

Implementing a Global Deep Ocean Observing Strategy (iDOOS)

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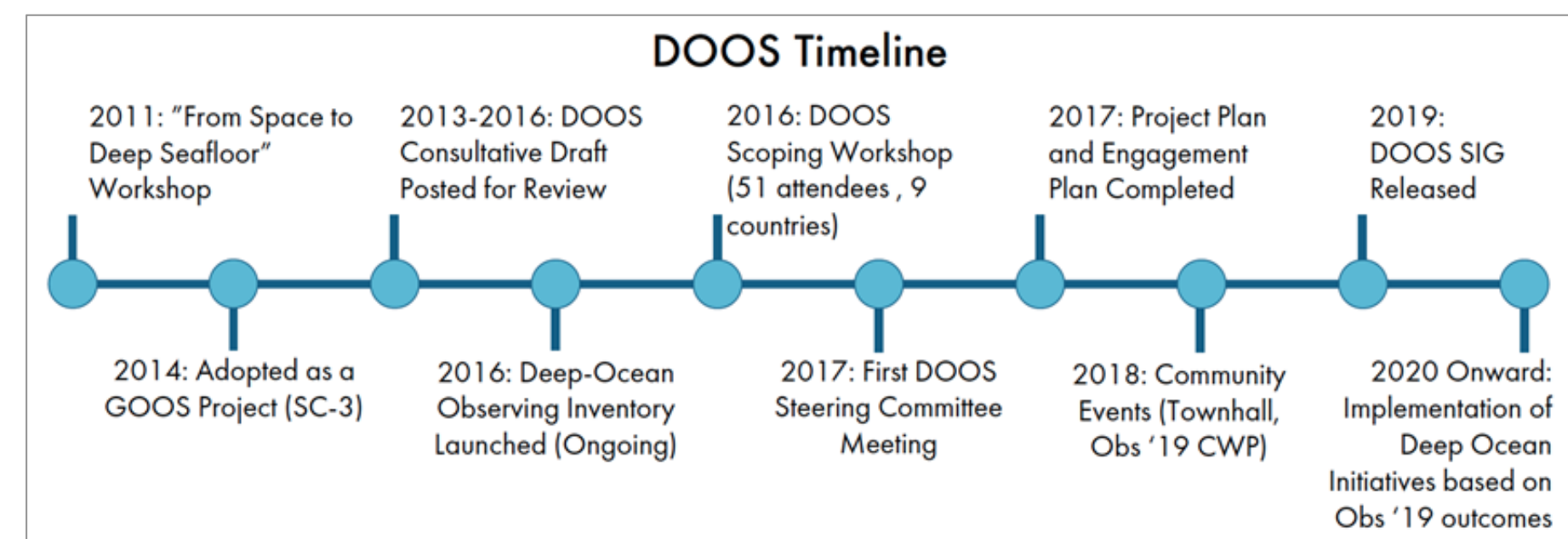
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iDOOS Background & Mission

iDOOS Actions

Observing Status

The **Deep Ocean Observing Strategy (DOOS)** is a GOOS project envisioning a globally integrated network of systems that observes the deep ocean (> 200m, with emphasis > 2000m) in support of strong science, policy and planning for sustainable oceans.

