IOC/UNESCO
The Global Ocean Observing System

# IOC/UNESCO
# Ocean Observations and Information in support of SDGs, assessment frameworks and policy

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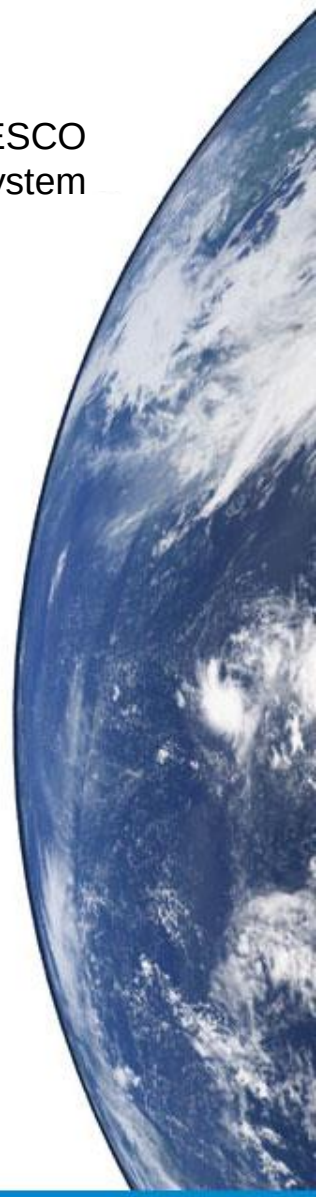


# The Ocean and the main UN Frameworks

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

## 17 objectives to transform our world: Agenda 2030


United Nations Framework Convention on Climate Change

**+ Paris**
**+ Ocean Pathway**

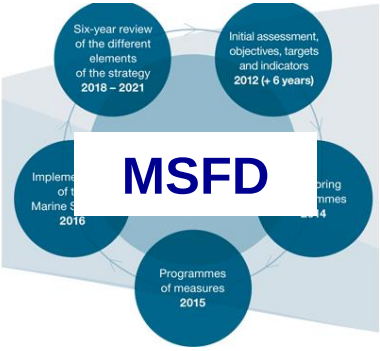
Sendai Framework for Disaster Risk Reduction
2015 - 2030

