Ocean Observations for societal benefit

Global Ocean Observing System



GCOS Climate WCRP Services Ocean Health

- the Ocean component of **GCOS** *(GOOS's cross-panel climate interface with GCOS)*
- the physical variables for **GOOS**,
- while defining sustained ocean observing requirements for **WCRP**

Support the value chain "observation/data – science/knowledge –service/policy"

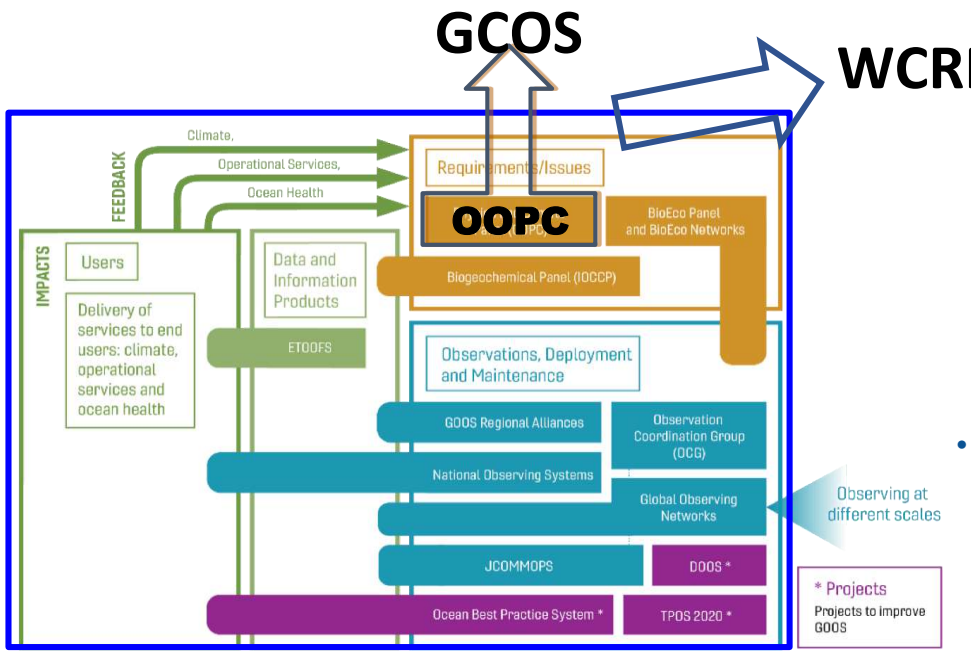
GCOS • GOOS • WCRP OOPC Ocean Observations Panel for Climate

https://www.goosocean.org https://gcos.wmo.int

A GOOS Expert Panel

- Conduit into all of GOOS, with structures covering parallel work in requirements for biogeochemistry and bioeco observations

- Requires wide consultation and proper planning

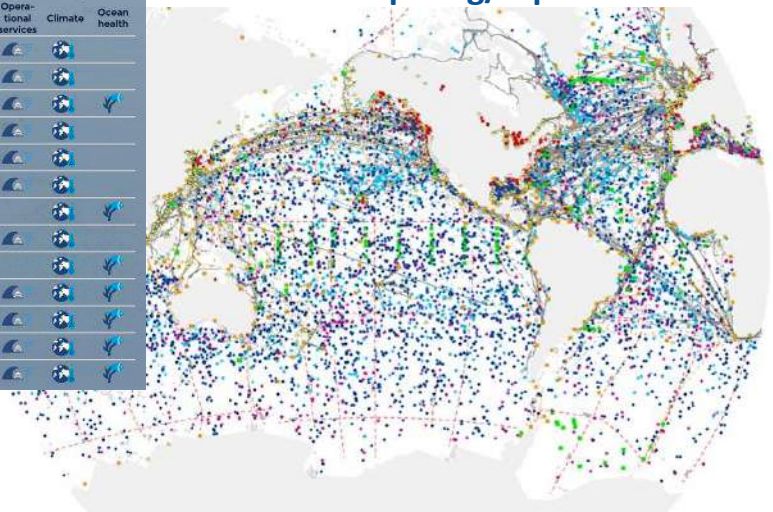


GOOS Structure

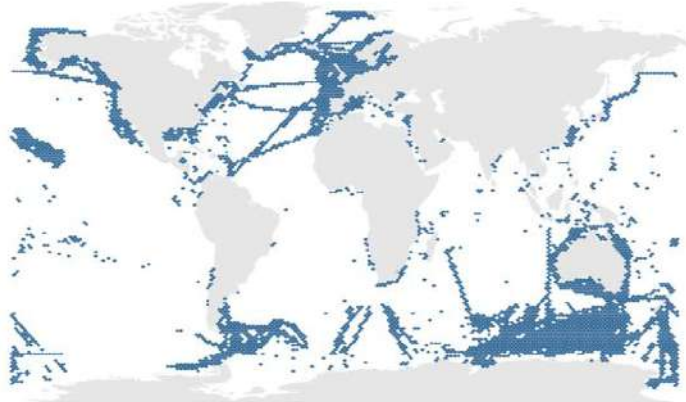
Integrating the Ocean Observing

1. **OceanOPS network status summary versus EOVs/ECVs**

www.ocean-ops.org/reportcard2020



2. **First biological "sustained" ocean observations assessment**



- Biological observations - subsumed into a small number of ECVs that are important for capturing the impact of climate on the ocean;

- Sustained obs cover only 7% of surface of the ocean; only ⅓ of those are freely and openly shared;

Satterthwaite et al., in press, 2020

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The Global Ocean Observing System GOOS

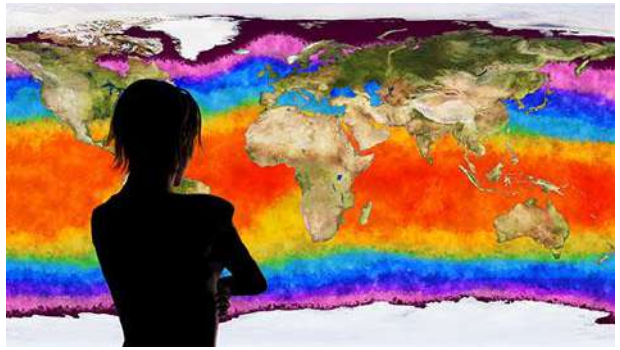
WCRP World Climate Research Programme

GOOS & the UN Ocean Decade

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

GOOS | At the heart of the Ocean Decade

Ocean Observing Co-Design, CoastPredict and Observing Together are the first programmes of many that will actively drive the Ocean Decade to “Ensure a sustainable ocean observing system across all ocean basins that delivers accessible, timely, and actionable data and information to all users."



