-year strategy and implementation plan.
	Maintains network mission and targets - A role in the GOOS is defined and progress towards targets can be tracked and progress assessed.
	Delivers data that are free, open, and available in a timely manner - Has a defined data management infrastructure that provides data on a free and unrestricted basis, in real time where possible, as well as FAIR-compliant ² data services for real time and delayed mode data.
	Ensures metadata quality and delivery - Complete platform metadata is submitted to OceanOPS in a timely manner.
	Develops and follows Standards and Best Practices - Make accessible, develop, document, follow, and update best practices encompassing the observation lifecycle ³ .
	Undertakes capacity development and technology transfer - Development of activities that enable new (developing and disadvantaged) communities of ocean observers and supports inclusivity and diversity in its members.
	Environmental stewardship awareness - Actively develops ideas to minimize environmental footprint and contributes positively towards a healthy ocean.

Recent advances WMO RRR

6 AA descriptions approved & published in OSCAR ([here](#)):

- 3.1 Ocean Forecasting and Real-Time Monitoring
 - 3.2 Coastal Forecasting
 - 3.3 Oceanic Climate Monitoring and Services
 - 3.4 Tsunami Monitoring and Detection
 - 3.5 Marine Environmental Emergency Response
 - 3.6 Maritime Safety (ports to open ocean)
 - 3.7 Ocean Biogeochemistry
-
- Variables in OSCAR database – crosswalk variables with EOVs
 - Drafting Statement of Guidance (SoG) Ocean ESAC
 - Considerable work completed by all AA POCs - taking on a role to consolidate requirements and run gap analyses by variables
 - Ocean, Atmosphere and Cryosphere, 3 initial Statements of Guidance in prep



OCG Cross-Network Data Implementation Strategy – 2022/23

Why?

- Many existing or developing data strategies
 - WMO Unified Data policy
 - Revision of IOC Strategic Plan For Data
 - **UN Decade Data Strategy**
- Ocean community pushing for compliance with FAIR data principles - what does that mean?

OCG Implementation Strategy defines actionable ways OCG network/programs can move towards FAIR data:

- Improve (meta)data discovery, accessibility and usability for all stakeholders
- Improve access to distributed (meta)data endpoints through federated, uniform data services

GOOS OCG Data Implementation Requirements			
Real Time Data		Metadata	
OCG-R1	Data shall be exchanged in real time (with minimum delay) via the WIS/GTS of the WMO in approved formats/templates.	OCG-R7	Networks shall have a defined uniform metadata content that includes at least the minimum OceanOPS requirements, thereby ensuring that they are compliant with the WIGOS metadata requirements. Note that OceanOPS is the authoritative source through which WIGOS metadata are submitted to OSCAR for all oceanographic and marine meteorological platforms.
OCG-R2	Data shall be available in real time or near-real time on the Internet through interoperable services (preferably ERDDAP) freely and without any restriction. Community agreed quality control procedures shall be applied in real-time and adjusted values made available when possible.	OCG-R8	Discovery and Use metadata shall be based upon a well-documented community standard, including a persistent and unique WMO/WIGOS identifier allocated by OceanOPS and use controlled vocabularies.
Delayed Mode Data		OCG-R9	Platform and Discovery metadata shall be exchanged with OceanOPS utilizing machine-2-machine services.
OCG-R3	Each network shall have at least one identified Global Data Repository. This Global Data Repository may be one or multiple (mirrored) repositories, or they may be data endpoints that can be federated into a virtual global repository.	Best Practices	
OCG-R4	Data and data products shall be available through publicly accessible ERDDAP services. These distributed ERDDAP services will be federated under a single OCG ERDDAP focal point.	OCG-R10	Each network should have an active data team.
OCG-R5	NetCDF is the preferred data file format, though ERDDAP services can act as a data format translator if needed.	OCG-R11	Each network should have identified best practices on data infrastructure and workflows and data Q.C.
OCG-R6	Additional platform metadata should be available through the Global Data Repository and harvestable by machine-2-machine services.	OCG-R12	Raw/real-time data, delayed mode data and data products should be archived and have unique identifiers created (i.e., Digital Object Identifier (DOI)) for citation and reuse.