UNEP Regional Seas

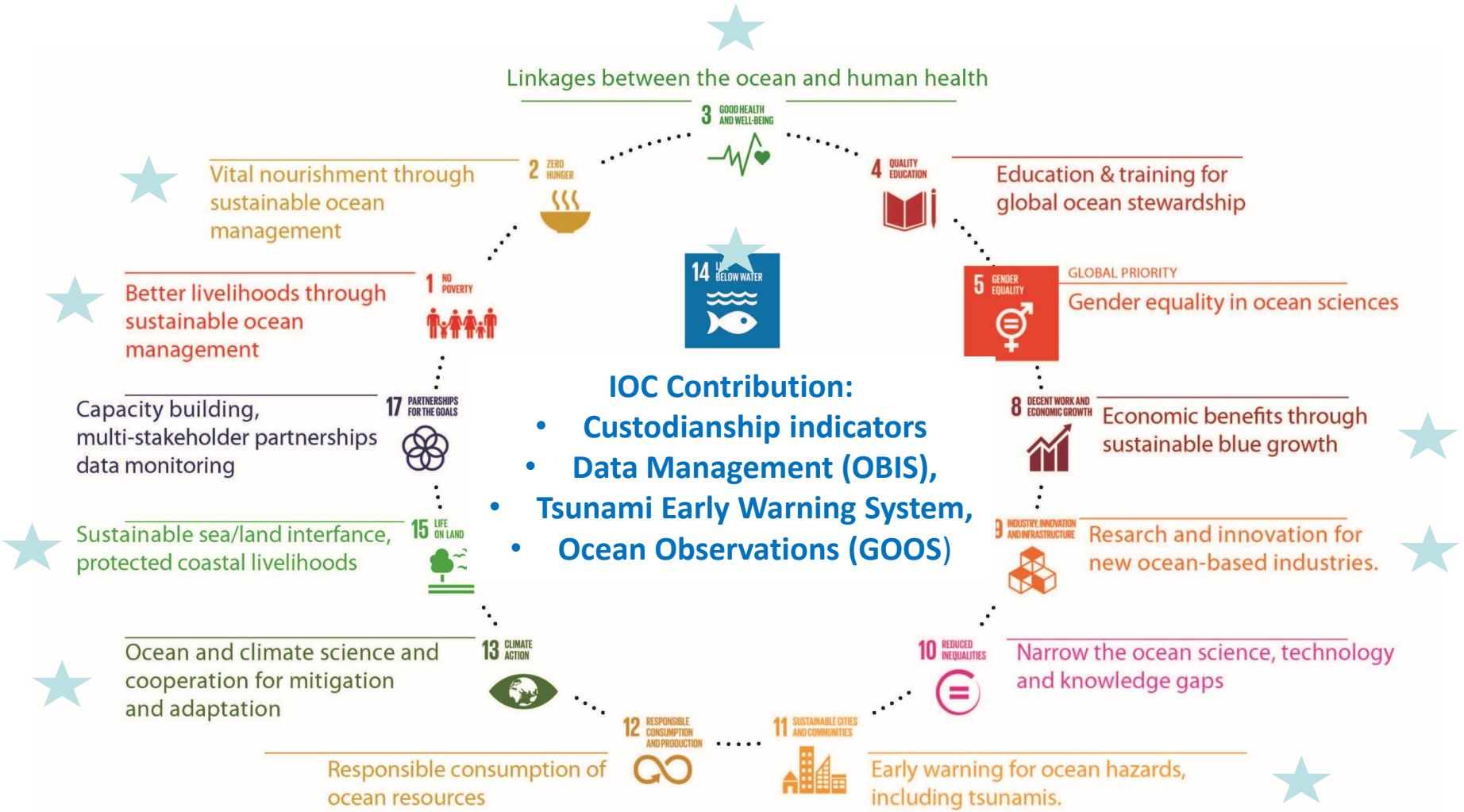
Convention on Biological Diversity

THE LAW OF THE SEA

**+ BBNJ**

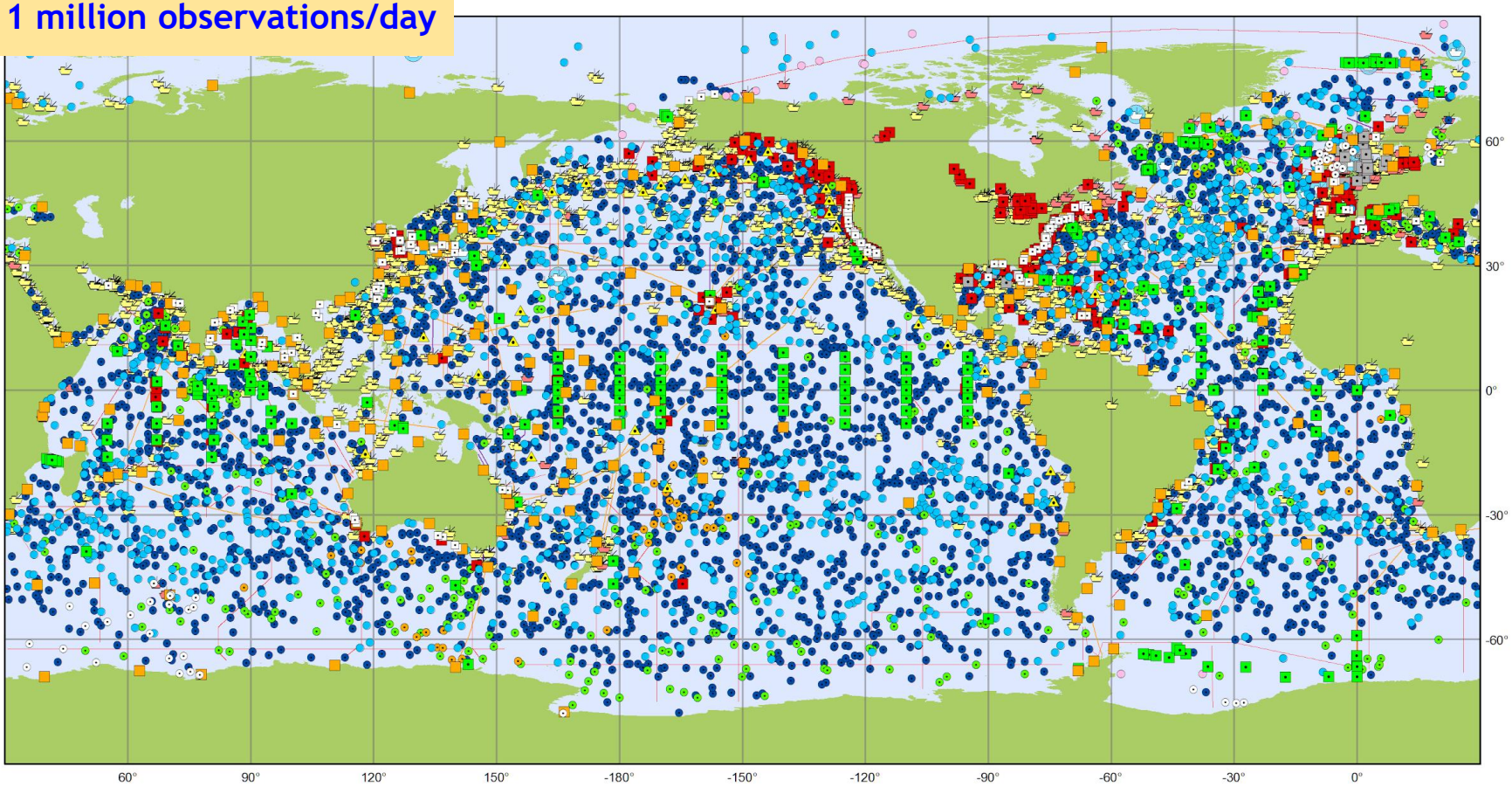



GOOS




IOC UNESCO is relevant to **13 out of 17** Sustainable Development Goals, Ocean Observations fundamental to **9**

# 1 million observations/day




Main in situ Elements of the Global Ocean Observing System

August 2018

**Profiling Floats (Argo)**
- Core (3944)
- Deep (70)
- BioGeoChemical (329)

**Data Buoys (DBCP)**
- Surface Drifters (1383)
- Offshore Platforms (97)
- Ice Buoys (16)
- Moored Buoys (392)
- Tsunameters (36)

**Timeseries (OceanSITES)**
- Interdisciplinary Moorings (451)

**Repeated Hydrography (GO-SHIP)**
- Research Vessel Lines (61)

**Sea Level (GLOSS)**
- Tide Gauges (252)

**Ship based Measurements (SOT)**
- Automated Weather Stations (254)
- Manned Weather Stations (1738)
- Radiosondes (16)
- eXpendable BathyThermographs (37)

