The Global Ocean Observing System

GOOS: Advancing a fit-for-purpose global ocean observing system

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Why observe the ocean?

Climate and weather

The ocean plays a huge role in the Earth's climate and weather: it absorbs 90% of excess heat and takes up 25% of anthropogenic carbon every year. At the same time, it is being affected by climate change.

Ocean health

Life in the ocean gives us the oxygen we breathe and the food we eat. Overfishing, climate change and pollution are putting these vital natural services at risk, and their impacts are critically under-observed.

Coastal communities

Coastal communities are in the front line facing threats posed by changing oceans. Communities in many less developed areas are particularly at risk from changing weather and ocean patterns, and increased disaster risk.

If we haven't got data underpinning our decisions, we might as well be guessing at solutions

Ocean data creates opportunities

Climate and weather

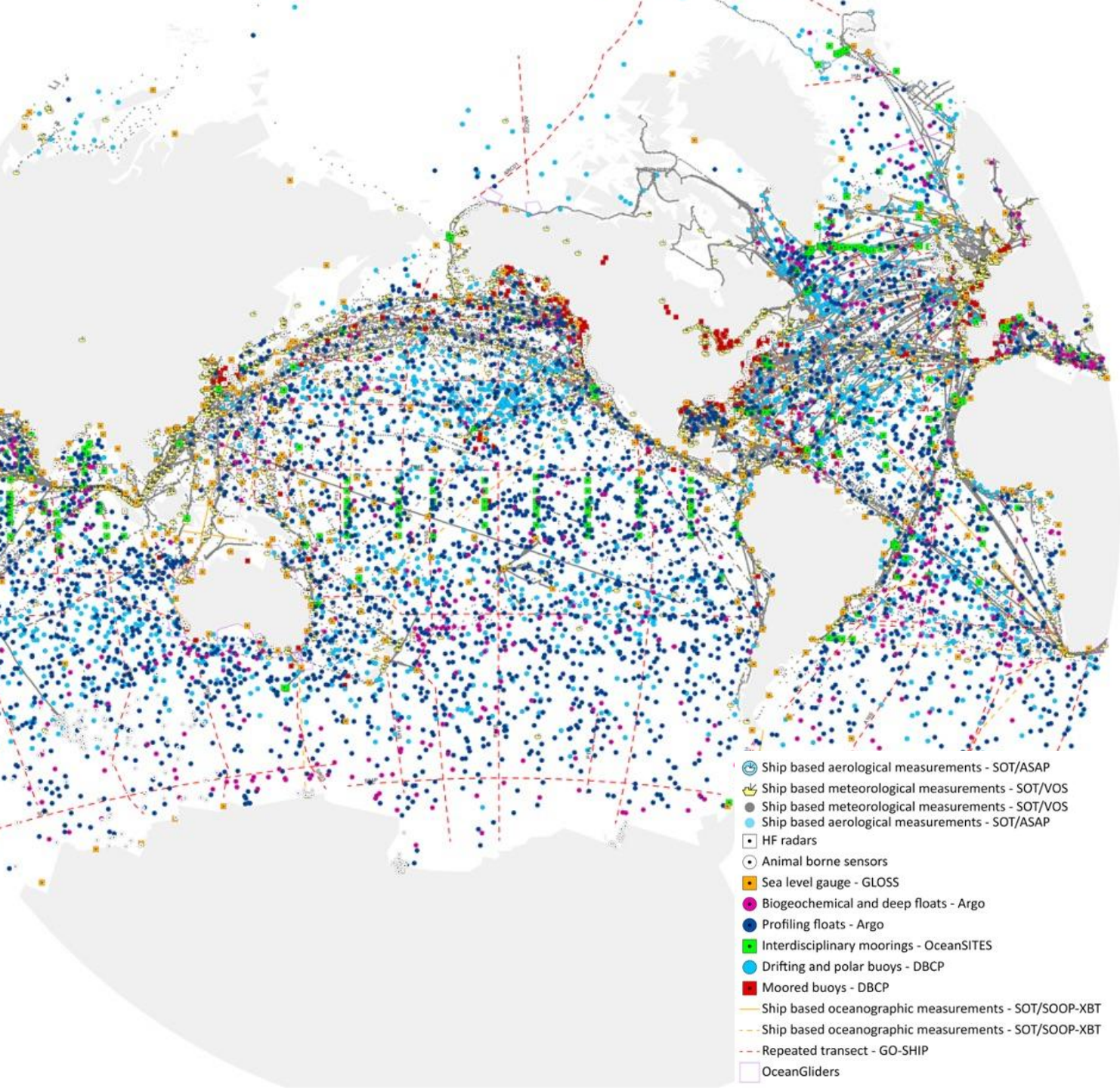
Ocean health

Coastal communities

Enabling coastal communities to evolve and flourish

Supporting blue economic growth

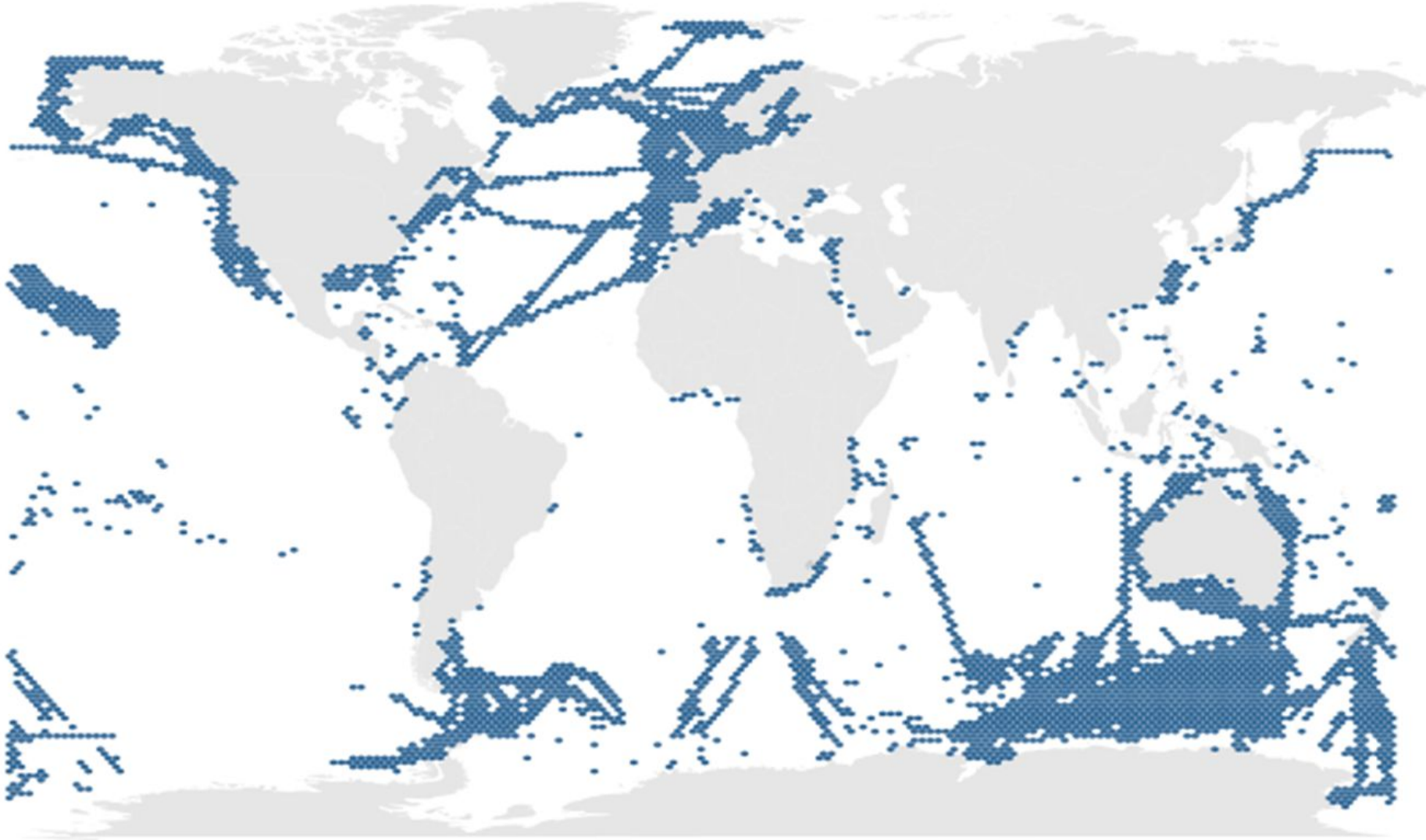
Underpinning sustainable development



GOOS Today

- 84 countries, 8,700+ observing platforms, 13 global networks
- More than 100,000 observations per day - delivering an accessible, safe and productive ocean
- Global observing networks, e.g. Argo, GO-SHIP, Drifting Buoys, plus emerging networks, e.g., OceanGliders, HF Radar.

