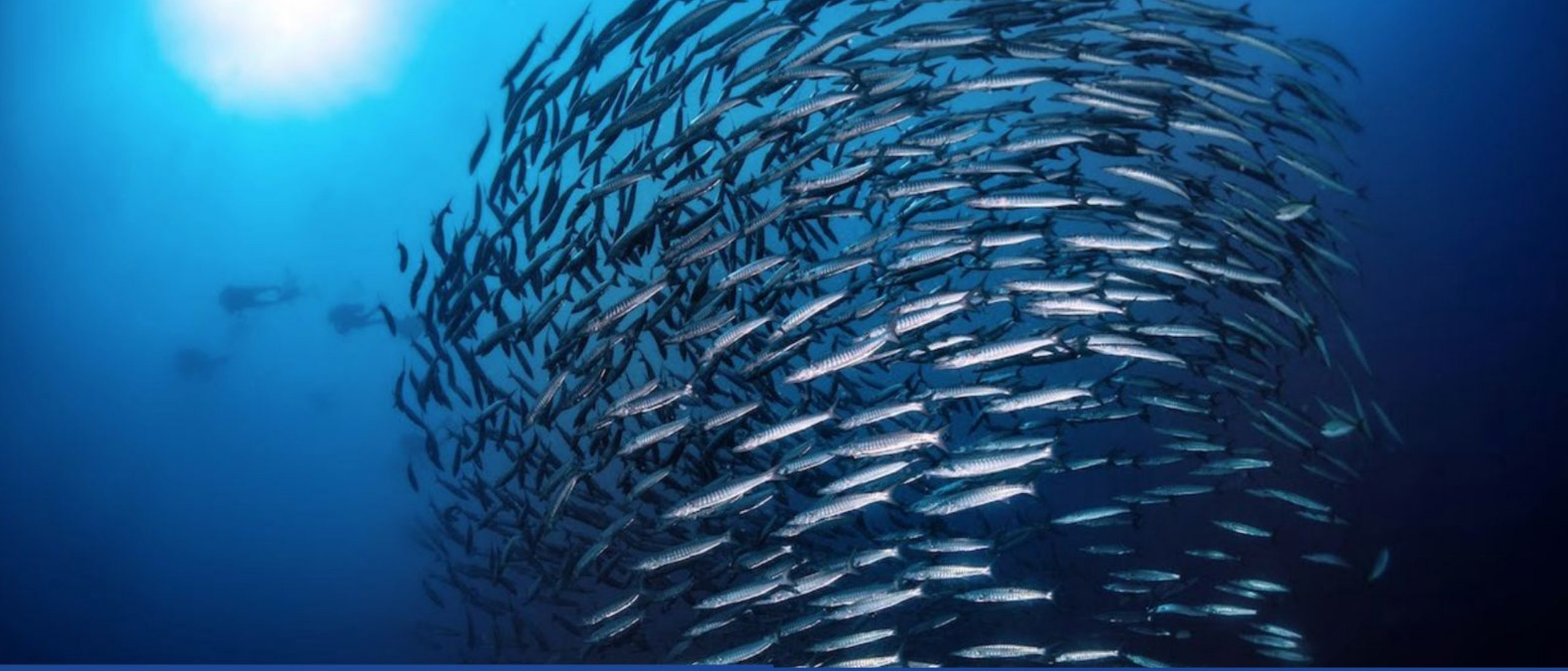


At the heart of the Ocean Decade

Mairéad O'Donovan,
Ocean Decade Programmes Support, GOOS

3 integrated programmes to help achieve the **Global Ocean Observing System 2030 Strategy** and **Ocean Decade** outcomes

- **CO-DESIGN**
- **COASTAL OCEAN**
- **CAPACITY DEVELOPMENT**

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Observing Together

by The Global Ocean Observing System

Meeting stakeholder needs and making every observation count

Co-chairs:

Molly Powers (Pacific Community)

Alvaro Scardilli (Naval Hydrographic Service, Argentina)

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

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

Observing Together

by The Global Ocean Observing System

GUIDING PRINCIPLES

- **Sustained** ocean observations
- **Engagement with GOOS components** (networks, regional systems, etc);
- Use and / or contribute to **best practices**;
- **FAIR** [findable, accessible, interoperable, and reusable] data principles;
- **Share** experience and lessons learnt;
- Engage in **co-design** activities

OBSERVING TOGETHER PROJECTS ENDORSED BY THE OCEAN DECADE

PROJECT CONTACTS PAGE LINKED

NEW OBSERVING SYSTEMS:

National Commission for Education, Sciences and Culture, Kingdom of Morocco (MarocNatCom)