**Other Networks**
- HF Radars (270)
- Animal Borne Sensors (53)
- Ocean Gliders (31)

*Generated by www.jcommops.org, 17/09/2018*

JCOMMOPS

# GOOS 2030 Strategy

## Our Vision

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

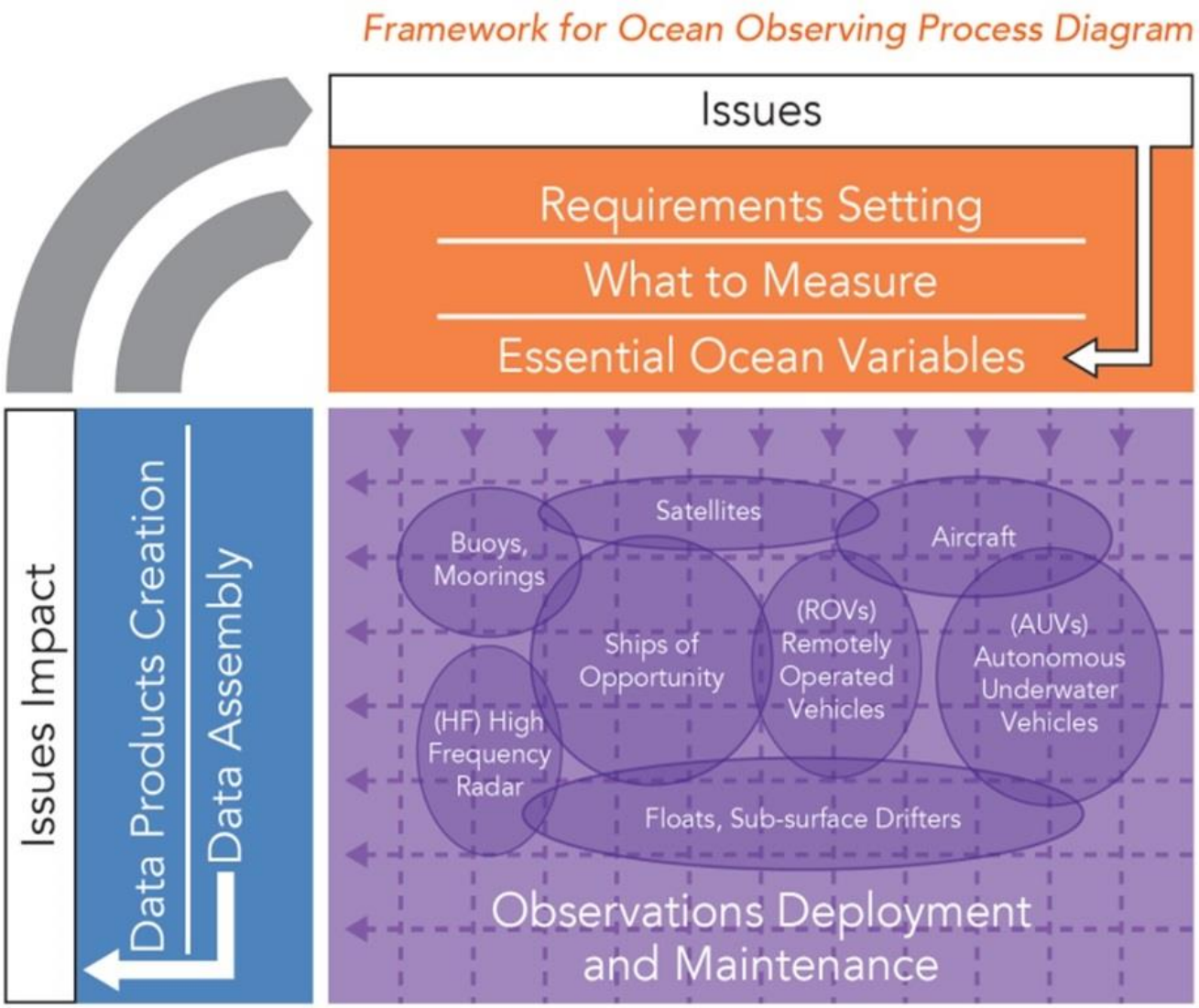
# Observing system **delivery targets**

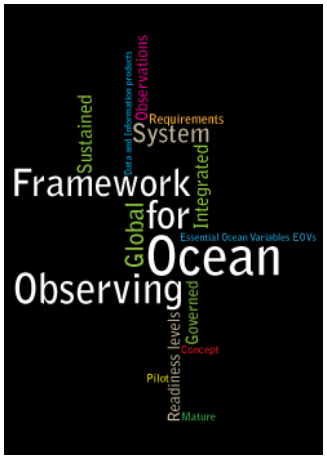
*Ocean health*

*Climate*

*Operational services*

# GOOS systems approach: FOO

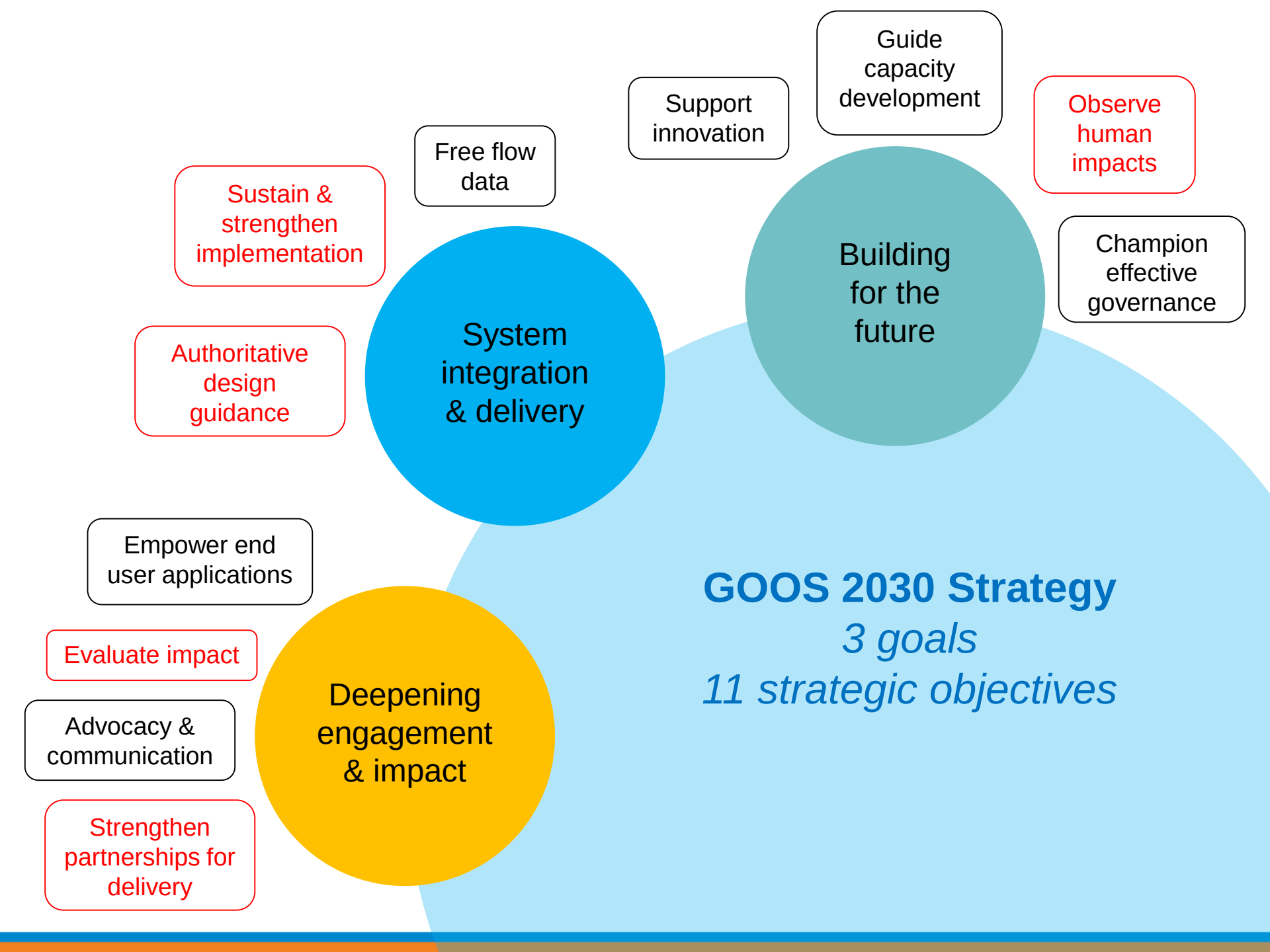


# GOOS 2030 Strategy

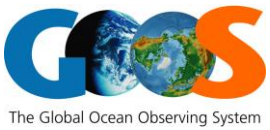
## The GOOS Mission

To lead the ocean observing community and create the partnerships to grow an integrated, responsive and sustained global observing system


Guide capacity development
Support innovation
Observe human impacts
Free flow data
Sustain & strengthen implementation
Building for the future
Champion effective governance
System integration & delivery
Authoritative design guidance
Empower end user applications
Evaluate impact
Deepening engagement & impact
Advocacy & communication
Strengthen partnerships for delivery
GOOS 2030 Strategy
3 goals
11 strategic objectives