"The weather forecasting systems will run off the rails if they don't have the surface pressure information over the ocean to constrain them" - Lars Peter Riishojgaard, Director of the Earth System Branch WMO



Biological & ecological observations

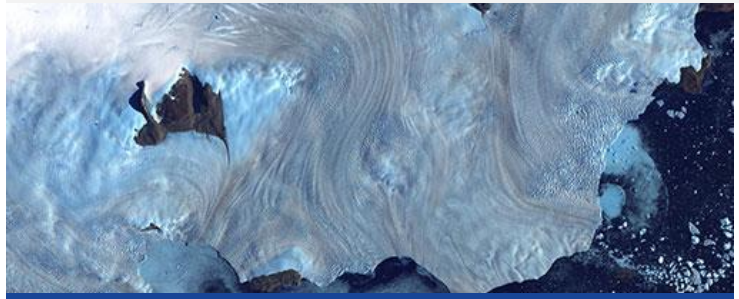
- 203 active, long-term programs that systematically sample BioEco EOVs
  …and more out there?
- Only 7% of the ocean surface has an *identified* active monitoring program
- Some of the biggest gaps are in areas of high biodiversity and high human pressure

Satterthwaite et al. (2021) Frontiers in Marine Science - GOOS news

Biology and Ecosystems Panel

Delivered through: Core Coordination

GOOS Steering Committee



Expert Panels

Ocean Observation Physics and Climate Panel (OOPC)

Biology and Ecosystem Panel (BioEco)

Biogeochemical Panel (IOCCP/BGC)

Observing

Observations Coordinating Group (OCG)

Global Regional Alliances (GRA)

OceanOPS

GOOS National Focal Points

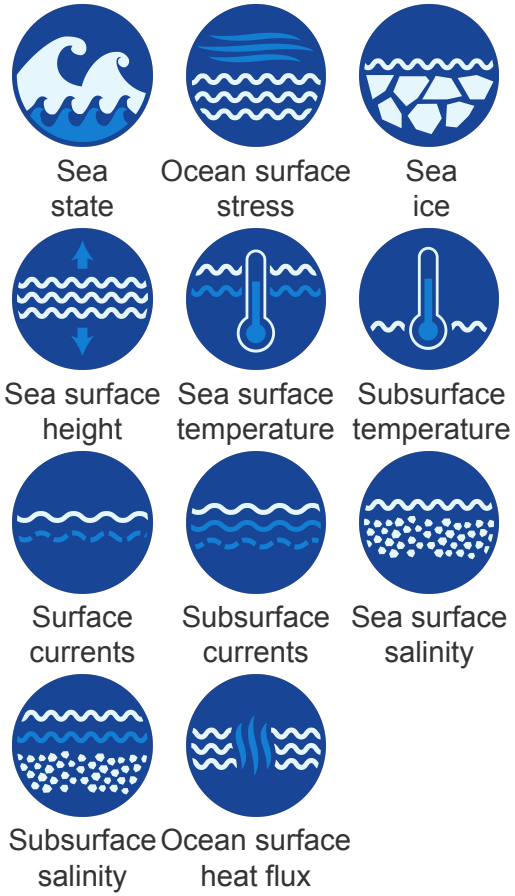
Projects (TPOS, DOOS, OBPS, AtlantOS)

Prediction

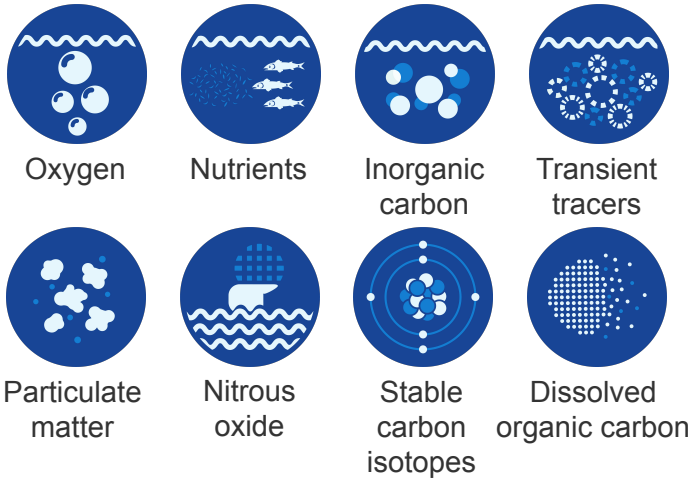
Expert Team on Operational Ocean Forecast Systems (ETOOFS)

Through: Frameworks
GOOS Essential Ocean Variables (EOVs)

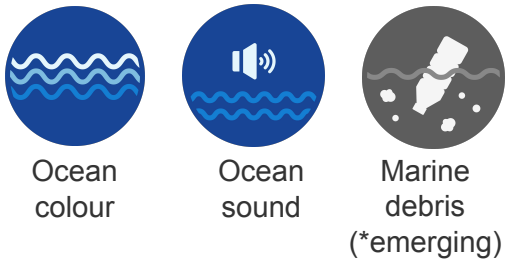
Physics



Biogeochemistry



Cross-disciplinary



Biology & ecosystems

THE LAW OF THE SEA

+ BBNJ

Convention on Biological Diversity

GPA Global Programme of Action for the Protection of the Marine Environment from Land-based Activities

