

ГЛОБАЛЬНАЯ СИСТЕМА
НАБЛЮДЕНИЙ ЗА КЛИМАТОМ
НЕУСТАННО СЛЕДИМ ЗА КЛИМАТОМ

SYSTÈME MONDIAL
D'OBSERVATION DU CLIMAT
NOUS VEILLONS SUR LE CLIMAT

النظام العالمي
لرصد المناخ
لنضع المناخ نصب أعيننا

全球气候观测系统
密切监视气候

SISTEMA MUNDIAL
DE OBSERVACION DEL CLIMA
SIEMPRE VIGILANDO EL CLIMA

GLOBAL CLIMATE
OBSERVING SYSTEM
KEEPING WATCH OVER OUR CLIMATE

OOPC Ocean Observations Physics and Climate Panel

31st Session of the GCOS Steering Committee
Geneva, 2-5/07/2024

Sabrina Speich, OOPC Chair



**GLOBAL CLIMATE
OBSERVING SYSTEM**

KEEPING WATCH OVER OUR CLIMATE



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OOPC Membership

	Role		Name		Institution	Country	Expertise / ECVs
1	OOPC Co-chair	Prof.	Sabrina	Speich	Ecole Normale Supérieure (Paris), Laboratoire de Météorologie	France	Ocean physics, air-sea interactions, ocean observations, nonlinear dynamics, numerical modeling, process studies
2	OOPC Co-chair	Dr	Weidong	Yu	Center for Ocean and Climate Research SOA First Institute of Oceanography	China	ocean-atmosphere interactions, ocean's role in Earth system, monsoon-ocean interaction and climate observing capacities over tropical Indo-Pacific Oceans.
3	OOPC Member	Prof Dr	Lijing	Cheng	International Center for Climate and Environment Sciences	China	ocean observations, data processing, climate change and variability, energy and water budget
4	OOPC Member	Dr	Meghan	Cronin	NOAA	United States	ocean-atmosphere interactions, ocean's role in Earth system, monsoon-ocean interaction and climate observing capacities over tropical Indo-Pacific Oceans
5	OOPC Member	Dr	Antonio	Espejo Hermosa	SPC-GEM	Fiji	Wave climate and climate variability, coastal hazards, wave, storm surge and coastal inundation modeling and forecasting
6	OOPC Member	Dr	Stefan	Kern	ICDC - Uni Hamburg	Germany	Marine cryosphere, remote sensing, satellite data product quality assessment
7	OOPC Member	Dr	Tony	Lee	NASA Jet Propulsion Laboratory	United States	Ocean Climate Variability, Water Cycle, Remote Sensing
8	OOPC Member	Dr	Rick	Lumpkin	NOAA/AOML	USA	Ocean circulation, surface currents, ocean buoy observations, global drifter array
9	OOPC Member	Dr	Tamaryn	Morris	South African Weather Service (SAWS)	South Africa	Western boundary currents, mesoscale eddies, ocean observing infrastructure
10	OOPC Member	Dr	Peter	Oke	CSIRO	Australia	Ocean data assimilation, ocean forecasting, ocean observing, and ocean dynamics; leads the Australian Argo Program; leads the Bluelink project; founding Co-Chair of the GOV Observing System Evaluation Task Team.
11	OOPC Member	Dr	Katrin	Schroeder	CNR-ISMAR	Italy	Ocean physics and biogeochemistry, ocean observations, ocean circulation and climate, sustained in situ observations in the Mediterranean Sea (moorings, gliders, R/Vs), water masses
12	OOPC Member	Dr	Karina	Von Schuckmann	Mercator	France	Ocean physics, air-sea interactions, ocean observations, nonlinear dynamics
13	OOPC Member	Dr	Hao	Zuo	ECMWF	UK	Ocean data assimilation and NWP, ocean reanalysis, ocean observations, ocean forecasting

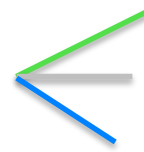
Plus ex-officio members representing biogeochemistry and biology and ecosystems panels in GOOS, plus the Observations Coordination Group (OCG) and the OOPC Secretariat.