GOOS | Ocean Observing Co-Design
by The Global Ocean Observing System

Creating the partnerships, process, and infrastructure to evolve ocean observing, co-designed with key stakeholders, and delivering the data we need for the future we want.

GOOS | CoastPredict
with The Global Ocean Observing System

Revolutionising Global Coastal Ocean observing and forecasting, co-designing the needed infrastructure and offering open and free access to coastal information.

GOOS | Observing Together
by The Global Ocean Observing System

Transforming ocean data access and availability by connecting ocean observers and the communities they serve, going further to make every observation count.

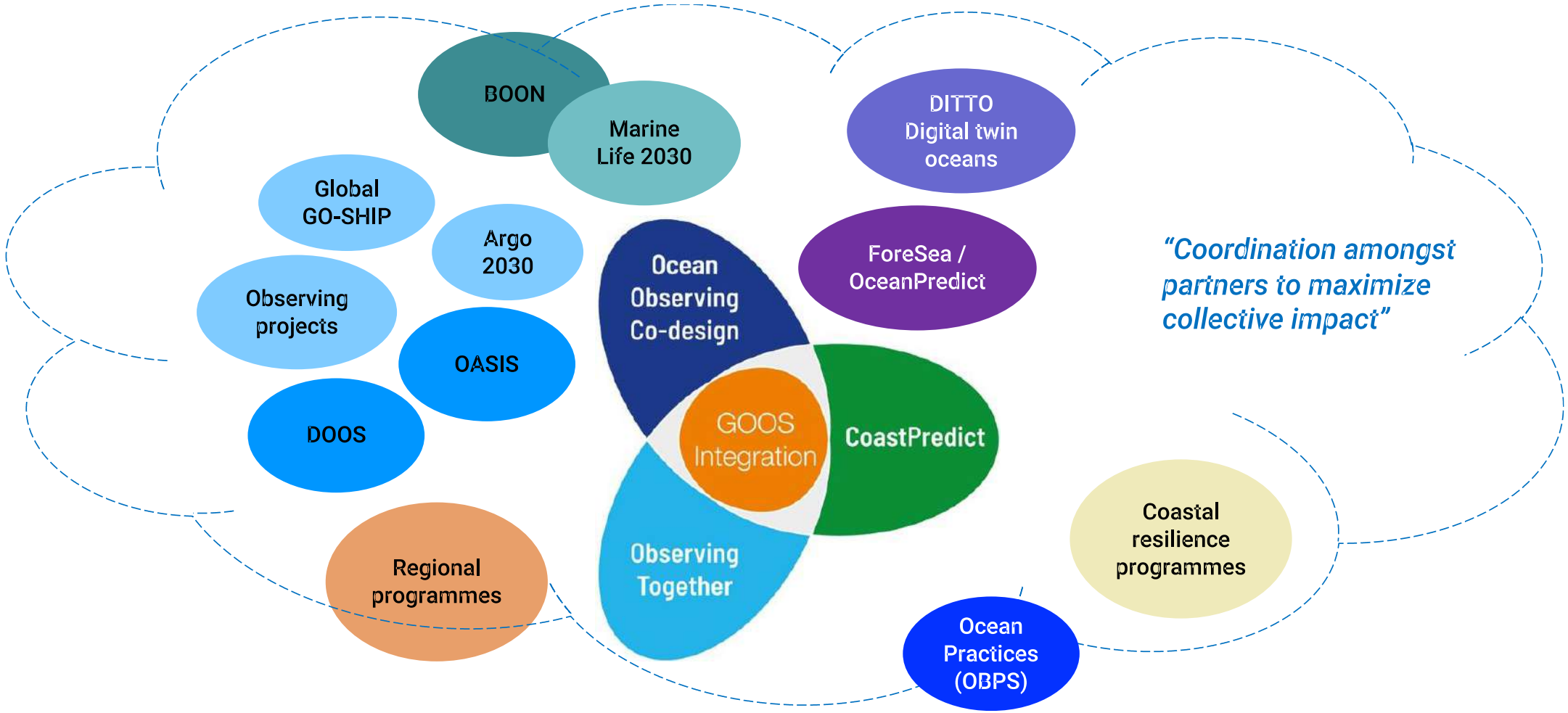
GCOS • GOOS • WCRP
OOPC Ocean Observations Physics and Climate panel

GOOS & the UN Ocean Decade

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

GOOS | At the heart of the Ocean Decade

The planning process has already deepened partnerships with other organizations and endorsed Ocean Decade Programmes.