UNEP Regional Seas

United Nations Educational, Scientific and Cultural Organization · The Protection of the Underwater Cultural Heritage

New: ILBI on Plastic Pollution 2024

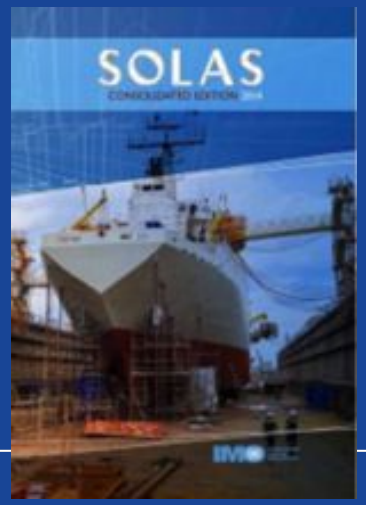
Sendai Framework for Disaster Risk Reduction

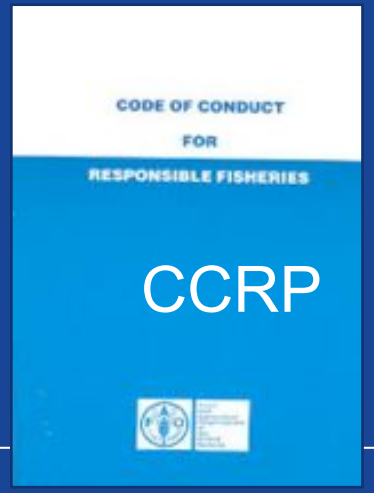
2015 - 2030

ISLAND VOICES GLOBAL CHOICES

UN Conference on Small Island Developing States

SAMOA PATHWAY





Through: operational system

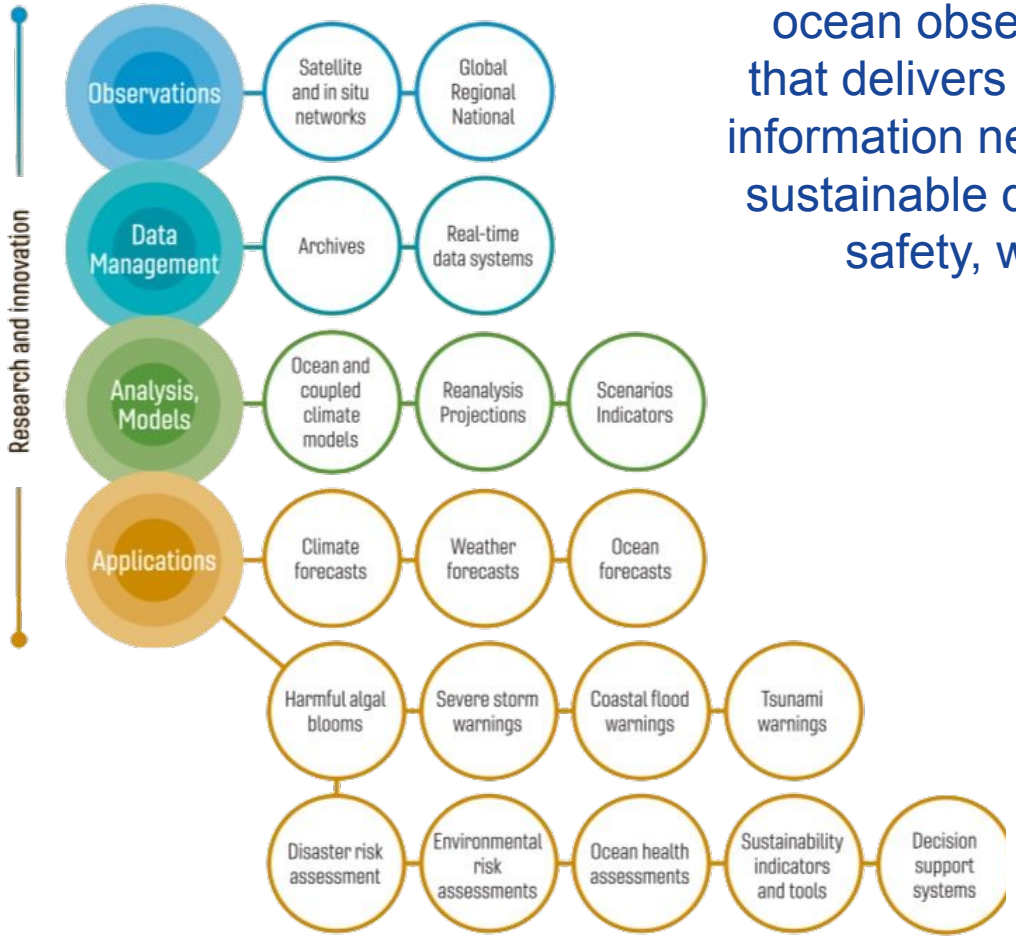
Global and emerging networks

GOOS *in situ* networks [1]	Implementation	Data & metadata			Best practices [6]	GOOS delivery areas [7]		
	STATUS [2]	REAL TIME [3]	ARCHIVED DELAYED MODE [4]	META-DATA [5]		OPERATIONAL SERVICES	CLIMATE	OCEAN HEALTH
Ship based meteorological - SOT	★★☆	★★☆	★★☆	★★☆	★★☆	✓	✓	
Ship based oceanographic - SOT	★★☆	★★½	★★★	★½☆	★★☆	✓	✓	
Repeated transects - GO-SHIP	★★½	Not applicable	★★★	½☆☆	★★★		✓	✓
Sea level gauges - GLOSS	★★½	★★☆	★★★	★☆☆	★★☆	✓	✓	
Time series sites - OceanSITES	★★☆	Not applicable	★★½	★★☆	★★☆		✓	✓
Moored buoys - DBCP	★★½	★★★	★★★	★★☆	★★½	✓	✓	✓
Tsunami buoys - DBCP	★★☆	★★★	★★★	½☆☆	★★★	✓		
HF radars	★½☆ Emerging	★½☆	½☆☆	★☆☆	★★★	✓	✓	
Drifting buoys - DBCP	★★★	★★½	★★½	★½☆	★★★	✓	✓	
Profiling floats - Argo	★★★	★★★	★★★	★★★	★★☆	✓	✓	
Deep & biogeochemistry floats - Argo	★☆☆ Emerging	★★½	★★½	★★★	★★☆	✓	✓	✓
OceanGliders	½☆☆ Emerging	★★☆	★☆☆	★½☆	★★☆	✓	✓	✓
Animal borne sensors - AniBOS	½☆☆ Emerging	★☆☆	★★☆	½☆☆	★★☆	✓	✓	✓

www.ocean-ops.org/reportcard

Sufficient to meet accelerating climate impacts and societal needs?