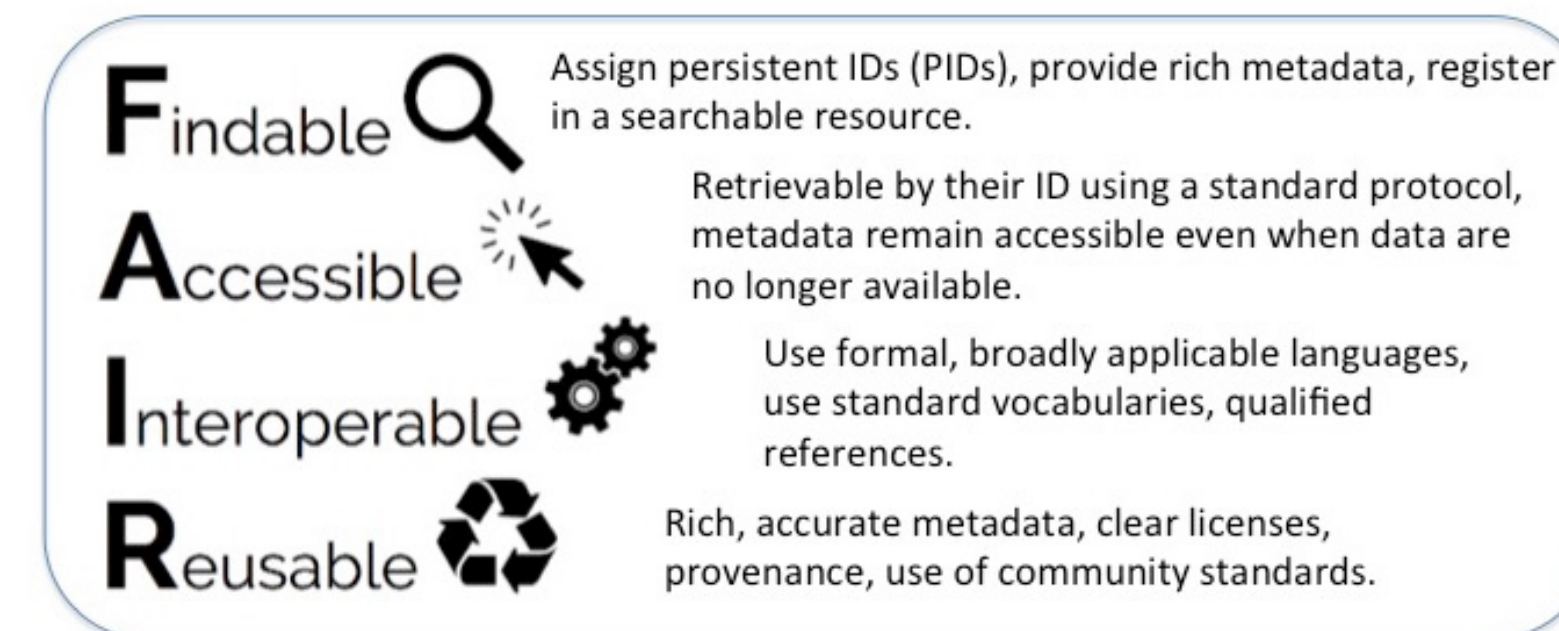


This ocean shot (iDOOS) will implement an interconnected network of deep-ocean observing, mapping, exploration, and modelling programs working together for the coming decade.