Ocean Observing Co-Design

by The Global Ocean Observing System

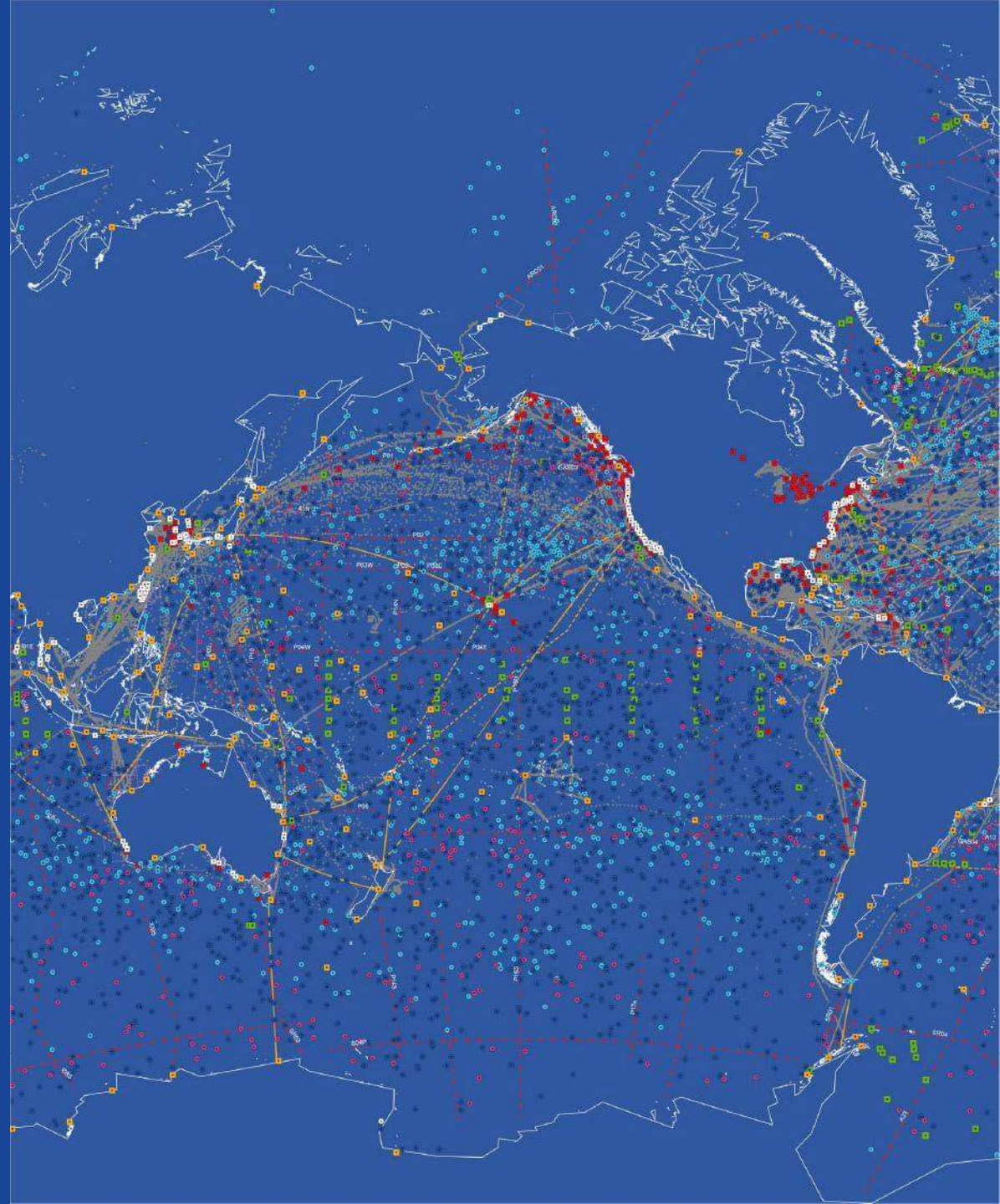
Transforming our ocean observing system assessment and design process

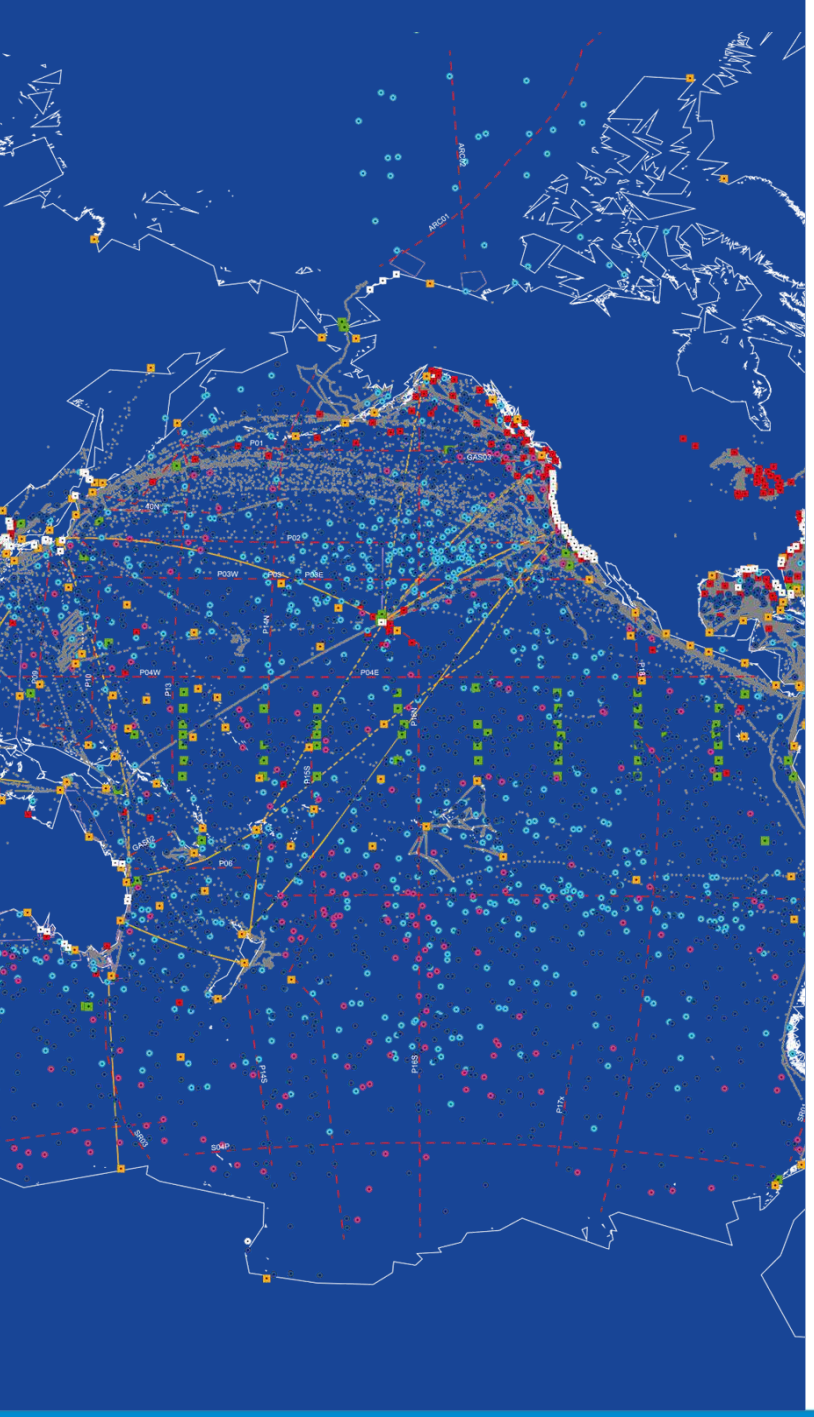
Supporting the Decade of Ocean Science

for Sustainable Development

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

This programme is endorsed by the **UN Decade of Ocean Science**





Ocean Observing Co-Design

by The Global Ocean Observing System

Aims

1. Develop a more user-focused co-design process, involving existing efforts and new technologies, and modelling, forecast and service communities
2. Establish international capacity and modular infrastructure to co-design and regularly evaluate the observing system at different scales
3. Develop system diagnostics, tools and reporting capability to better assess fitness-for-purpose