Underpinning a wide range of applications



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

11 Strategic Objectives

We face key challenges in expanding observations and enhancing fit for purpose of our system

Need a step change…

To help achieve the Global Ocean Observing System 2030 Strategy and the Ocean Decade outcomes, GOOS has launched 3 integrated programmes that will be foundational building blocks for the Ocean Decade.

- CO-DESIGN
- COASTAL OCEAN
- CAPACITY DEVELOPMENT

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Ocean Observing Co-Design

by The Global Ocean Observing System

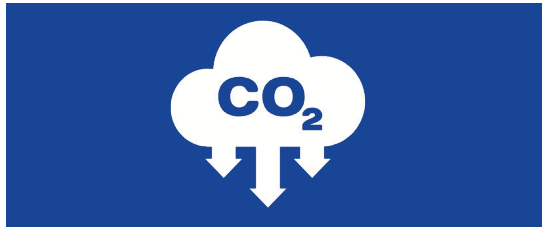
Transforming our ocean observing system assessment and design process.

- Develop a more user-focused co-design process - with scientific experts in observations and forecasts, and with key user stakeholders
- Develop tools that allow sponsors to ask key questions about cost and benefit and receive clear answers.
- Include the range of ocean observing efforts in place, actively involve new technologies, and prediction and services communities.

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

THE EXEMPLARS

*Each exemplar is at different levels of maturity



The Ocean Carbon Cycle

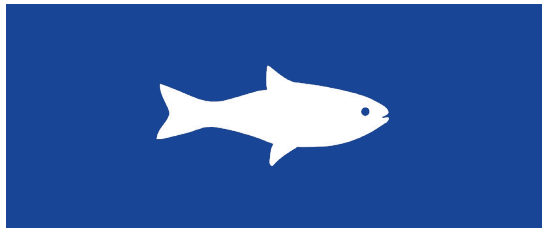
Improving carbon data to inform climate targets, such as net zero

Tropical Cyclones

Advancing tropical cyclone forecasting to save lives & property

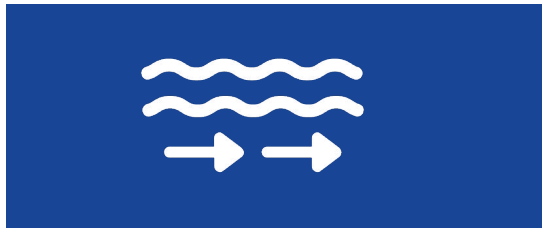
Storm Surge

Improving predictions to minimise impacts on vulnerable communities & natural resources