Enhancement of oceanic knowledge by developing a Moroccan national observations network

Mauritius Meteorological Services

Enhancement of the ocean observing system within the Republic of Mauritius

END-USER ENGAGEMENT:

Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia [BMKG]

Ocean Literacy: Fisherman Weather Field School - Sekolah Lapang Cuaca Nelayan [SLCN]

AtlantOS-Connect

Focus on user community engagement with observing networks

NEW OBSERVERS:

Norway NTNU

Sailing4Science: expand capacity for through citizen science, with emphasis on remote under-observed areas

https://goosocean.org/index.php?option=com_content&view=article&id=436:observing-together-behind-the-programme&catid=9&Itemid=411

GOOS | Observing Together
by The Global Ocean Observing System

PROJECT DEVELOPMENT SCHEMATIC

Observing Together
by The Global Ocean Observing System

PROGRAMME COORDINATION

GOOS components: OCG, OCEANOPS, ETOOFS, networks

GRAs, CLIVAR, other initiatives

GOOS Ocean Decade Programmes

Ocean Best Practices, IODE, OTGA

SUPPORT & INTERACTION THROUGH:
Expert consultation | Workshops | Knowledge sharing sessions | Co-design / interaction with Exemplars & pilot areas

PROJECT ONBOARDING

>Scope project needs, maturity, opportunities for synergy.
>Identify commonalities with other projects

OPTIONAL: PROJECT SCOPING

> Support to more fully scope & design project & estimated costs

PROJECT DEVELOPMENT

PRIORITIES
> Design based on priority needs v cost
> Implementation plan & timeframe
> Budget based on design & timeframe
> Define metrics for evaluation

BUILD CAPACITY
> Expertise
> Infrastructure
> Data management

SHARE
> Contribute data
> Contribute to knowledge sharing / best practice development

EVALUATE
> Examine metrics
> Re-evaluate priorities

ONGOING SUSTAINED PART OF GOOS

OBSERVING TOGETHER PROJECT ACTIVITIES

- **NATIONAL OBSERVING SYSTEMS**
  Morocco, Mauritius
- **END-USER ENGAGEMENT**
  Indonesia, AtlantOS
- **NEW OBSERVERS**
  Norway (Ghana, Tanzania)