OUTCOME

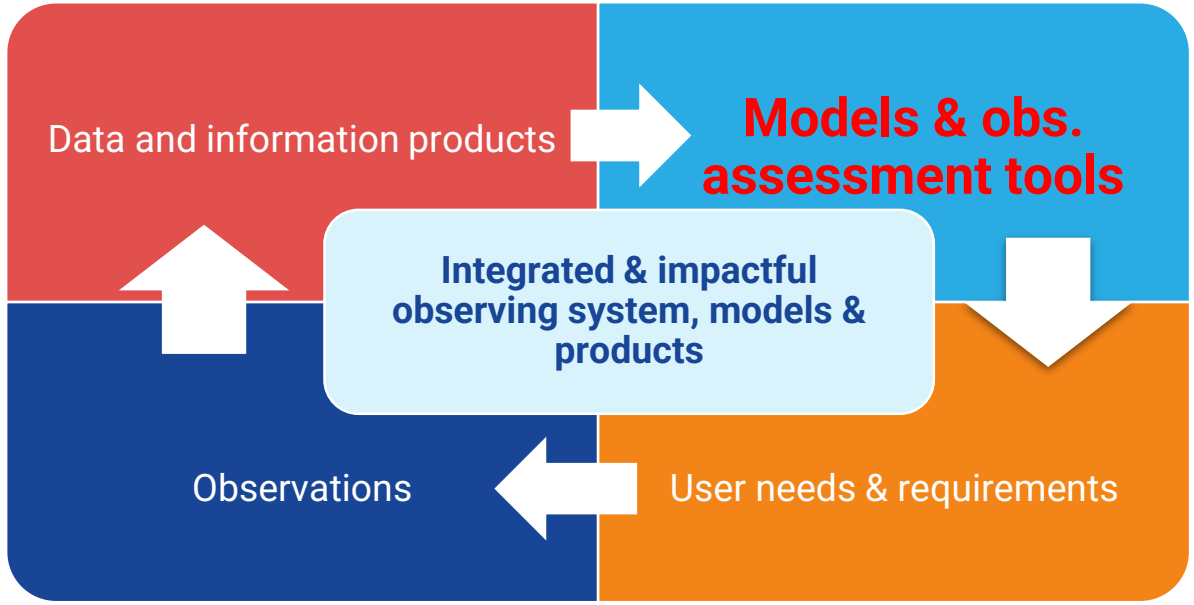
Ocean Observing Co-Design will develop a more user-focused co-design process to create a truly integrated, responsive ocean observing system.

System diagnostics, tools and reporting capacity to better assess fitness-for-purpose based on user needs

This will involve:

- Co-design with **end-users/stakeholders**
- Integrating with the **modelling**, **forecast**, and **services** communities
- Building upon **existing efforts & lessons learnt**

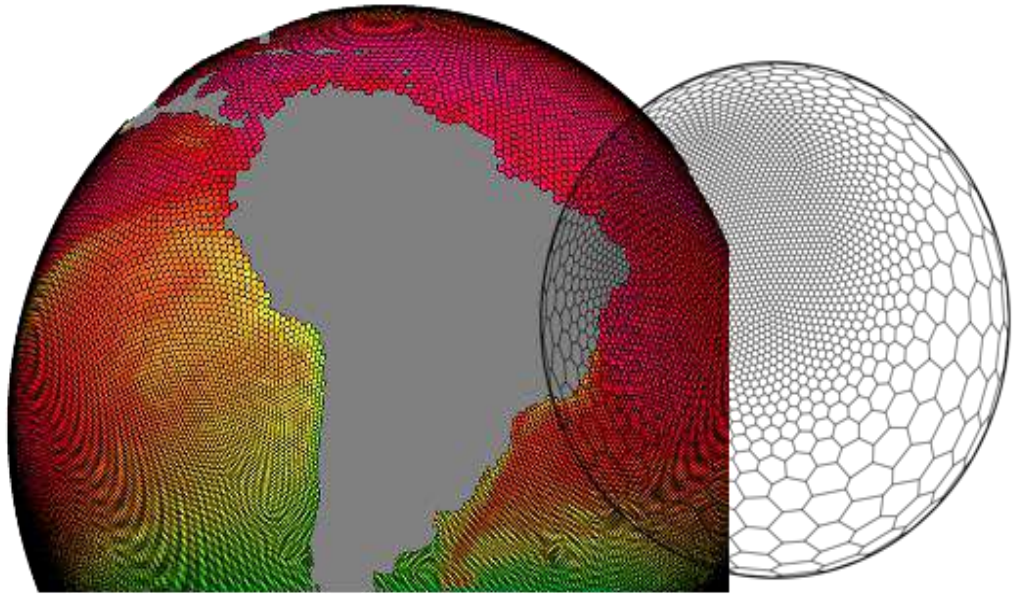
Ocean Observing Co-Design &
the Framework for Ocean Observing (FOO)