# GOOS Partnerships

Working on common objectives, e.g. SDGs, safety of life at sea, improving forecast & prediction - across the value chain




ocean in situ & satellite remote sensing

CEOS


Real-time data systems — WIGOS, WOD

QC & Archive — IODE, IMBER

Ocean & coupled forecasts — WWRP, ECMWF + others

Reanalysis Projections Research — WCRP, CMEMS, OceanPredict, GOA-ON, ICES, PICES

Research Scenarios Indicators — IMBER, GESAMP

Weather services & warnings — National Met Services

Marine services & warnings

Early warning systems — IPCC WG2

Climate services — CMEMS

Climate assessments — IPCC WG1

Ecosystem warnings (HABs) — UN Environment, IPHAB

Ocean health services & assessments — WOA, MSP, IPBES

## Operational Services

Marine industry; fishing, shipping, ports and harbors, ferries

Recreational, public SAR

Seasonal decisions; farming, logistics, insurance, civil defense

Local adaptation; extremes/storms, sea level

## Climate

Global policy

Fishing/food

Tourism

Coastal Protection

## Ocean health

Clean Waters; MSFD, marine plastics

Impact assessment

Conservation, biodiversity

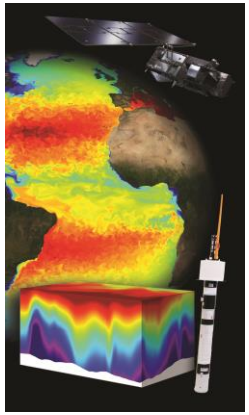
Renewables, mining, oil & gas

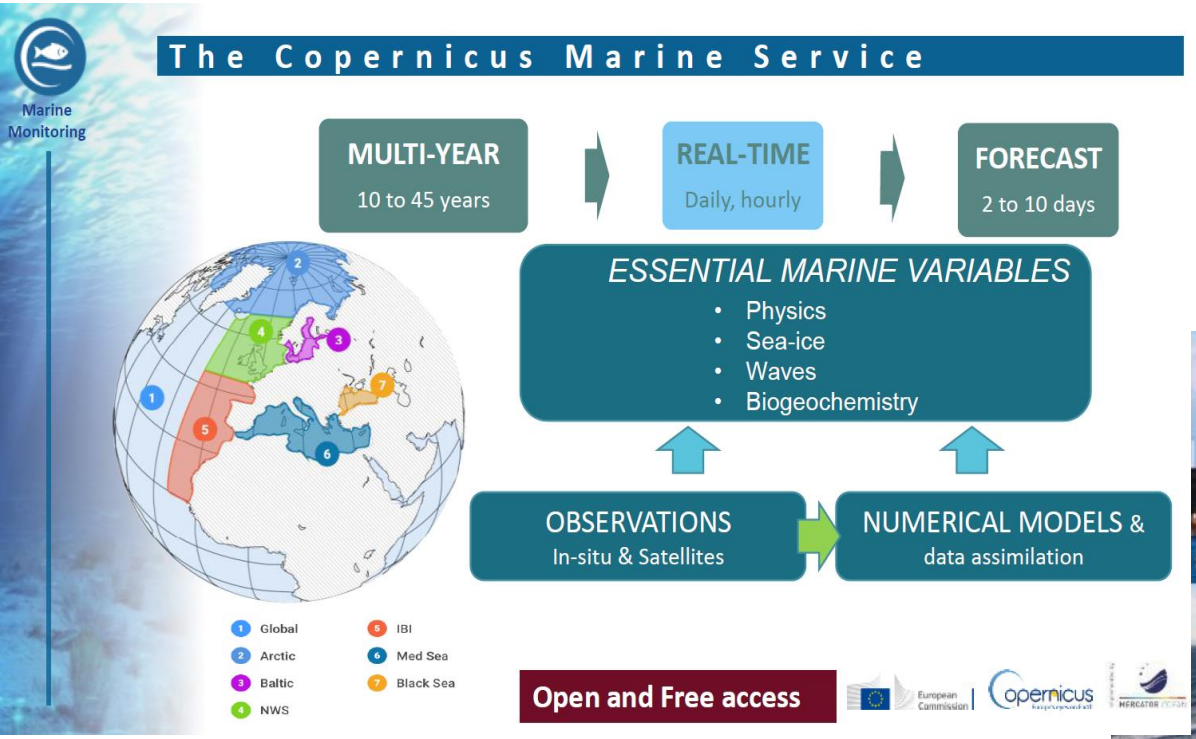
Observations → Data Management → Analysis, Models → Information Services, Applications → Users/Use areas