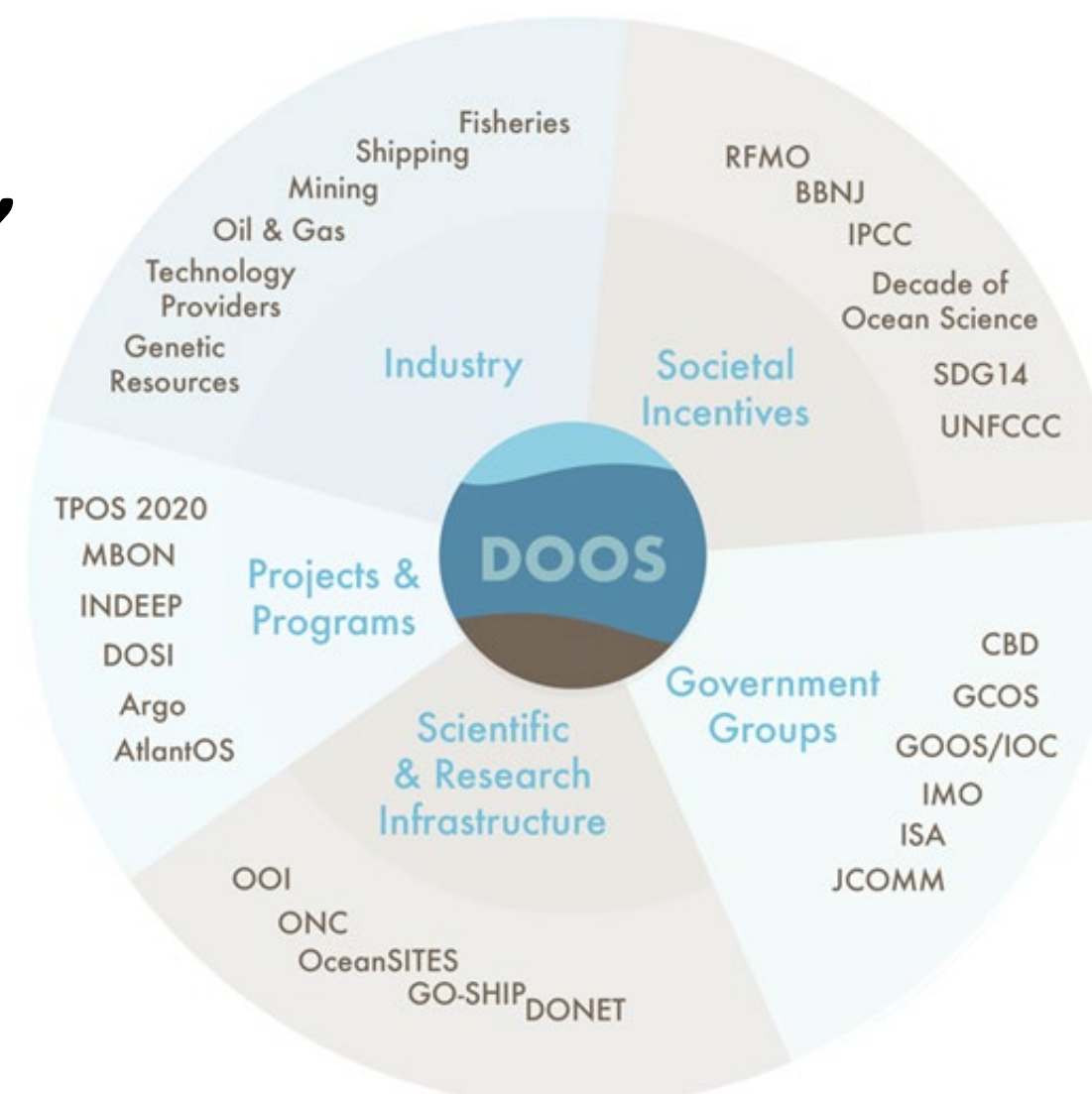
iDOOS will:

- Characterize physics, biogeochemistry (BGC), and biology of the deep ocean in space and time
- Establish a baseline required to understand changes to its habitats and services
- Provide information needed for a healthy, predicted, resilient and sustainably managed (deep) ocean