Projects around 'exemplar' use areas

Examples with users

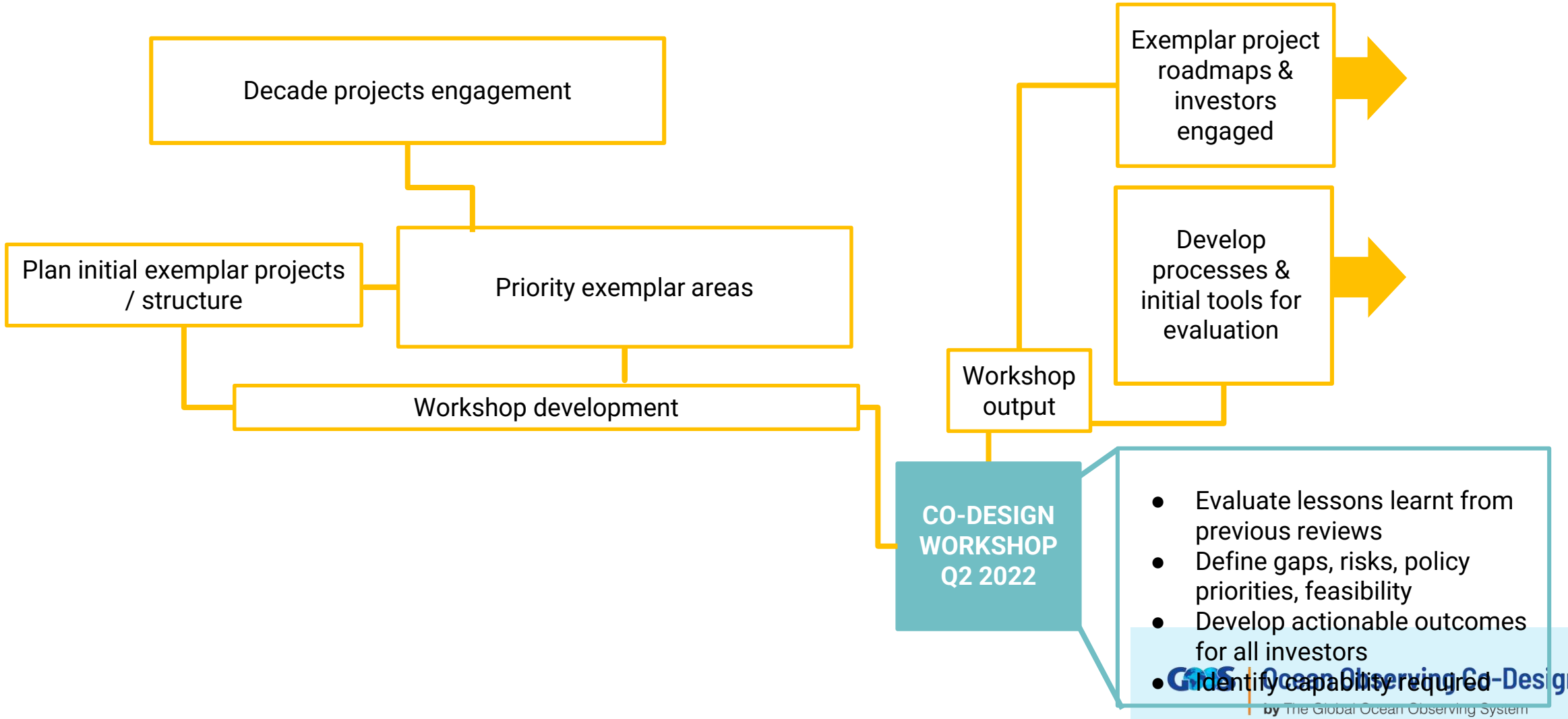
- **Carbon Budgets -** national policy makers, those assessing carbon storage
- **Heatwaves** - national weather services, industry, public
- **Coastal storm surge inundation** - coastal managers, urban planners, coastal industries & communities
- **Marine heatwaves** - aquaculture, fisheries
- **Climate assessment** - UNFCCC
- **Extreme weather events** - coastal communities, local authorities, national governments



Different exemplar areas are more mature than others for service delivery, model and observing maturity - different levels will be addressed

Ocean Observing Co-Design
by The Global Ocean Observing System

Next in 2022



Ocean Observing Co-Design
by The Global Ocean Observing System

SAVE-THE-DATE

Ocean Decade Co-Design Workshop

June 7, 8, 9 @ UTC 1000 - 1330
'Supporters' Forum' date TBC late June

We will hear lessons learnt from co-design across GOOS and other sectors. Teams will work on the development of co-design 'exemplar' projects, for example around providing the ocean information needed to national governments for carbon budgets, users of marine heatwave information, and improving the forecasting of hurricanes and tropical storms.

For exemplars, teams must identify key stakeholders, projects, needs in the underlying infrastructure, and ways that groups across modelling, observing and end-users can interact to develop tools and best practices for the co-design of an integrated and responsive ocean observing system. Some exemplars are already in development, we invite suggestions for other exemplars.

GET INVOLVED
REGISTRATION WILL OPEN EARLY APRIL
Contact us now if you would like to suggest or lead an exemplar project area
m.o-donovan@unesco.org

Event details will be published on the OceanExpert event page

Day 1: June 7, UTC 1000 - 1330 | Lessons learnt & recommendations for successful co-design

1. **Welcome & Ocean Observing Co-Design Programme introduction** 15 min
2. **Co-Design process: lessons learned**
   TPOS 2020 | IndOOS | TAOS | IOOS | ....
3. **Interactive panel discussion: Co-design use cases**
4. BREAK 15 min
4. **Value of ocean observations** | 20 min
5. **Discussion** | What will a successful exemplar look like: success / failure / recommendations / **what's missing**?
6. **Synthesis & wrap up** | 10 min

Day 2: June 8 UTC 1000 - 1330 | Working session on Exemplar areas

1. **Day 1 Summary & guidance for Breakout Sessions**
2. **Working Sessions** | Shaping of exemplar areas

Day 3: June 9, UTC 1000 - 1330 | Finalising of Exemplar areas under Ocean Observing Co-Design

1. **Day 2 Report back** | Exemplar recommendations from breakout teams
2. **Selection of priority exemplar areas**

Day 4: June X, UTC 1000 - 1300 | Supporters' Forum: Presentation of Exemplar proposals to funders

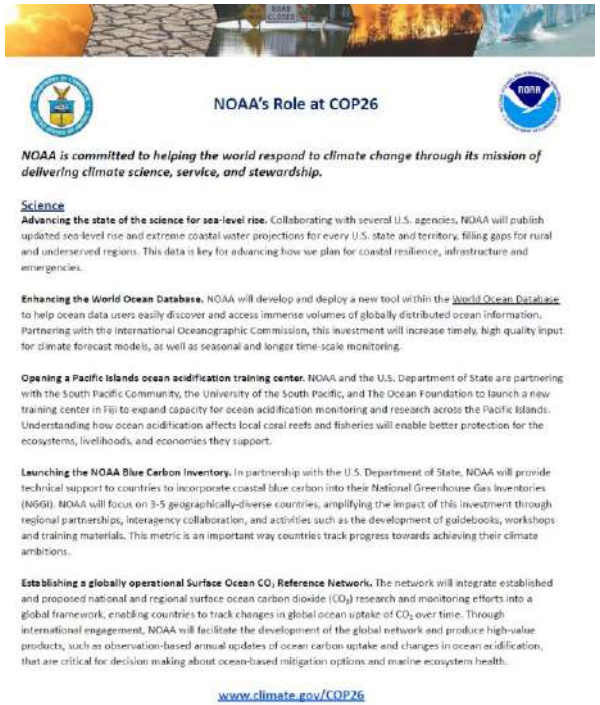
1. **Exemplar areas presentations** | Outline, gaps, needed infrastructure
2. **Open discussion** | Consensus on actions