Ocean Observing Co-Design

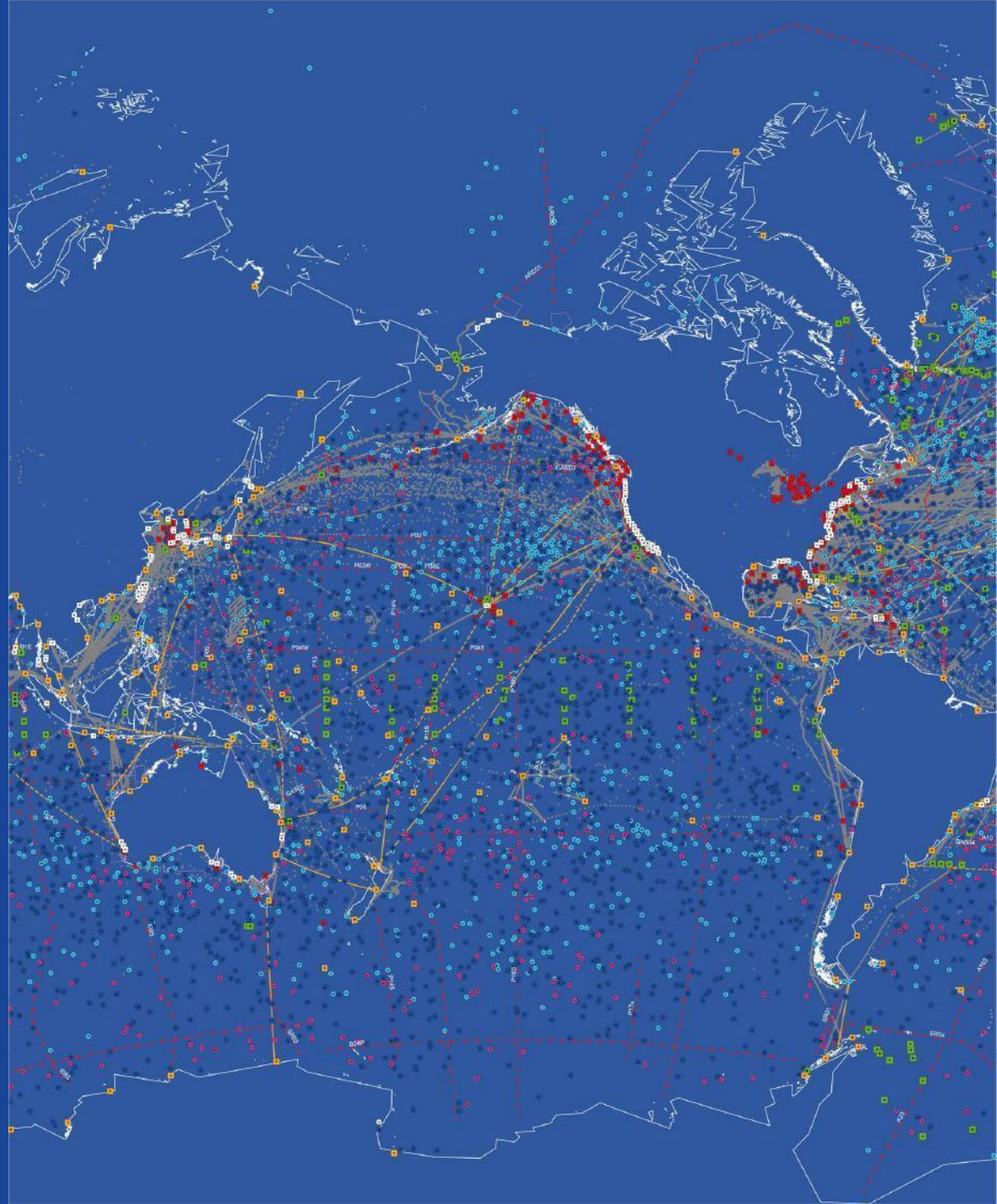
by The Global Ocean Observing System

Transforming our ocean observing system assessment and design process

Programme leadership: David Legler, NOAA; Sabrina Speich IPSL; Emma Heslop, IOC/UNESCO

Programme support: Andrea McCurdy, Ocean Leadership; Mairéad O'Donovan, GOOS - IOC UNESCO; Ann-Christine Zinkann, NOAA

2021 2030 United Nations Decade of Ocean Science for Sustainable Development



THE NEED...

Ocean Observing Co-Design
by The Global Ocean Observing System

- Connect to **end users**
- Lack of information on value to help **prioritize investment**
- Leverage separate pockets of science research - **convene global effort**
- Society's **needs are expanding and urgent**, especially vulnerable communities - SIDS, LDCs

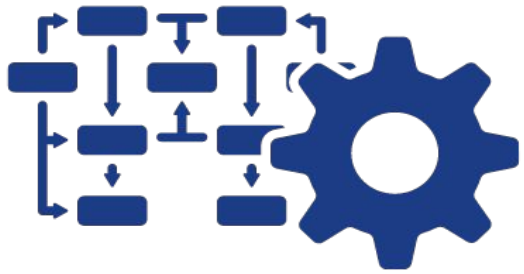
Ocean Observing Co-Design

by The Global Ocean Observing System

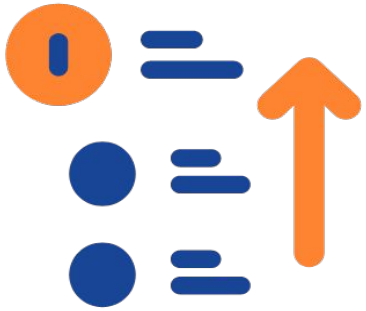
The Programme will evolve the ocean observing system so that it is co-designed with end-users and responds to their needs

THE CHANGE

Increase Global Capacity



Bridge and engage across observing - modeling/forecasting- policy and other users