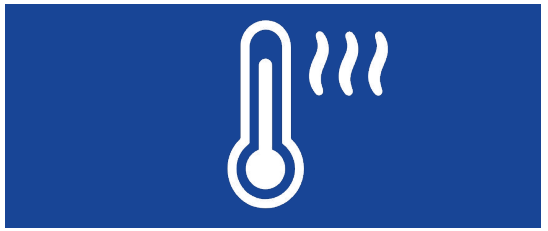
Marine Life

Conserving marine biodiversity and supporting sustainable use of resources



Boundary Currents

Understanding key current systems that significantly influence productivity, weather and climate



Marine Heatwaves

Monitoring marine heatwave impacts on biodiversity and economies

Pilot Areas

Tropical Cyclones - 3	Boundary Currents - 2
Ocean Carbon - 1	Storm Surge - 10
Marine Heatwaves - 2	Marine Life - 4

Ocean Observing Co-Design

by The Global Ocean Observing System

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Revolutionising Global Coastal Ocean observation and forecasting and offering open and free access to coastal information

CoastPredict
with The Global Ocean Observing System

Focus areas and initial projects

3 Core Projects endorsed

30 contributing partner projects endorsed

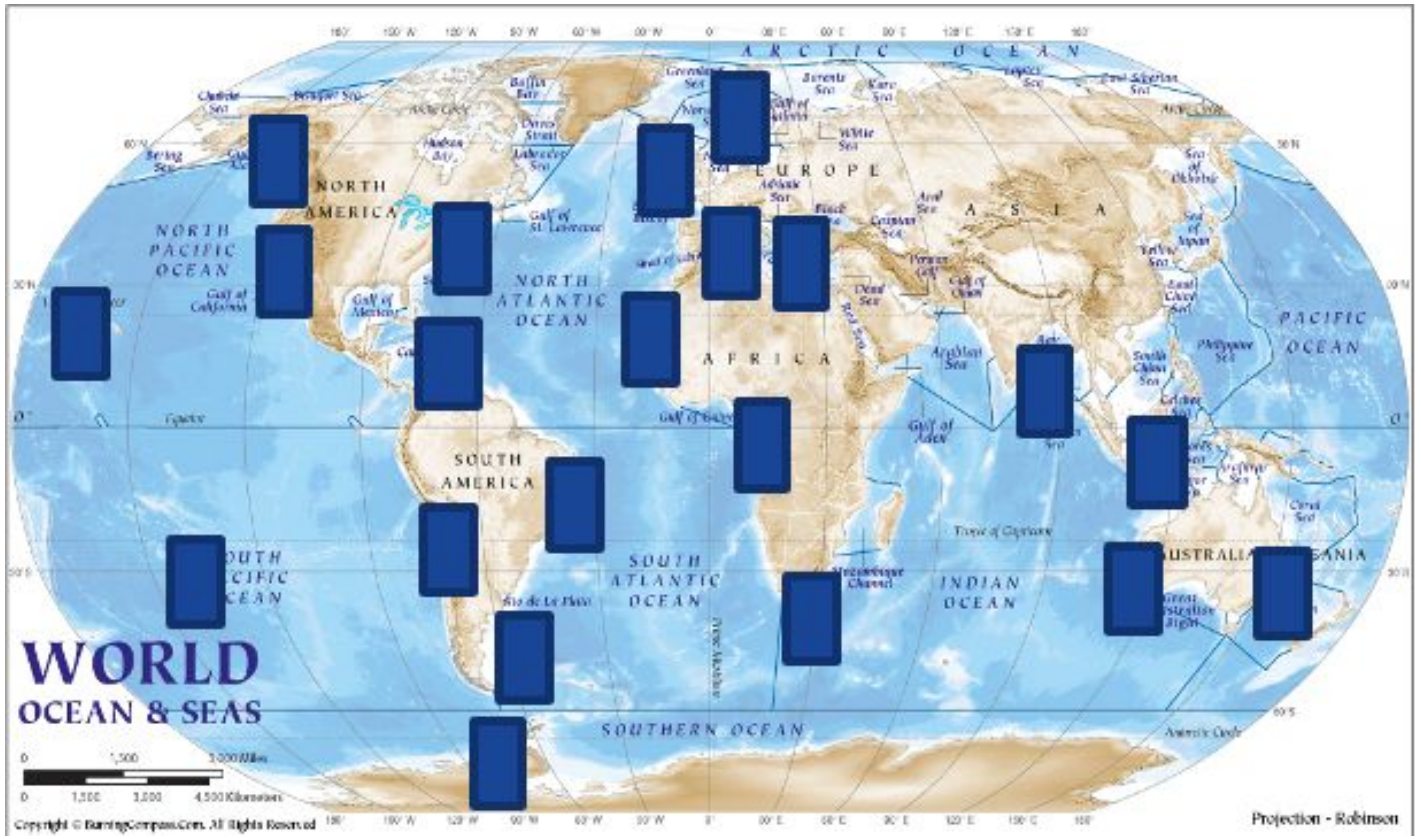
Global Coast

Area with different coastal features, societal needs, and level of development – same backbone

- Global Coast - 10 coastal sites selected for diversity: - coastal features, needs, infrastructure - demonstration sites for developing new technologies and services

- Making the focus area work fit for purpose for observing and predicting the Global Coastal Ocean

- Common data and best practice backbone - Focus Area 5