GOOS | Ocean Observing Co-Design
by The Global Ocean Observing System

Supportive International Context

- NOAA Statement
- G7 Statements
- UN Decade
- Canadian NACO
- IOCR

- G7 FSOI- IOCCP
- JPI Oceans



NOAA's Role at COP26

NOAA is committed to helping the world respond to climate change through its mission of delivering climate science, service, and stewardship.

Science

Advancing the state of the science for sea-level rise. Collaborating with several U.S. agencies, NOAA will publish updated sea-level rise and extreme coastal water projections for every U.S. state and territory, filling gaps for rural and underserved regions. This data is key for advancing how we plan for coastal resilience, infrastructure and emergencies.

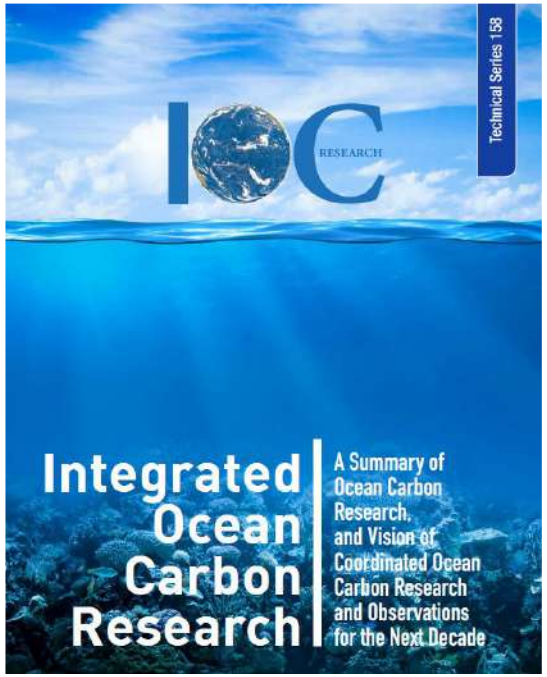
Enhancing the World Ocean Database. NOAA will develop and deploy a new tool within the World Ocean Database to help ocean data users easily discover and access immense volumes of globally distributed ocean information. Partnering with the International Oceanographic Commission, this investment will increase timely, high quality input for climate forecast models, as well as seasonal and longer time-scale monitoring.

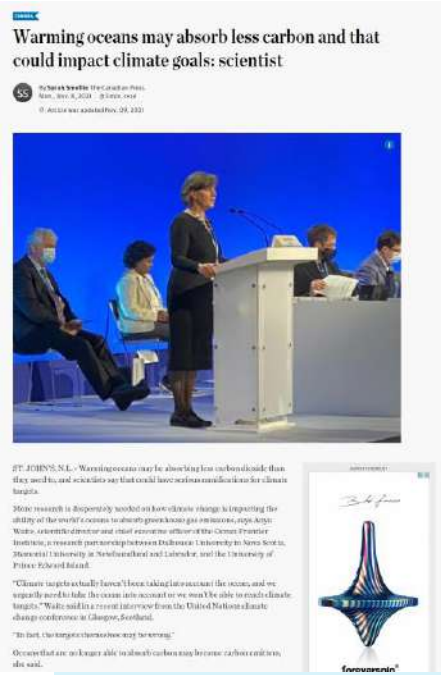
Opening a Pacific Islands ocean acidification training center. NOAA and the U.S. Department of State are partnering with the South Pacific Community, the University of the South Pacific, and The Ocean Foundation to launch a new training center in Fiji to expand capacity for ocean acidification monitoring and research across the Pacific Islands. Understanding how ocean acidification affects local coral reefs and fisheries will enable better protection for the ecosystems, livelihoods, and economies they support.

Launching the NOAA Blue Carbon Inventory. In partnership with the U.S. Department of State, NOAA will provide technical support to countries to incorporate coastal blue carbon into their National Greenhouse Gas Inventories (NGGI). NOAA will focus on 3-5 geographically-diverse countries, amplifying the impact of this investment through regional partnerships, interagency collaboration, and activities such as the development of guidebooks, workshops and training materials. This metric is an important way countries track progress towards achieving their climate ambitions.

Establishing a globally operational Surface Ocean CO_2 Reference Network. The network will integrate established and proposed national and regional surface ocean carbon dioxide (CO_2) research and monitoring efforts into a global framework, enabling countries to track changes in global ocean uptake of CO_2 over time. Through international engagement, NOAA will facilitate the development of the global network and produce high-value products, such as observation-based annual updates of ocean carbon uptake and changes in ocean acidification, that are critical for decision making about ocean-based mitigation options and marine ecosystem health.

www.climate.gov/COP26





G7 2030 Nature Compact

(3E) **Supporting the UN Decade of Ocean Science for Sustainable Development:** endorsing the G7 Ocean Decade Navigation Plan to drive developments in transformational ocean science to protect and further our sustainable relationship with the ocean. As part of this work we will convene scientific and policy experts to discuss the carbon absorption function of the ocean, furthering targeted and effective ocean action.

erving Co-Design
n Observing System

FUTURE OF THE SEAS & OCEANS INITIATIVE

- Scoping Paper v2, June 2021-

A Surface Ocean CO_2 Monitoring Network: Facilitating the development of an internationally-agreed observing strategy and coordination structure for GOOS.

In partnership with the GOOS Biogeochemistry Panel and other international and G7 Member ocean carbon programmes, catalyse and facilitate the development of an internationally-agreed strategy for monitoring surface ocean CO_2 globally, and build on existing observing programmes, data management structures, and coordination bodies to create a global surface monitoring CO_2 network capable of responding to the needs of global and regional policy drivers including the UNFCCC Global Stocktake 2023.