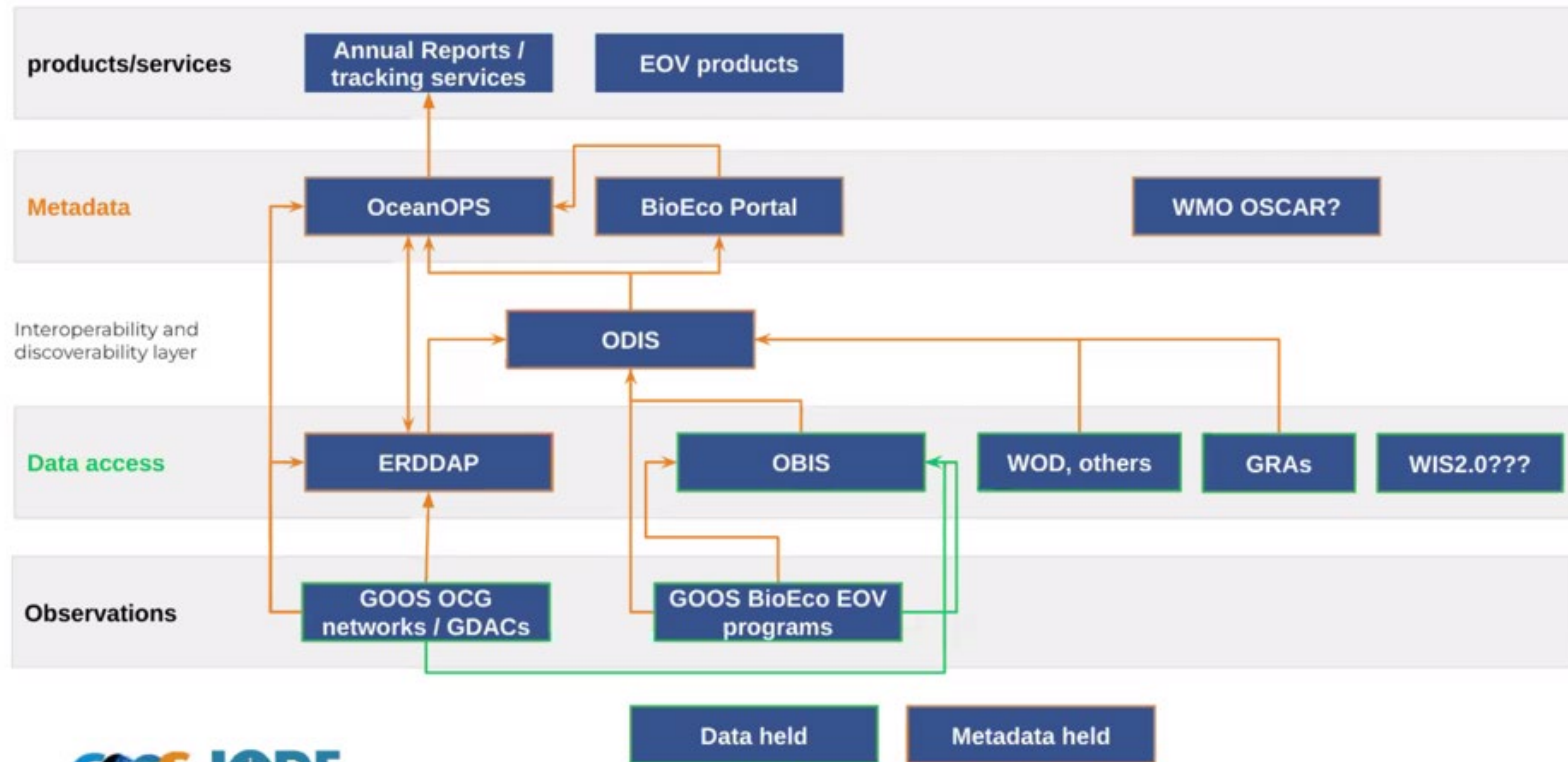


IODE/GOOS Data Workshop - consistent themes

First Cross IOC Data Workshop - Sept 2025

Support data access, service delivery, future looking, open architecture, cross-discipline and IOC

Agreed IOC Data Architecture - based on ODIS, EOVS, FAIR & CARE principals, and metadata linked to original source