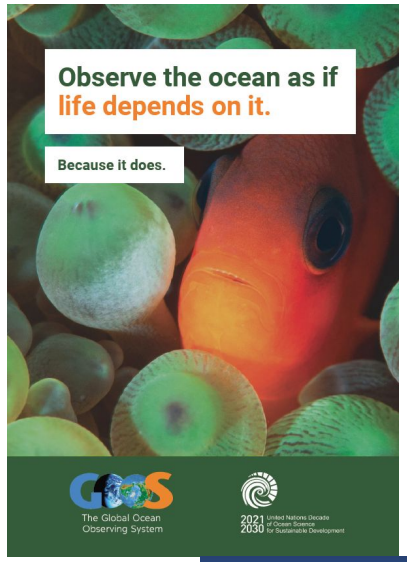
From Officers meeting in Jan 2022

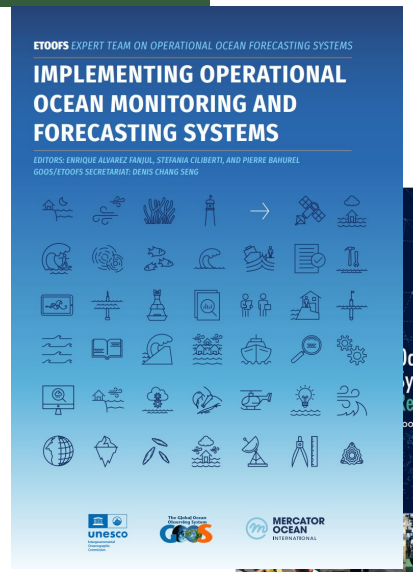
GOOS SC priorities *(November 2021)*

- Push for national/regional engagement in **ocean carbon observatories** *(profiled at COP-26)*
- revisiting **Regional** Policy to allow for more flexibility and growth
- Start of investment in **Communications, Resourcing,** and the **Ocean Decade programmes** *(from Covid-19 travel savings)*
- engaging WMO *(more in next presentation)*
- Ocean Indicators *(cross-IOC)*

2022 Advances

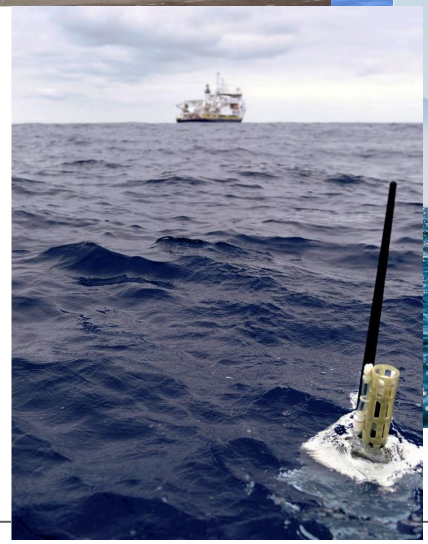
- Raised profile ocean, ocean observing & GOOS - UN HQ Informal Consultation Process (DOALOS) June, UN Oceans Conference July, COP-27 November, and COP-15 December
- Comms Plan, 17 original content GOOS news articles (shared IOC and external news), 5 GOOS Updates (41% open rate), new theme focused media campaigns, 120 tweets
- Messaging platform philanthropic sector, supports stronger messaging
- Ocean Observing System Report Card - cross-GOOS, launched Sept - 2000 visits
- Launched BioEco Portal in July - first time search sustained BioEco observing programmes
- Release of technical guide on “Implementing Operational Ocean Monitoring and Forecasting Systems” in July, 80 contributing authors, 18 countries