OOPC – Ocean Observations Physics and Climate Panel

GCOS • GOOS • WCRP



Ocean observations



Physics

Biogeochemistry

Biology and Ecosystems



OOPC activities – New Work plan
2024-2028

Identification of ocean observation requirements (ECVs and EOVs)

Evaluation of the global ocean observing system (GCOS Status Report and IP)

Activities led by experts

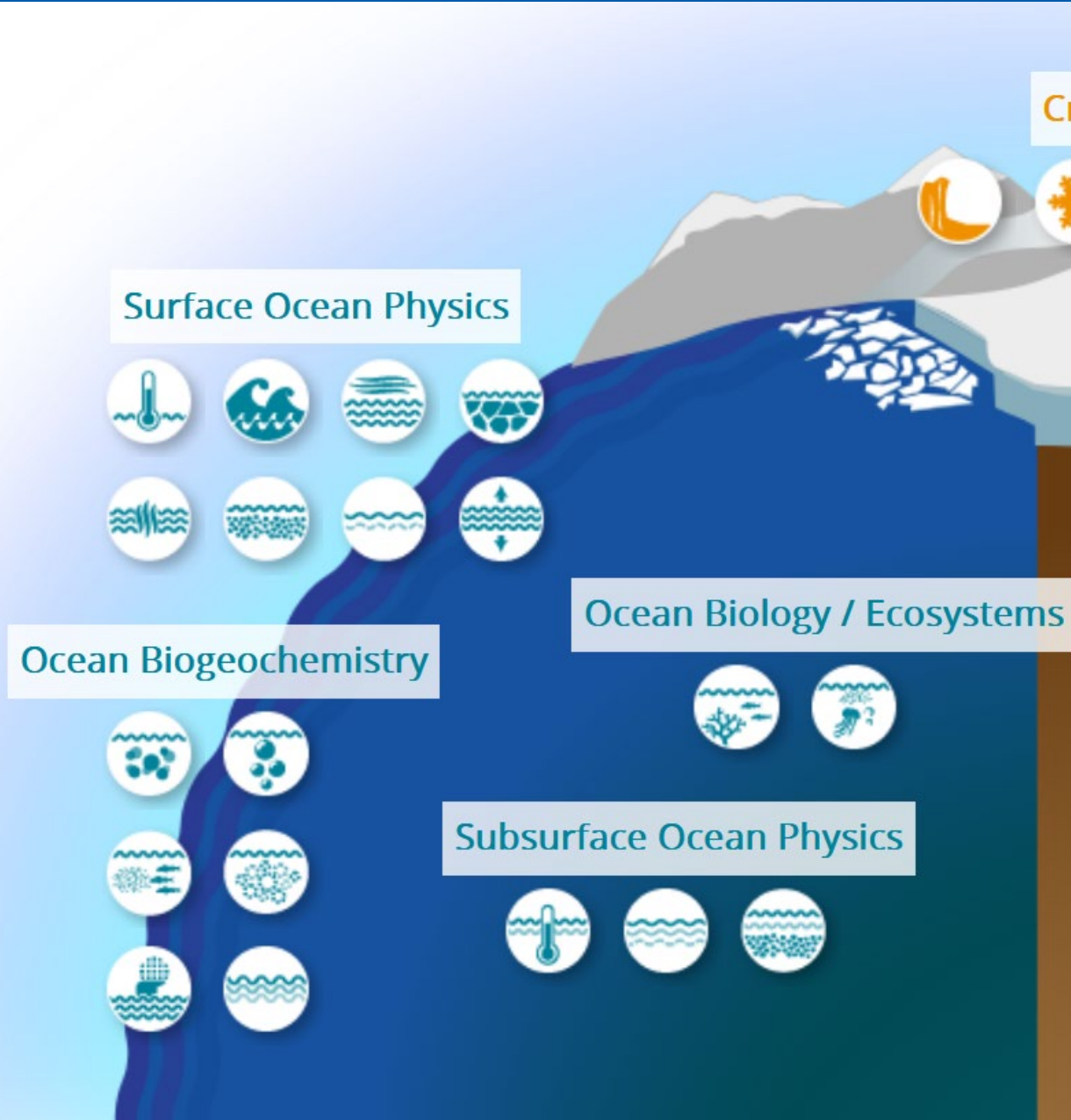
- Boundary Systems Task Team
- Essential Ocean Variables Paper
- Global Ocean Indicators Framework
- Air-Sea fluxes
- Marine Heatwaves*
- Pan-tropical Observing System*

* Joint with WCRP/CLIVAR

The Physics and Climate Panel focuses on physical processes, including interactions with the atmosphere and cryosphere – the frozen part of the earth's water system – circulation patterns, transport and storage of heat and momentum and influences on ecosystem functions that control the uptake of critically important gases.