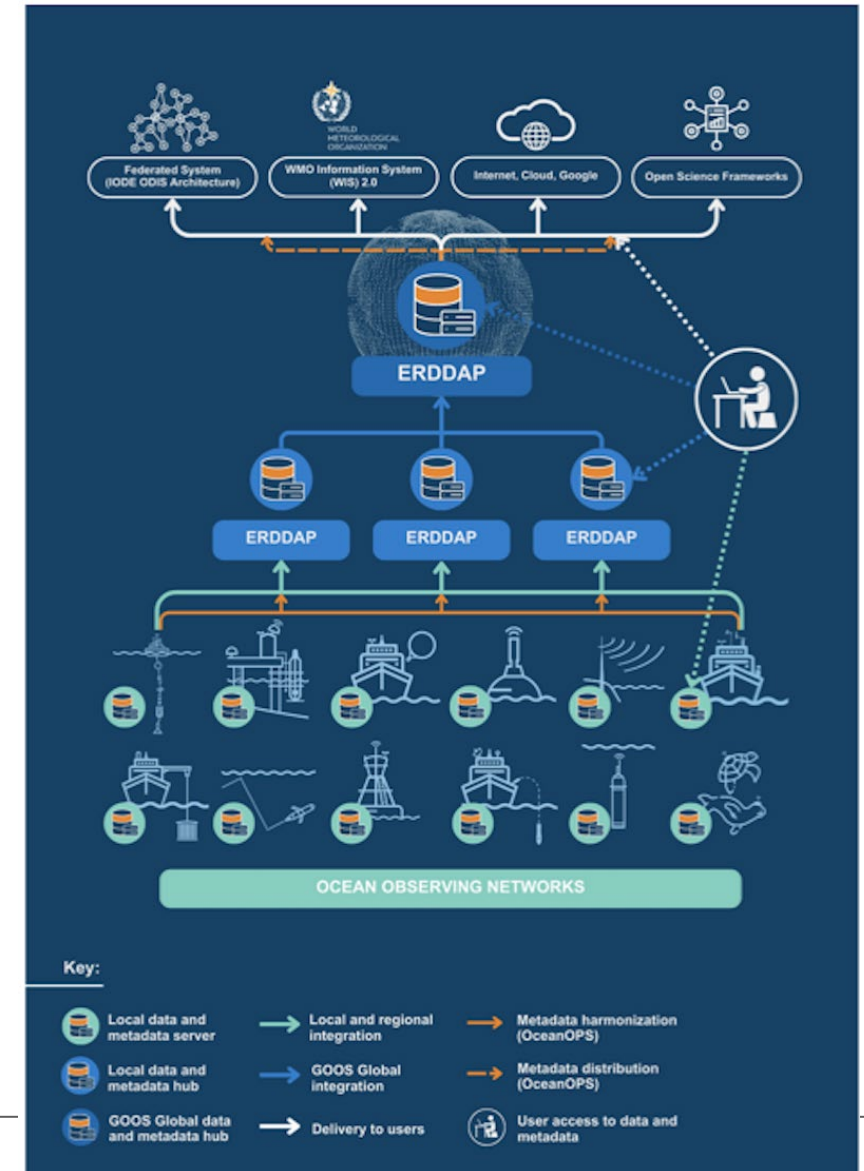
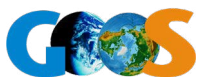


- In line with OCG Data Implementation Strategy
- GOOS ERDDAP as a Hyper node
- OBIS as a Super GDAC for BioEco EOVS
- WIS2/OCG connections to ODIS
- 'GOOS' metadata - signal quality
- Provenance and licencing in metadata important
- Support products (ie O2 synthesis)
- Joint session IOC Assembly 2025
- Meeting Report available soon

OCG Cross-Network Data Implementation Strategy

Next step: Implementation!

- Deploy ERDDAP services where needed for delayed mode data and metadata - federate ERDDAP nodes in OCG
- Improve metadata availability and exchange with OceanOPS
- OCG Data TT - provenance, licencing topics for discussion - survey underway
- Status of the GLOSS ERDDAP federation? At the last GLOSS SC in Tampa, 01/2024 - goal was to develop an ERDDAP Federation across the GLOSS data centers



Standards and best practices

Best Practices are defined as a methodology that has repeatedly produced **superior results** relative to other methodologies.