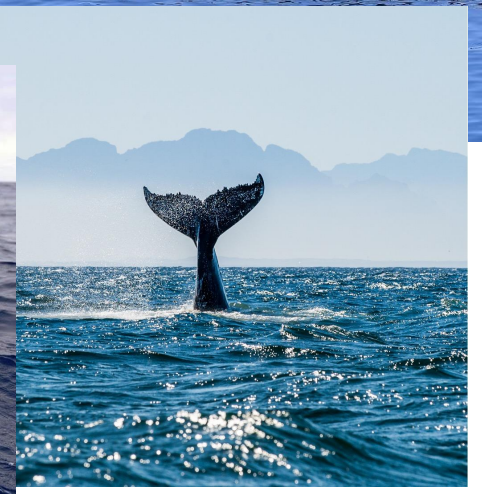




Advancing partnership

- **IOC**
  - IODE - OBPS Joint Project / OBIS BioEco Data
  - MPA - CoastPredict / Economics
  - OSS - StOR & work to do carbon and OA
  - Decade
- **WMO**
  - RRR - invited to lead ocean application areas
  - SG OOIS - functional connections
  - Support for GOOS
- **DOALOS** collaborate for observations in EEZ
- Contributed significantly to the **GCOS** Implementation Plan, launched in May 2022.
- Projects with partners **OECD and MTS**
- Unique hosting agreement between UNESCO and Sorbonne University - Argo support
- Attracting new talent components / secondments





Dialogues with Industry

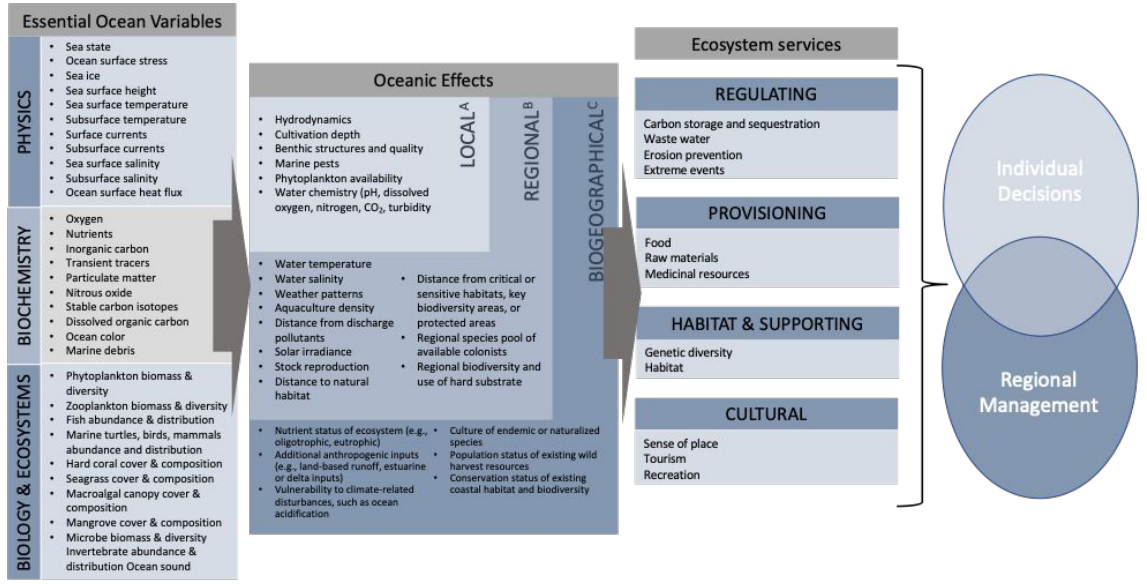
- GOOS, MTS and NOAA
- Lower barriers and increase opportunity for private sector engagement and partnership in multi sectoral observing system
- 4 sessions, ended Jan 2023
- Successfully enabled rich dialogue - government, private and international - how to grow the observing system and information services
- Synthesise key findings & recommendation in paper - work with public, private and academic

marine technology SOCIETY

Opportunity runs deep™

Value of Ocean Observing

- GOOS, OECD and University of New Mexico
- Private and public sectors make use of EOVs in decisions that affect individuals' and society's use of the ocean
- Paper identifies how EOVs can have a positive impact on the choice of policy instruments, on producer production and revenue, and regulatory cost effectiveness
- Blueprint for a data informed approach to a balanced development of the Earth's oceans.



Key challenges in 2023…

2023

Immediate/practical
Small budget, Web migration, under resourced

Resourcing
Broader range societal actors
Ocean Decade Programmes - 2023 make or break
GOOS Core - secondments, focused fundraising

GOOS governance evolution
IOC support and engagement
National Focal Points, Regional Policy, new activation in the regions

Integrate Decade actions, DCO, DCC….
Elevated collaboration

Expanding partnership