19 Ocean ECVs (...at present!), 44 ECV quantities vs. 36 EOVs (GOOS)

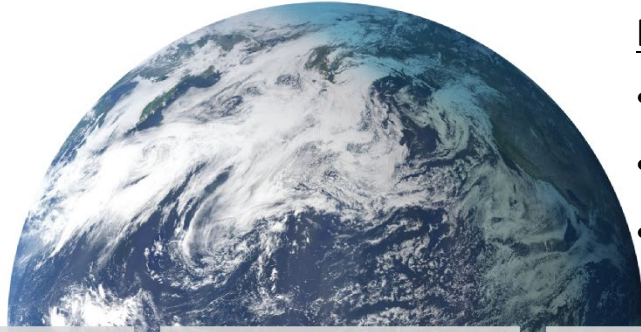


ECV	ECV Quantity (GCOS-245, 2022)
1 Sea-Surface temperature	1 Sea-Surface temperature
2 Subsurface Temperature	2 Interior Temperature
3 Sea-Surface Salinity	3 Sea-Surface Salinity
4 Subsurface Salinity	4 Interior Salinity
5 Sea Ice	15 Sea Ice Concentration 16 Sea Ice Thickness 17 Sea Ice Drift 18 Sea Ice Age 19 Sea Ice Surface Temperature (IST) 20 Sea ice Surface Albedo 21 Snow Depth on Sea Ice
6 Surface Currents	5 Surface Geostrophic Current 6 Ekman Currents
7 Subsurface Currents	7 Vertical Mixing
8 Sea Level	8 Regional Mean Sea Level 9 Global Mean Sea Level
9 Sea State	10 Wave Height
10 Surface Stress	11 Surface Stress
11 Ocean Surface Heat Flux	12 Radiative Heat Flux 13 Sensible Heat Flux 14 Latent Heat Flux
12 Oxygen	22 Dissolved Oxygen Concentration
13 Nutrients	23 Silicate 24 Phosphate 25 Nitrate
14 Ocean Inorganic Carbon	26 Total Alkalinity (TA) 27 Dissolved Inorganic Carbon (DIC) 28 pCO ₂
15 Transient Tracers	29 ¹⁴ C 30 SF ₆ 31 CFC-11 32 CFC-12
16 Ocean nitrous oxide N ₂ O	33 Interior Ocean Nitrous Oxide N ₂ O 34 N ₂ O Air-Sea Flux
17 Ocean Colour	35 Water Leaving Radiance 36 Chlorophyll-a concentration
18 Plankton	37 Zooplankton Diversity 38 Zooplankton Biomass 39 Phytoplankton Diversity 40 Phytoplankton Biomass
19 Marine Habitat Properties	41 Mangrove Cover and Composition 42 Seagrass Cover (areal extent) 43 Macroalgal Canopy Cover and Composition 44 Hard coral cover and composition

ECVs and EOVs:

- Most of the physical EOVs are ECVs too (11 out of 13)
- 6 out of 8 biogeochemistry EOVs are ECVs
- 2 ECVs bring 6 Biological and Ecosystem EOVs