Ocean Best Practices System (OBPS):

- Repository for practices
- Improving efficiency and quality
- Improving data access and interoperability
- Spread best practices

>> cross-IOC Ocean Best Practice System

GOOS-endorsed Best Practices:

- Best practices that have undergone a rigorous process of community review and consensus building
- 1000's of downloads



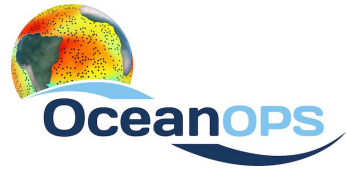
Manual for Real-Time Quality Control of Water Level Data

A Guide to Quality Control and Quality Assurance
for Water Level Observations

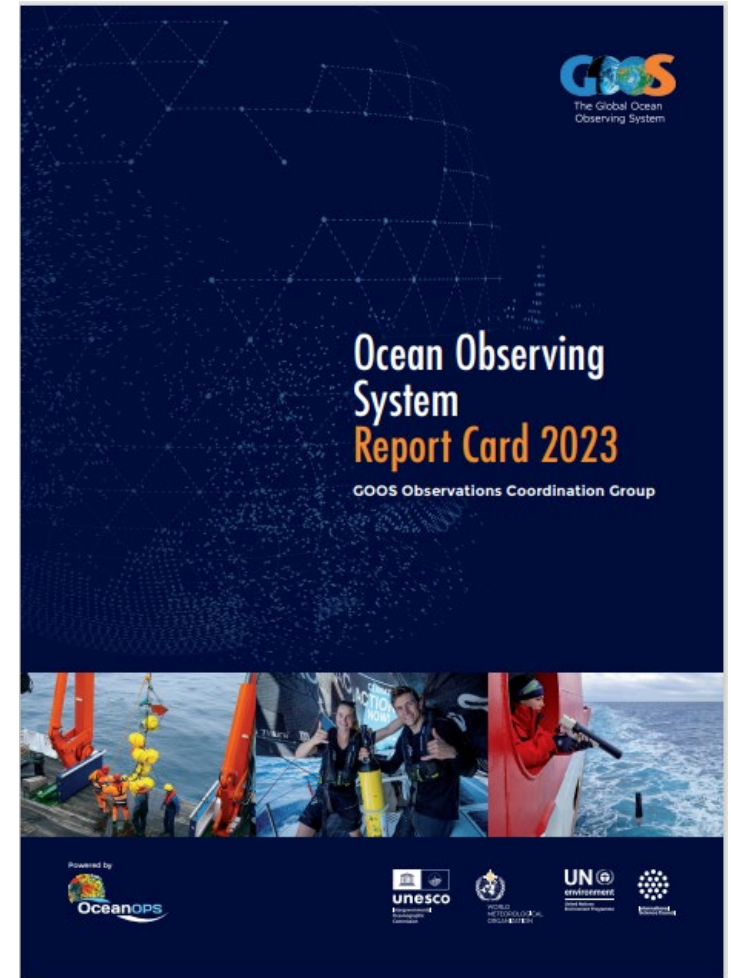
Version 2.1
March 2021



OceanOPS



- Service level agreements
- Minimum metadata standards - OceanOPS 'passport' - unique ID and onward tracking of data
- Restructuring for the future and 2026 - 2030 Strategy



OCG-16 April 2025 & GLOSS



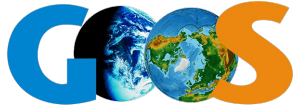
Have your say - networks input to the work of the OCG

Key topics OCG-16:

- Data
- OceanOPS
- Network Issues
- Modelling inputs
- IOCARIBE - Caribbean Regional Alliance
- Network Maturity and Health Index
- Communications
- OCG goals- future foci

Asks at OCG-15:

- Addressing gaps in the network, particularly in Africa
- Exploring the use of data archeology



The Global Ocean Observing System

Thank you

goosocean.org



unesco
Intergovernmental
Oceanographic
Commission



WORLD
METEOROLOGICAL
ORGANIZATION



UN
environment
programme

International
Science Council