Establish clear priorities for investment in ocean observing

Accessible and impactful ocean information to effectively meet global challenges

HOW DO WE BEGIN?
EXEMPLAR PROJECTS

Ocean Carbon Cycle

Tropical Cyclones

Marine LIfe

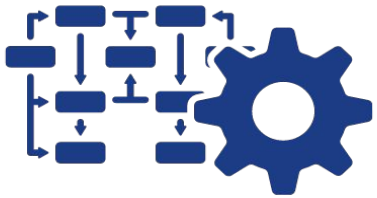
Marine Heatwaves

Boundary Current

Storm Surge

CO-DESIGN to bring about a STEP CHANGE

TANGIBLE OUTCOMES



Link along **value chain and users**

Design for observing and forecasting

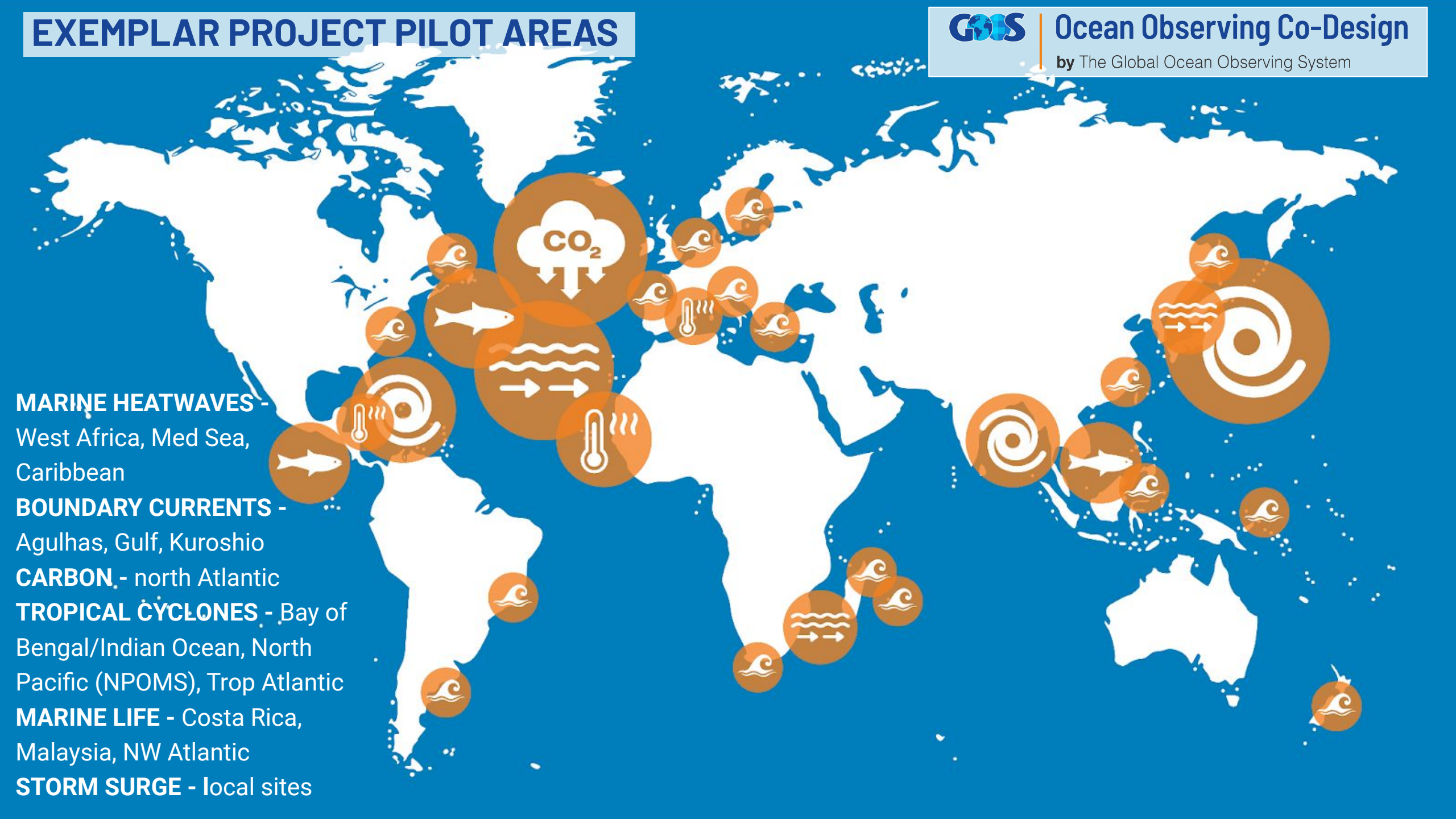
Economic value assessment

Blueprint for services if they don’t exist

Ongoing **tracking** of implementation

EXEMPLAR PROJECT PILOT AREAS

Ocean Observing Co-Design
by The Global Ocean Observing System



MARINE HEATWAVES - West Africa, Med Sea, Caribbean

BOUNDARY CURRENTS - Agulhas, Gulf, Kuroshio

CARBON - north Atlantic

TROPICAL CYCLONES - Bay of Bengal/Indian Ocean, North Pacific (NPOMS), Trop Atlantic

MARINE LIFE - Costa Rica, Malaysia, NW Atlantic

STORM SURGE - local sites

CoastPredict
with The Global Ocean Observing System

Revolutionising Global Coastal Ocean observing and forecasting

coastpredict.org

Nadia Pinardi, University of Bologna
Villy Kourafalou, University of Miami
Joaquín Tintoré, Balearic Islands Coastal Observing & Forecasting System
Emma Heslop, GOOS, IOC/UNESCO