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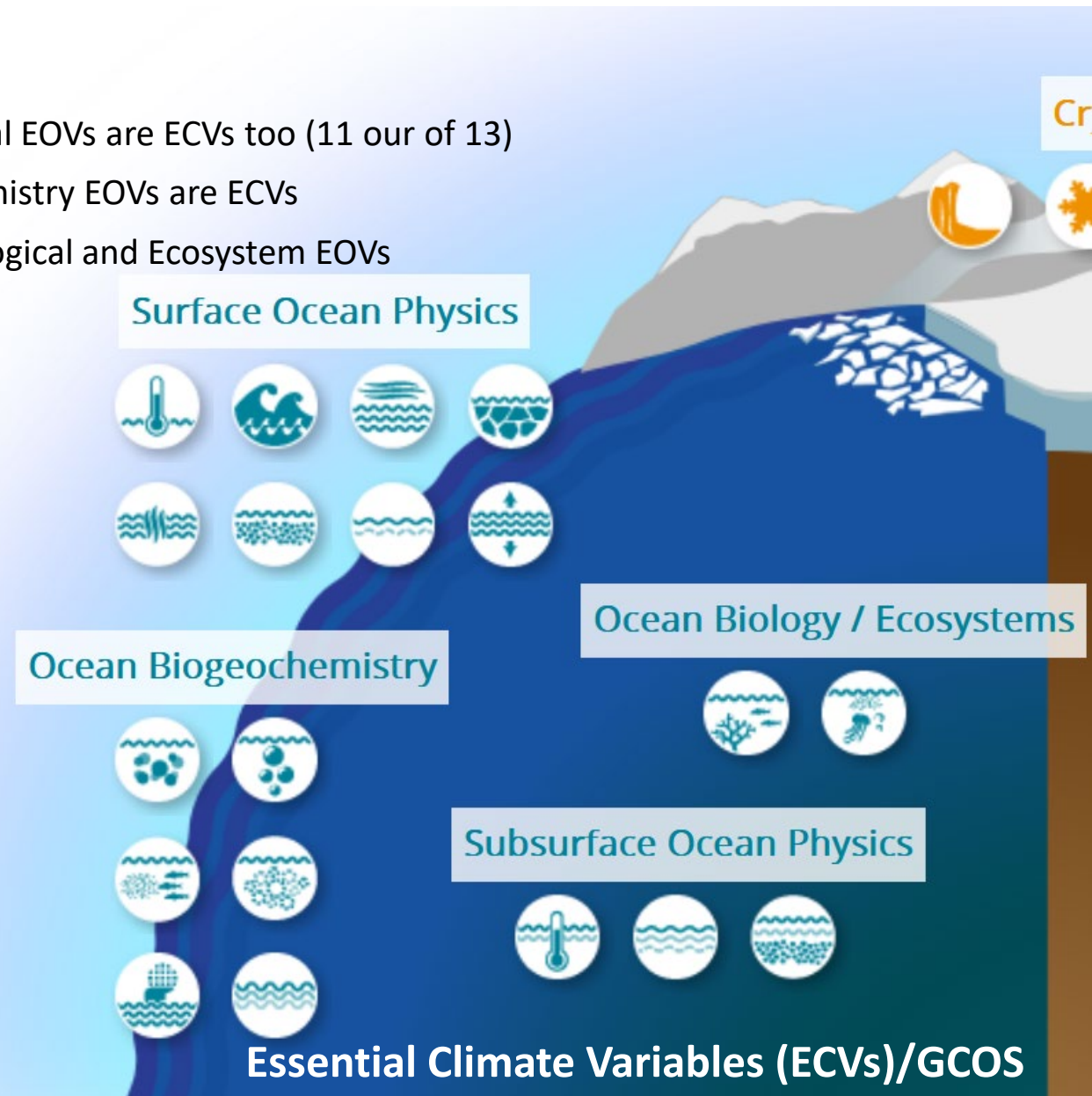


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Physics	Biogeochemistry	Biology & Ecosystems
Sea state* Ocean surface stress* Sea ice*	Oxygen* Nutrients* Inorganic carbon*	Phytoplankton* biomass & diversity Zooplankton* biomass & diversity Fish abundance & distribution
Sea surface height* Sea surface temperature* Subsurface temperature*	Transient tracers* Particulate matter Nitrous oxide*	Sea turtles abundance & distribution Seabirds abundance & distribution Marine mammals abundance & distribution
Surface currents* Subsurface currents* Sea surface salinity*	Stable carbon isotopes Dissolved organic carbon	Hard coral* cover & composition Seagrass* cover & composition Macroalgal canopy* cover & composition
Subsurface salinity* Ocean surface heat flux* Ocean bottom pressure	Ocean sound Ocean colour* Marine debris	Mangroves* cover & composition Invertebrates abundance & distribution Microbes biomass & diversity
Turbulent diapycnal fluxes	<h3>Cross-disciplinary</h3> Ocean sound Ocean colour* Marine debris	*Also identified as Essential Climate Variables (ECVs) Pilot EOVs