Research & innovation

# Partnership for delivery – CMEMS

- Observations are the foundation: quality of service is dependent on ocean & satellite networks – global/coastal
- Critical gaps: biogeochemical observations, improving key observing systems global and regional






# Essential Variables:

| PHYSICS | BIOGEOCHEMISTRY | BIOLOGY AND ECOSYSTEMS |
|---|---|---|
| Sea state | Oxygen | Phytoplankton biomass and diversity |
| Ocean surface stress | Nutrients | Zooplankton biomass and diversity |
| Sea ice | Inorganic carbon | Fish abundance and distribution |
| Sea surface height | Transient tracers | Marine turtles, birds, mammals abundance and distribution |
| Sea surface temperature | Particulate matter | Hard coral cover and composition |
| Subsurface temperature | Nitrous oxide | Seagrass cover and composition |
| Surface currents | Stable carbon isotopes | Macroalgal canopy cover and composition |
| Subsurface currents | Dissolved organic carbon | Mangrove cover and composition |
| Sea surface salinity | Ocean colour | Ocean Sound |
| Subsurface salinity | | Microbe biomass and diversity (*emerging) |
| Ocean surface heat flux | | Benthic invertebrate abundance and distribution (*emerging) |

- Essential Climate Variables (GCOS)
- SDG (& MFSD) relevant

**'Emerging' human impact variables**

- Ocean Sound (new EOV)
- Marine Plastic working with partners, UN Environment, GESAMP, etc.

**Supporting for global coverage**

- CalVal of satellite observations, existing and emerging EOVs
- Model assimilation

- Increasing complexity
- Increasing needs
- **Smarter, efficient, design >> fit for purpose system**

# IOC Custodianship: SDG indicator 14.3.1

**Goal 14.** Conserve and sustainably use the oceans, seas and

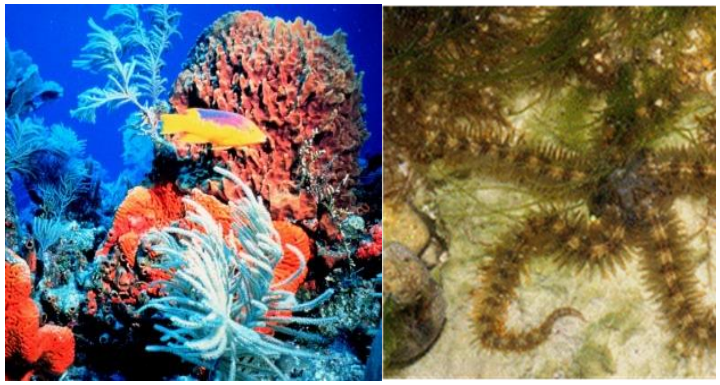
**Target 14.**

**Indicator:** **sentative**

***Jan 2018:*** *s or methodolo*

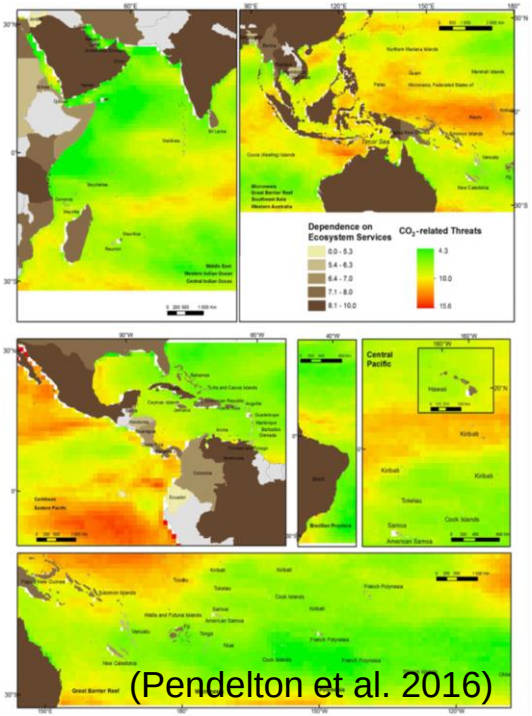
***Nov 2018*** *d) - Indicator is ards are availa*