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

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

GOOS | CoastPredict

with The Global Ocean Observing System

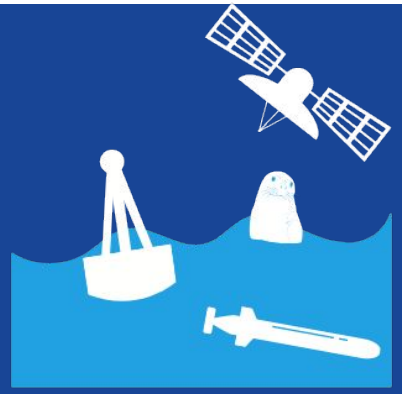
Objective

- co-design and implement an **integrated coastal ocean observing and forecasting system** adhering to best practices and standards, designed as a **global framework and implemented locally**

For nations: responsive & fit-for-purpose systems into coast to address many challenges: 30x30, carbon sequestration, shipping/ports, hypoxia, storm surge, climate impacts …

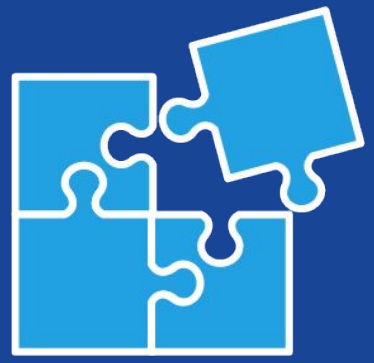
CoastPredict
with The Global Ocean Observing System