Essential Ocean Variables (EOVs)/GOOS



OOPC & GCOS IP Actions – an overview

OOPC related actions – 2023-2024

- Action A1: Undertake an assessment of current levels of funding support for global in situ networks delivering relevant in situ ECV data (Done, see topic...)
- Action A2; Implementation of initial GBON and the associated SOFF mechanism to fill long-standing gaps to globally monitor climate over land and oceans. (in progress) - Participation in definition of requirements in EEZ for GBON compliance
- Action B4: Extend the in-situ monitoring of atmospheric composition over the ocean (in progress, connection to GAW)
- Action B9: Improve estimates of latent and sensible heat fluxes and wind stress (in progress, cross-panel activity)
- Action B10: Identify gaps in the climate observing system to monitor the global energy, water and carbon cycles
- Action C1: Review existing monitoring standards, guidance and best practices for each ECV, ensuring these reflect current state-of-the-art (in progress)
- Action D1: Define governance and requirements for Global Climate Data Centres (in progress)
- Action D2: Identify ECVs for which adequate global centres do not exist or are insufficiently supported and facilitate and support the creation or improvement of global data centres for these ECVs (in progress)

+ follow up of all actions with an ocean observing component, even if the implementers are not OOPC

OOPC & WMO

OOPC has become a broker body under the WMO Earth System Approach:

- Well positioned due to its strong bonds to GOOS and to WCRP
- Many experts sitting in teams across the three programmes
- OOPC helps connecting WMO with biogeochemical experts (relevant for G3W)
- Cryosphere: Co-custodianship of Sea-Ice. Sea-Ice expert shared between OOPC and GCW.
- GBON ocean sub-group and definition of requirements for GBON compliance in EEZs (SLP and SST)



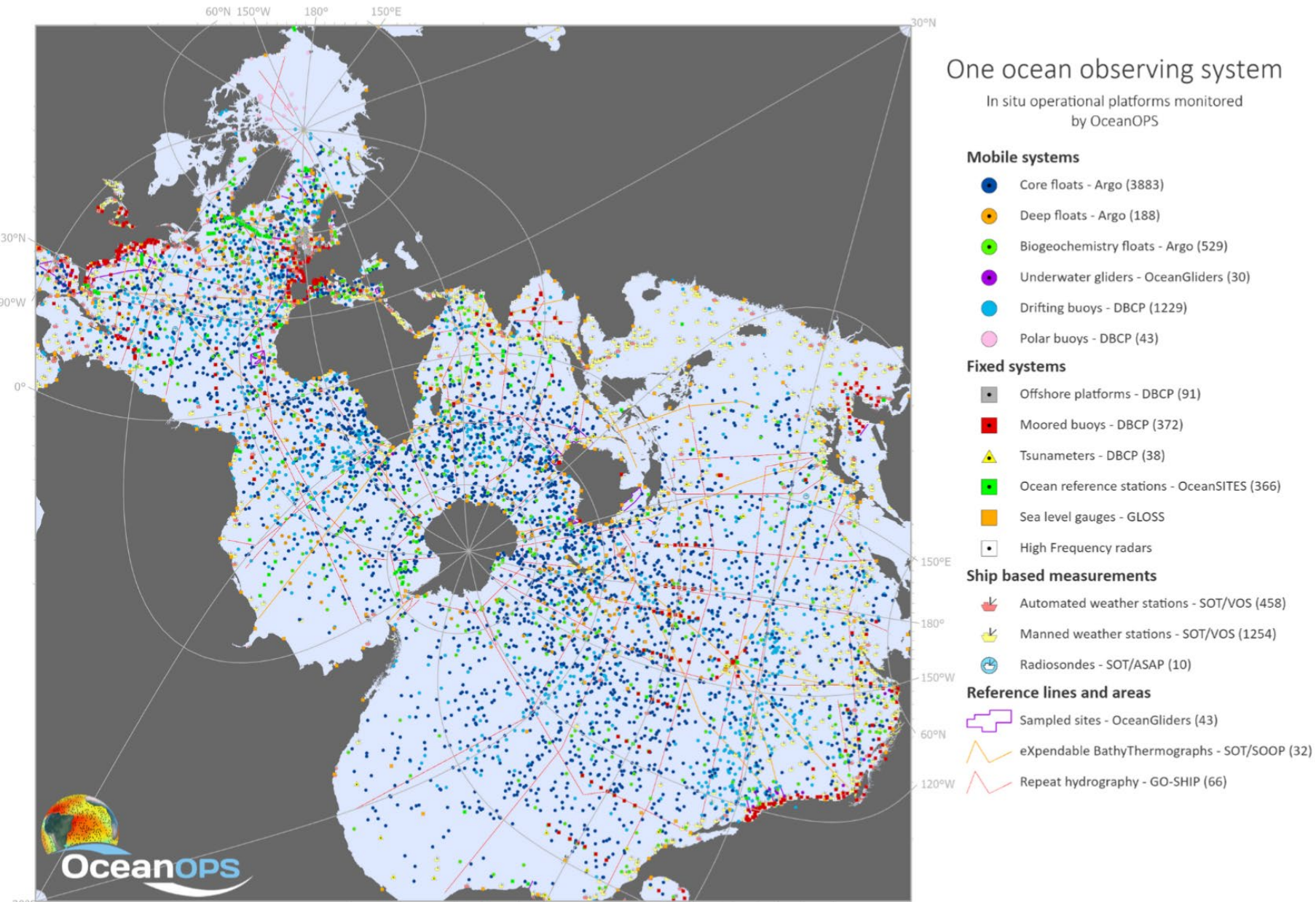
OOPC Responsible for RRR - Rolling Review of Requirements:

- AA 3.1 3.1 Ocean Forecasting and Real-Time Monitoring
- AA 3.3 Oceanic Climate Monitoring and Services

















































At the Secretariat level, OOPC officer well integrated in WIGOS activities related to ocean, including connection with IOC/UNESCO


OOPC Related Networks - OCG



OOPC Related Networks - OCG

GOOS <i>in situ</i> networks ¹	Implementation Status ²	Data & metadata			Best practices ⁶	GOOS delivery areas ⁷		
		Real time ³	Archived high quality ⁴	Metadata ⁵		Operational services	Climate	Ocean Health
 Ship based meteorological - SOT	★★★	★★★	★★★	★★★	★★★			
 Ship based oceanographic – SOT	★★★	★★★	★★★★	★★★	★★★★			
 Repeated transects - GO-SHIP	★★★★	Not applicable	★★★★	★★★	★★★★			
 Sea level gauges - GLOSS	★★★	★★★	★★★★	★★★	★★★			
 Time series sites - OceanSITES	★★★	Not applicable	★★★	★★★	★★★			
 Coastal Moored buoys – DBCP	★★★★	★★★★	★★★★	★★★	★★★			
 Tsunami buoys - DBCP	★★★	★★★★	★★★★	★★★	★★★★			
 Tropical moored buoys - DBCP	★★★	★★★★	★★★★	★★★★	★★★			
 HF radars	★★★	★★★	★★★	★★★	★★★★			
 Drifting buoys - DBCP	★★★★	★★★	★★★	★★★	★★★★			
 Profiling floats - Argo	★★★★	★★★★	★★★★	★★★★	★★★			
 Deep & biogeochemistry floats - Argo	★★★	★★★	★★★	★★★★	★★★			
 OceanGliders	★★★	★★★	★★★	★★★	★★★			
 Animal borne sensors - AniBOS	★★★	★★★	★★★	★★★	★★★			

OOPC relations

- Strong connection with the other two panels of GOOS
- CLIVAR – Core project under WCRP, Climate and Ocean Variability, Predictability and Change
- Observations Coordination Group (OCG): In-situ global networks
- Global Cryosphere Watch (Sea Ice) – co-custodianship
- European projects: ObsSea4Clim 
- Ocean Decade: ObsCoDesign programme and OceanPredict



OOPC Challenges

Lack of resources to act as brokers:

- It is a lot about navigating a complex landscape, the need to foster interactions and optimise resources is there, but there is a systemic lack of time from experts and also a lack of Secretariat support. As a result, the **follow up is not optimal**: Many of the outputs are not properly communicated, enforced (e.g. GCOS IP Recommendations or EOV/ECV requirements)

Engagement with the modeling community

- developing the optimal matrix to guide the observing system development,
- promoting observation-based model assessments to improve models
- advocate the importance of ocean observations for weather to climate projections, i.e. links with WMO, subseasonal to seasonal forecasts communities, and decadal to climate projections.

OOPC Challenges

- **Adaptation and Extremes – very important, but difficult to find resources?**
- **Career stage and gender balance**
- **Experts would benefit from an official request/support from GCOS to pursue certain activities**
- **It is not always easy to persuade ocean communities to engage with WMO: perceived as very heavy and time consuming**

OOPC Membership: Changes

- **Meghan Cronin: extraordinary extension of her term for 1 year**
- **Roland Souza (BR) – New member, expert in remote sensing and modeling, Senior Researcher working in INPE (Brazil)**
- **Mélanie Juza (ES) – New member, expert in Marine Heatwaves, Early Career Researcher working at SOCIB (Balearic Islands, Spain)**

Thank you!



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