Indicators



**50% of marine animals threatened by ocean acidification**

(Wittmann & Pörtner 2013)




(Pendelton et al. 2016)

Ocean Acidification a global issue addressed at the regional scale

GOA-ON

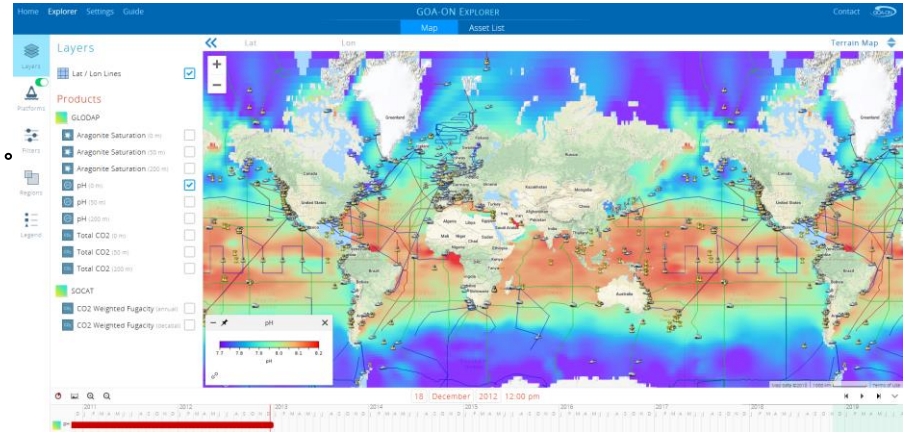
Global Ocean Acidification Observing Network

1. Document the **status and progress of ocean acidification** in open-ocean, coastal, estuarine, and coral reef environments,
2. Understand the **impacts** of ocean acidification on diverse marine ecosystems and societies, and
3. Support **forecasts**

GOA-ON Global Network in 2018
**506** scientists from **83** countries

Through coordination around:

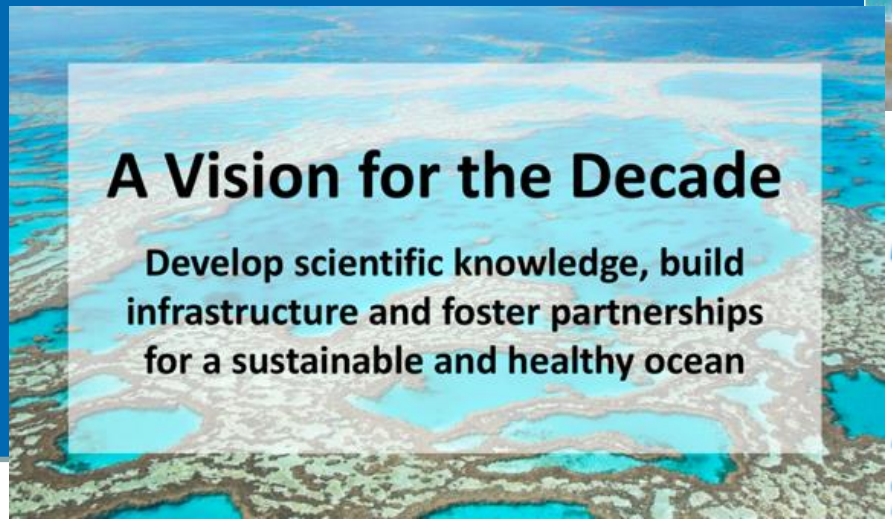
- Design rationale and locations
- Minimum set of parameters
- Community best-practices
- Quality assurance for data




pH at surface (GLODAP)
Data Portal http://portal.goa-on.org/Explorer

***Future view:***

- *UN Decade of Ocean Science for Sustainable Development*
- *Greater partnership*
- *Coastal – resilience, impacts, resource management – opportunity for satellite / in-situ observing / modelling – close cooperation*


2021 2030 United Nations Decade of Ocean Science for Sustainable Development

# The **ocean** and **discovery**