CoastPredict potential to transform



Leverage and evolve existing GOOS infrastructure

Evolve a system that complements what already exists and works



Fill gaps

New observing technology, community science, commercial networks

Build for the future

Integrate & build a system that continues to evolve beyond the Decade

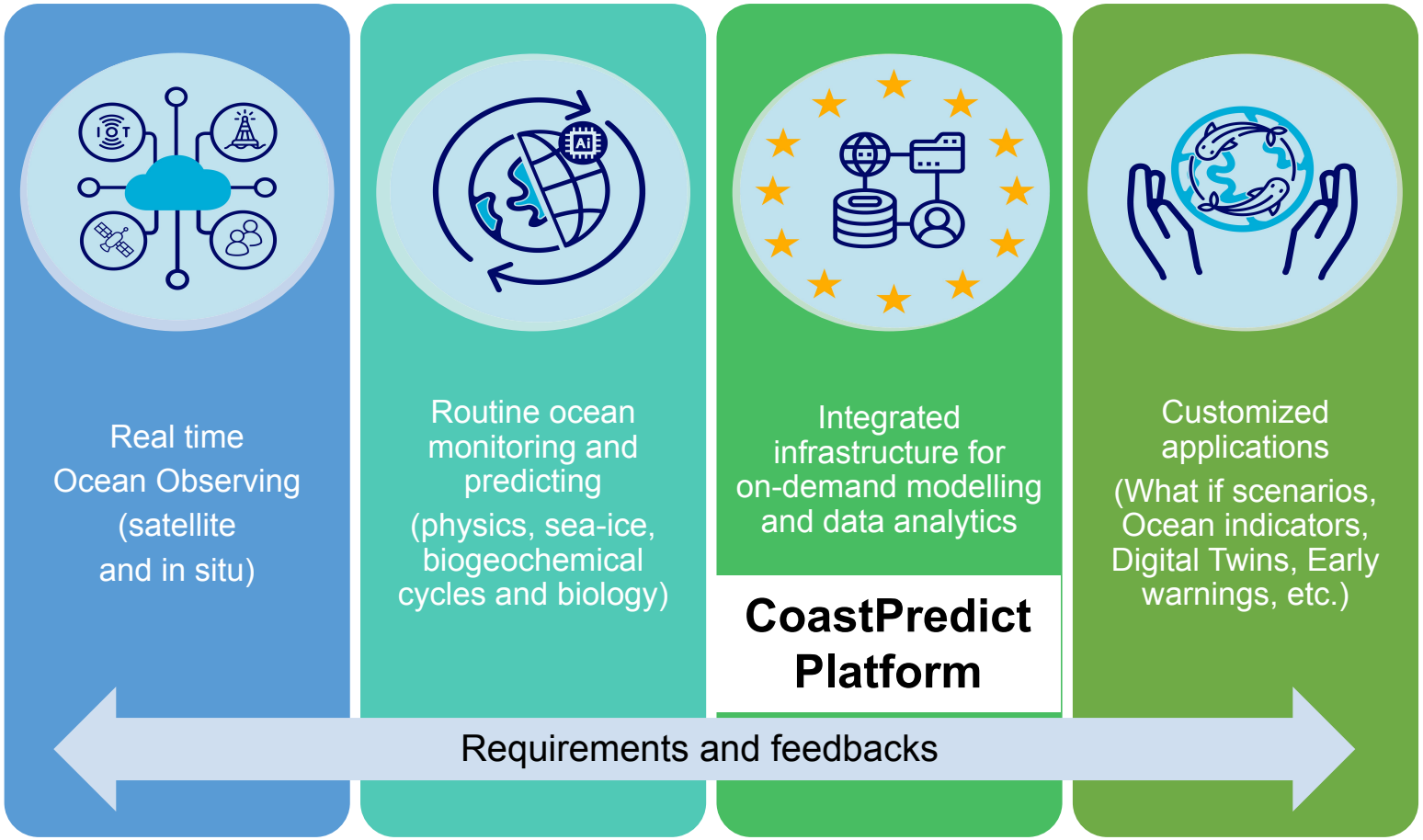
Global Coastal Experiment

1) define **test sites** in coastal areas around the world

2) Design, implement, calibrate and validate integrated observing and modelling systems for each test site experiment, the outcomes of which should be shared on Test Site Experiment Platforms and replicable in other coastal areas

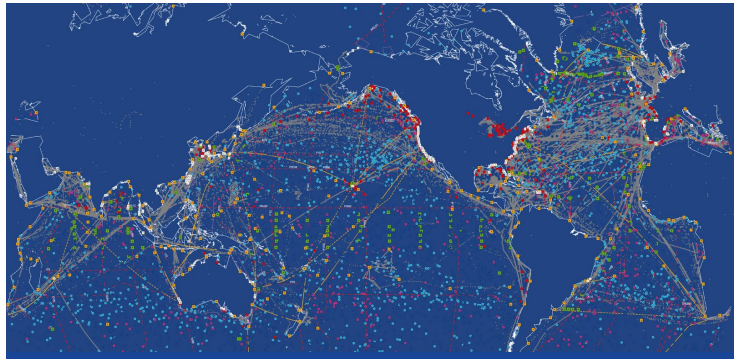
REQUEST FOR GRAs to contribute to site selection

CoastPredict:
strengthen Coastal Operational Oceanography



Transformational for GOOS and the Ocean Decade

2021 2030 United Nations Decade of Ocean Science for Sustainable Development



Ocean Observing Co-Design

Transforming our ocean observing system assessment and design processes

Co-chairs:
David Legler, NOAA, USA
Sabrina Speich, IPSL, FRANCE

CoastPredict

Revolutionising Global Coastal Ocean observing and forecasting

Co-chairs:
Nadia Pinardi, UNIBO, ITALY
Joaquín Tintoré, SOCIB, SPAIN
Villy Kourafalou, Univ. of Miami, USA

Observing Together

Connecting ocean observers and the communities they serve to transform ocean data access and availability

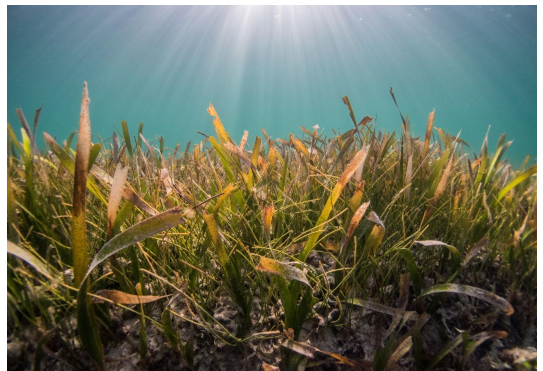
Co-chairs:
Molly Powers, SPC, FIJI
Alvaro Scardilli, Naval Hydrographic Service, ARGENTINA

PROJECT / PILOT AREAS

OPPORTUNITIES

- Project activities support **strengthening of GRAs / integration of new countries?**
- Alignment of **project activities with needs** identified in your region?
- Catalyse greater **connectivity** at global scale
- Foster long-term links **across observing, modelling, services**
- Information on **Return on Investment** in observing and forecasting





The Global Ocean Observing System

More information - GOOS webpage

GOOS at the heart of the Ocean Decade

Our observations and predictions are the foundation of much of the exciting work the Ocean Decade will carry out and essential to help give us the ocean we need for the future we want.