Action Areas 1, 3, and 4.

Phase 1: Strategy Development (mid-2021 to mid-2022)

Develop a G7 FSOI Task Team with partners to address Tasks 1 – 3 through an international workshop (virtual or mixed) and through regular writing team meetings to draft and circulate for extensive international review a strategy for a global surface CO_2 monitoring network, including a phased implementation plan (roadmap) and budget requirements.

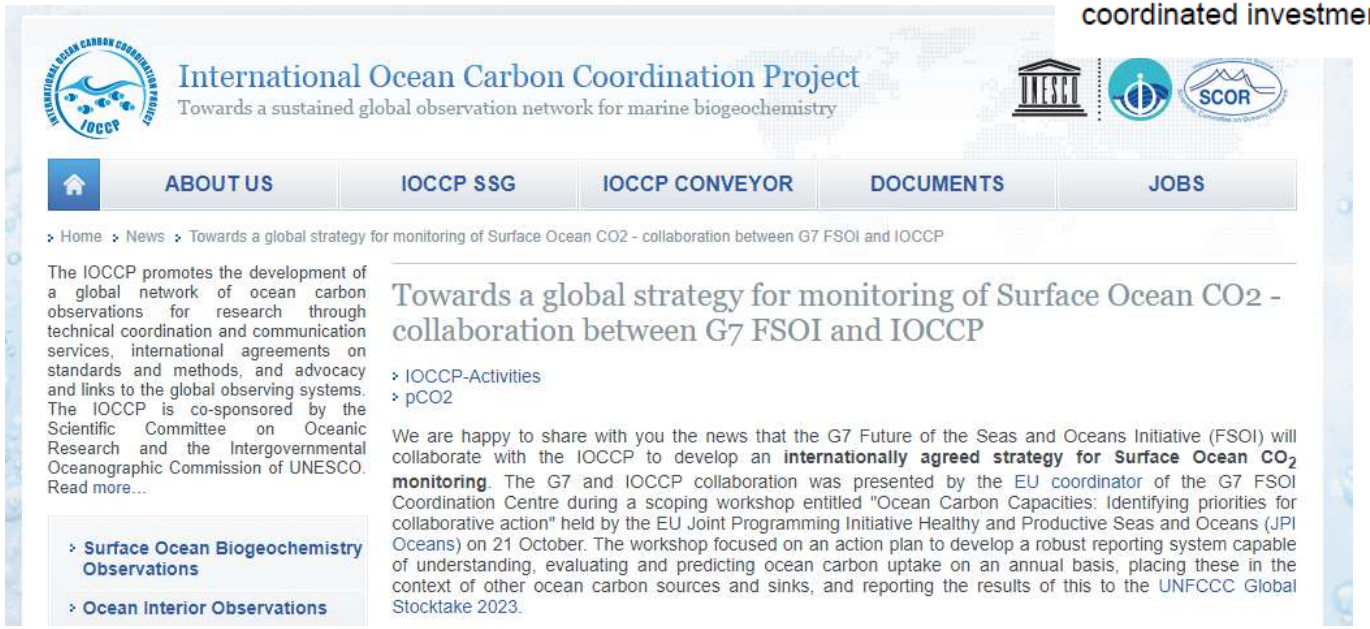
Deliverables:

Workshop report of the Strategy Development meeting.

Draft strategy, phased-implementation plan, and roadmap for the development of a sustained global surface ocean CO_2 monitoring network.

Phase 2: Establishment of the Global Network and Implementation agreements (mid-2022 to early-2023)

Using the Draft strategy and roadmap developed by the Task Team in Phase 1, host a stakeholders forum and global workshop for government agencies and ministries (G7 FSOI and GOOS) to address Task 4; namely, identify existing national programmes that are elements of the global surface ocean CO_2 monitoring network, identify critical gaps in the observing system (including global coordination structures and data management activities), and reach agreements on priorities for coordinated investment to establish the global network.



Official Recognition by UN Decade

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
COMMISSION OCÉANOGRAPHIQUE INTERGOUVERNEMENTALE
COMISIÓN OCEANOGRÁFICA INTERGUBERNAMENTAL
МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ
اللجنة الدولية الحكومية لعلوم المحيطات
政府间海洋学委员会

UNESCO

UNESCO - 7 Place de Fontenoy - 75352 Paris Cedex 07 SP, France
http://ioc.unesco.org - contact phone: +33 (0)1 45 68 03 18
E-mail: v.ryabinin@unesco.org

Ref. : IOC/VR/21.373/JB/AC/cn 7 October 2021

Dear Mr Sanders,

It is with great pleasure that I am writing to inform you of the endorsement of your Decade Action entitled "Integrated Ocean Carbon Observing System, ID 123" as a project forming part of the UN Decade of Ocean Science for Sustainable Development 2021-2030.
Please accept my sincere congratulations for this achievement. Let me also thank you for your engagement and commitment to the Ocean Decade vision of the science we need for the ocean we want.

Ocean Observing Co-Design will build a system co-designed with scientific experts in observations and forecasts, and with key user stakeholders.

It will provide fit-for-purpose ocean observing, supplying the information required to manage the ocean we need for the future we want.

Ocean Observing Co-Design
by The Global Ocean Observing System

JPI Oceans Process

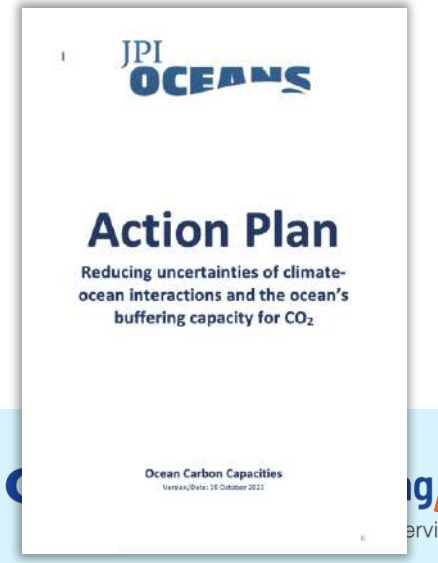
Started around 1 year ago

>50 scientific and policy experts consulted

Over 12 countries represented in consultations

7 Working Groups

- North Atlantic
- North Sea
- Baltic Outflow
- Mediterranean Sea
- Model Synthesis
- Observing System Design/ Infrastructure Sharing
- Negative Emission Technologies