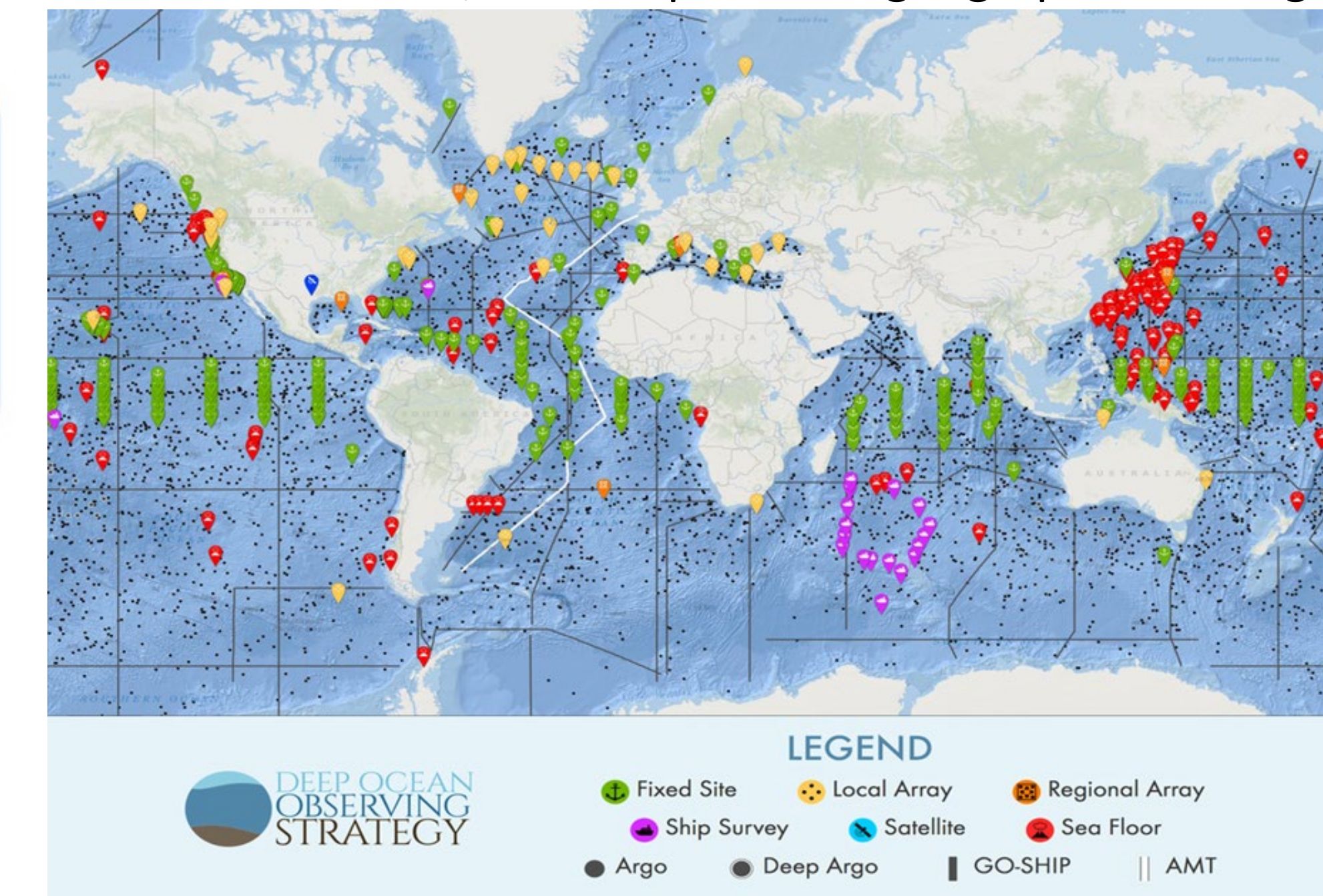
- **Identify Essential Ocean Variables (EOVs)** and evolve their specifications to fully consider deep-ocean perspectives across physical, BGC, biological, and ecological variables
- **Incorporate modeling needs**, expand deep-observing community to embrace exploration and industry, promote multi-disciplinary observing
- **Design and evaluate observing systems and oversee demonstration projects** to provide a blueprint for global deep-ocean observation technology readiness and deep-ocean **FAIR data**. Currently proposed demonstration projects: Clarion Clipperton Fracture Zone, Northeast Pacific, & Azores Archipelago



- **Serve as a communication hub** for a broad spectrum of stakeholders in the deep-ocean science, data, and information user communities
- Provide an avenue through which the deep ocean research community and the data they produce can **reach policy makers and inform policy decisions**



DOOS maintains an inventory to assess the status of deep-ocean observing - platforms, sensors, water depths, variables measured, and temporal and geographic coverage.