The Global Ocean Observing System

Project / Exemplar project summaries on next pages

unesco
Intergovernmental Oceanographic Commission

WORLD METEOROLOGICAL ORGANIZATION

UN environment programme

International Science Council

Observing Together

by The Global Ocean Observing System

PROJECTS IN FOCUS: NATIONAL OBSERVING SYSTEMS DEVELOPMENT

- **Enhancing ocean observing system within the Republic of Mauritius**
- **Enhancement of hydrographic and oceanographic observations in the Kingdom of Morocco**

- enhancement of ocean knowledge and forecasting by developing and enhancing national systems
- contribute to regional programmes of African / Indian Ocean regions
- strengthen capacity: platforms and network development
- develop modelling capabilities
- benefit from and adhere to best practices

Photo by Guillaume Baudusseau on Unsplash

Observing Together
by The Global Ocean Observing System

PROJECTS IN FOCUS: COMMUNITY ENGAGEMENT

AtlantOS-Connect

- integrate user communities to understand their needs
- enhance data accessibility to increase the value and responsiveness of the ocean observing system to critical users
- diversify membership of the AtlantOS Steering Committee
- develop and communicate studies of the societal and economic value of Atlantic Ocean observing to user communities

Observing Together

by The Global Ocean Observing System

PROJECTS IN FOCUS: COMMUNITY ENGAGEMENT

Fisherman Weather Field School (BMKG Indonesia)

- educating fishing communities to improve knowledge about weather climate literacy and climate change and their use for fishermen and coastal communities
- reduce accidents / risk due to extreme weather
- increase business certainty and sustainability by optimising fishing & aquaculture activities
- increase awareness of in-situ equipment vital role, to reduce vandalism

POTENTIAL TO REPLICATE THIS IN OTHER COUNTRIES / REGIONS?

Photo © BMKGSekolah Lapang Cuaca Nelayan (SLCN)

Observing Together

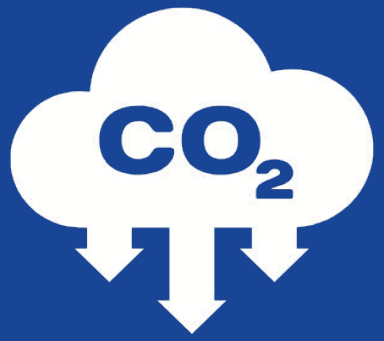
by The Global Ocean Observing System

PROJECTS IN FOCUS: NEW OBSERVERS

Sailing 4 Science (NTNU Norway)

- focus on remote, understudied coastal ocean often coinciding with SIDS or low income communities, where capacity building must be carefully co-designed
- deploy frugal, cost-effective observation tools
- Big capacity development focus e.g. **Ghana Dec 2022 / Tanzania Jan 2023**

- **POTENTIAL TO INTERACT WITH GRAs WHEN EXPEDITIONS ARE HAPPENING TO TARGET PRIORITY OBSERVATIONS?**



OCEAN CARBON

Users:
Government policy, Carbon Dioxide Removal industry and regulators, UNFCCC, Nature-based solutions, Fisheries

Pilot Region: North Atlantic

Ocean Observing Co-Design

by The Global Ocean Observing System

We cannot know what 'net zero' is without ocean carbon. Leverage leading edge projects towards defining what societal users need.

- How will Carbon Dioxide Removal (CDR) activities collectively affect the Ocean Carbon Cycle and net ocean carbon?
- 'If we do this amount of CDR and this amount of fishing in this area' then what will happen to the Ocean Carbon Cycle?

A cohesive global system:

- Support climate targets, adaptation and management strategies
- Inform Carbon Dioxide Removal targets and policy
- Predict coastal and ecosystem impacts

TROPICAL CYCLONES

Users:
Cyclone Forecasting Centres, Emergency Response, Blue economy

Pilot Region: Tropical Atlantic/Caribbean Sea, North Pacific and Marginal Seas, Indian Ocean/Bay of Bengal

Ocean Observing Co-Design
by The Global Ocean Observing System

Disproportionate impacts in Less Developed Countries and Small Island Developing States

Impacts are being amplified by warming ocean, rising sea levels, growing coastal populations - how do we improve forecasts to **save lives and property in the future?**

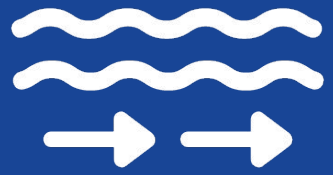
What is the best system design to support **equity and resilience for all coastal regions?**

Co-designed regional systems will:

- Test new responsive observing technologies
- Improve early-warning systems
- Enhance forecasting capacity in critical regions (e.g. LDCs, SIDS)

Ocean Observing Co-Design
by The Global Ocean Observing System

Impacts of ocean current structures on climate phenomena



BOUNDARY CURRENTS

Users:
Weather services; Regional fisheries; Ocean Industries, e.g. shipping; Marine resource management, Other Exemplar Projects [Carbon, Cyclones, Heatwaves]

Pilot Region: Agulhas Current, Gulf Stream and Kuroshio

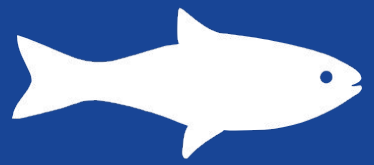
Boundary current variability and prediction is **critical** to short-term and seasonal **weather forecasts**, climate **adaptation**, regional **fisheries**, food **security** and **blue economies**.