EOVs and Essential Climate Variables (ECVs)

PHYSICS

- Sea State
- Ocean surface stress
- Ocean Heat Fluxes
- Sea Ice
- Sea level
- SST
- Subsurface temperature
- Surface currents
- Subsurface currents
- Sea Surface Salinity
- Subsurface salinity

BIOGEOCHEMISTRY

- Oxygen
- Nutrients
- Inorganic Carbon
- Tracers
- Suspended particulates
- Nitrous oxide
- Carbon isotope (^{13}C)
- Dissolved organic carbon
- Ocean Colour

BIOLOGY AND ECOSYSTEMS

- Phytoplankton biomass and diversity
- Zooplankton biomass and diversity

Plankton

- Fish abundance and distribution
- Marine turtles birds and mammals abundance and distribution
- Live coral
- Seagrass cover
- Mangrove cover
- Microalgal canopy

Marine Habitat Properties

- Microbe biomass and diversity (*emerging)
- Benthic invertebrate abundance and distribution (*emerging)

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The Global Ocean Observing System GOOS

WCRP World Climate Research Programme

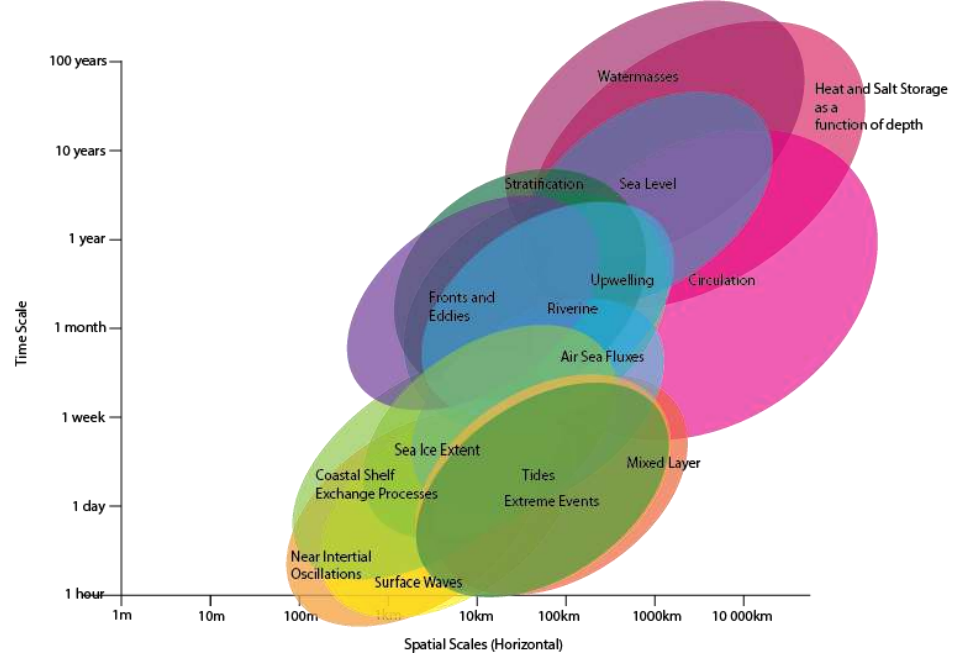
www.goosocean.org/eov

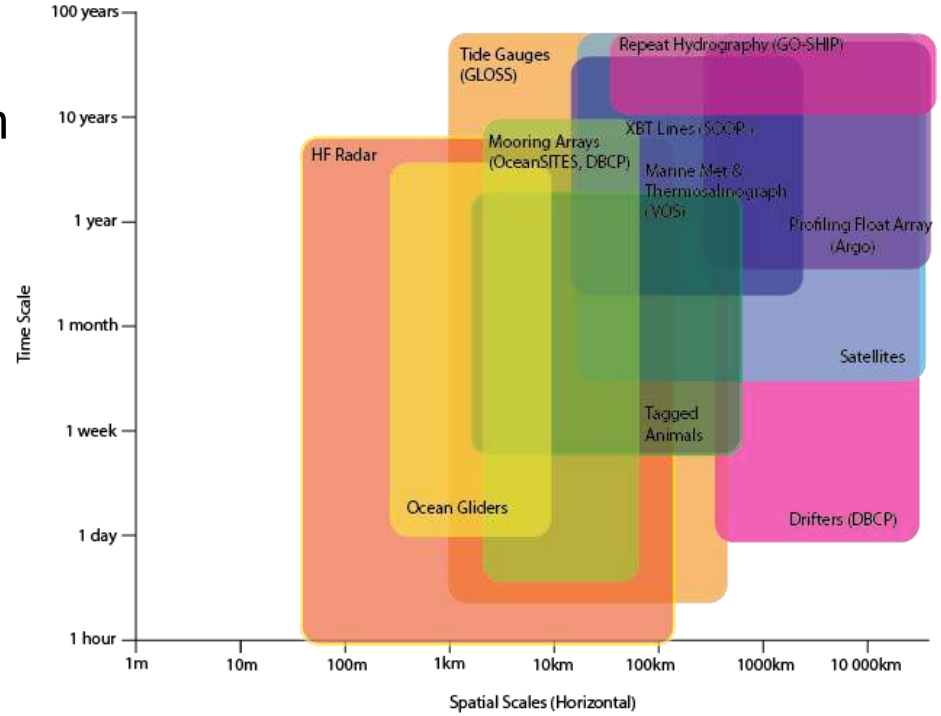
GOOS | Ocean Observing Co-Design by The Global Ocean Observing System

Developing requirements for Essential Ocean and Climate Variables

Essential Ocean/Climate Variables (EOV/ECV) Specifications (Stweardship)

- Mapping of societal drivers, applications, phenomena, EOV requirements, observing components, data streams.
- Phenomena approach; easy to draw out requirements for different applications (e.g. climate relevant phenomena)
- Seeking clarification, agreement between GCOS/GOOS on requirements setting, terms, etc before updating (see GCOS-GOOS paper).
  - Important to ensure that Panel efforts meet needs of GCOS, GOOS in link with WCRP
  - Clarity on terminology, how one maps to other particularly important for users.





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