Co-design to enhance regional operational ocean modelling using a multi-platform approach:

- Product and services for ocean industries (i.e., shipping)
- Integrated boundary current observing system strategy
- Report on economic value of a boundary current monitoring system

Ocean Observing Co-Design
by The Global Ocean Observing System

Sustainably manage ocean resources



MARINE LIFE

Users:
Small scale fishers; National and regional governments; industry; International conventions and treaties, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

Pilot Region: Costa Rica; Malaysia, N. Atlantic, global (for 30x30 MPAs designation needs)

This exemplar will identify needs for scientific information about **marine life** at local, regional and global scales in an integrated way, to **sustainably manage** ocean **resources** and improve the **livelihood** of coastal communities.

Co-design to improve predictive capabilities for ocean resource management:

- A framework for observations at different scales and the intersection of development, conservation, science, and policy
- Global ecosystem assessments with national participation
- Stakeholder driven planning for 30x30 and sustainable development

Ocean Observing Co-Design
by The Global Ocean Observing System

STORM SURGE

Users:
National weather & ocean forecast centres; First & second responders;
Resiliency planners;
Aquaculture, ports, tourism, insurance industries

Pilot Region: Shelf and slope regions in global coastal ocean

Improving forecasting lead-time and accuracy to save livelihoods

This exemplar will develop **observing** and **forecasting capabilities** to better serve **vulnerable communities**.

Co-design regionally distributed ocean observing and forecasting systems at local pilot sites in the global coastal ocean.

- Relocatable integrated observing and prediction for storm surge
- Development of impact forecasting systems
- Storm surge hazard and warning systems, end-to-end demonstration

Ocean Observing Co-Design
by The Global Ocean Observing System

MARINE HEATWAVES

Users:
Climate change adaptation; Aquaculture; Commercial, artisanal & Industrial fisheries; Operational forecast centers; MPA & coral reef management

Pilot Region: Mediterranean Sea, Caribbean Sea, West Africa

Co-design a sustainable monitoring system of marine heatwaves

This exemplar will develop a sustainable **monitoring system** to better advice **management** to ensure **food security** through **transformative science**.

Co-design of operational forecast models for marine heatwaves:

- Real-time in-situ information for validation and corrections of operational forecast models
- Early warning systems for end-users
- Sustainable monitoring systems of marine heatwaves and their impacts on marine ecosystems co-designed with stakeholders

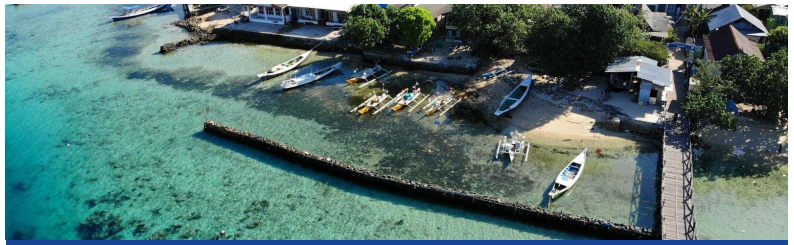
CO-DESIGN EXPERT TEAM LEADS [some have wider international steering teams]

BOUNDARY CURRENTS
- Tamaryn Morris, South African Weather Service , SAF
- Ann-Christine Zinkann, NOAA, USA

MARINE LIFE
- Frank Muller-Karger, U. South Florida, USA
- Jake Kritzer, G. Canonico, IOOS, USA

OCEAN CARBON
- Richard Sanders, NORCE / ICOS, NOR
- Anya Waite, Ocean Frontier Institute, CAN

TROPICAL CYCLONES
- Scott Glenn, Rutgers University, USA
- Cheyenne Stienbarger, NOAA, USA



MARINE HEATWAVES
- Alban Lazar, SU-LOCEAN , FR
- Diana Ruiz Pino, SU-LOCEAN, FR
- Juan Carlos Herguera, CIGOM-CICESE, MEX

STORM SURGE
- Giovanni Coppini, CMCC, IT