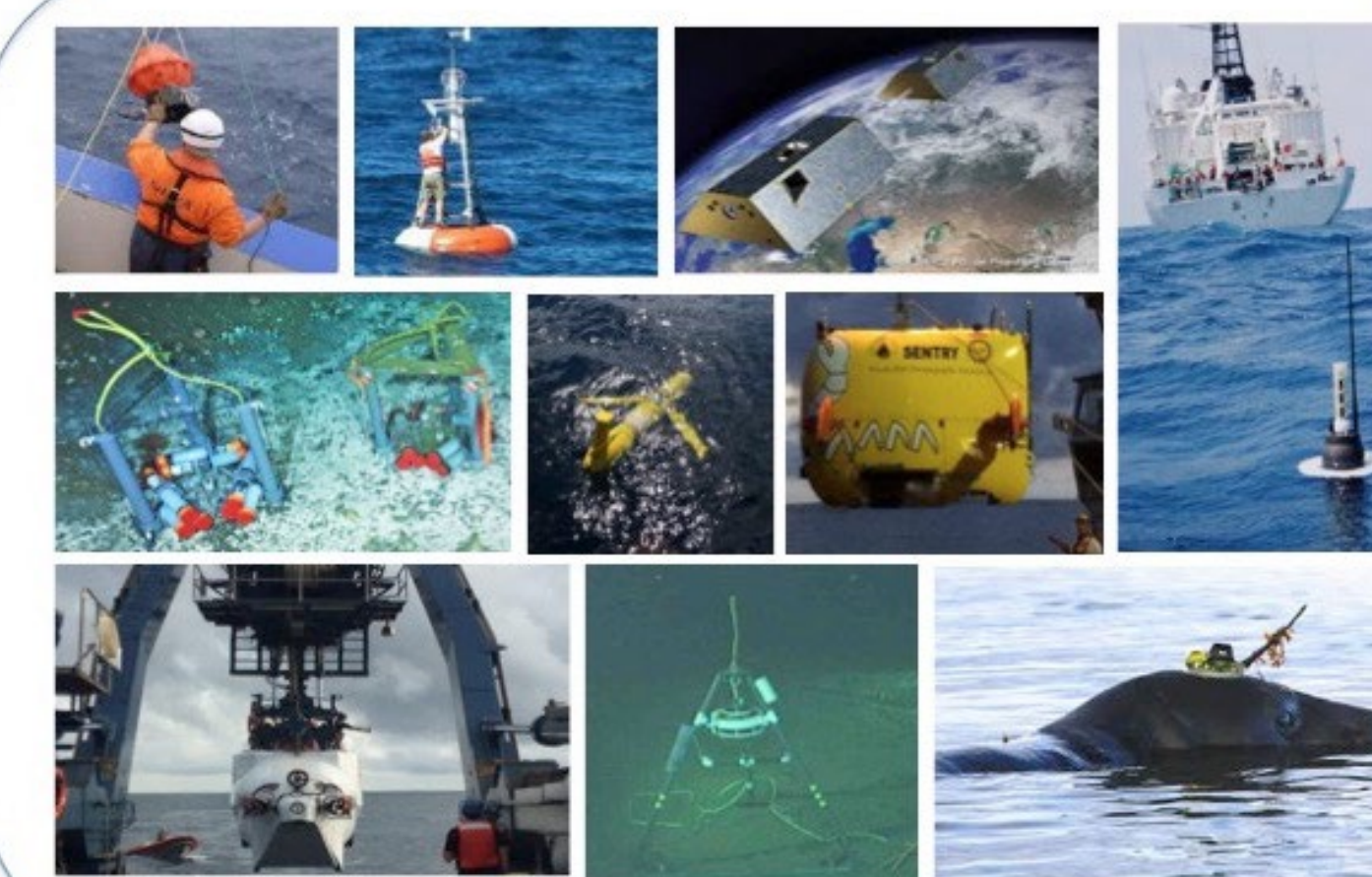
Thematic Activities

Thematic Working Groups will address:

- Requirement Setting**
- Implementing Observing**
- Translation of Science to Policy**

With input from iDOOS EOVS Task Teams:

Physics, Biogeochemistry, Ecology/Biology, & Data



Outcomes

- **Development & deployment of multi-disciplinary sensing technology** that is smart, integrated, deep-sea capable, and scalable to operate as a globally distributed autonomous network;
- **Interoperable landscape** of standardized, analysis- ready, automated data access across a broad range of data types in a manner suitable for predictive big data science;
- **A framework for international coordination and collaboration** among stakeholders, regulators, and policymakers for science-guided decision-making, optimal asset deployment and data sharing;
- **Establishment of an inclusive community** that reflects the diversity of the nation and works for a sustainable, just, and equitable deep ocean science and management.
- Create a community and infrastructure that **generates deep ocean information needed to address critical scientific and management questions** related to the climate, biodiversity and sustainability.

iDOOS Science Goals

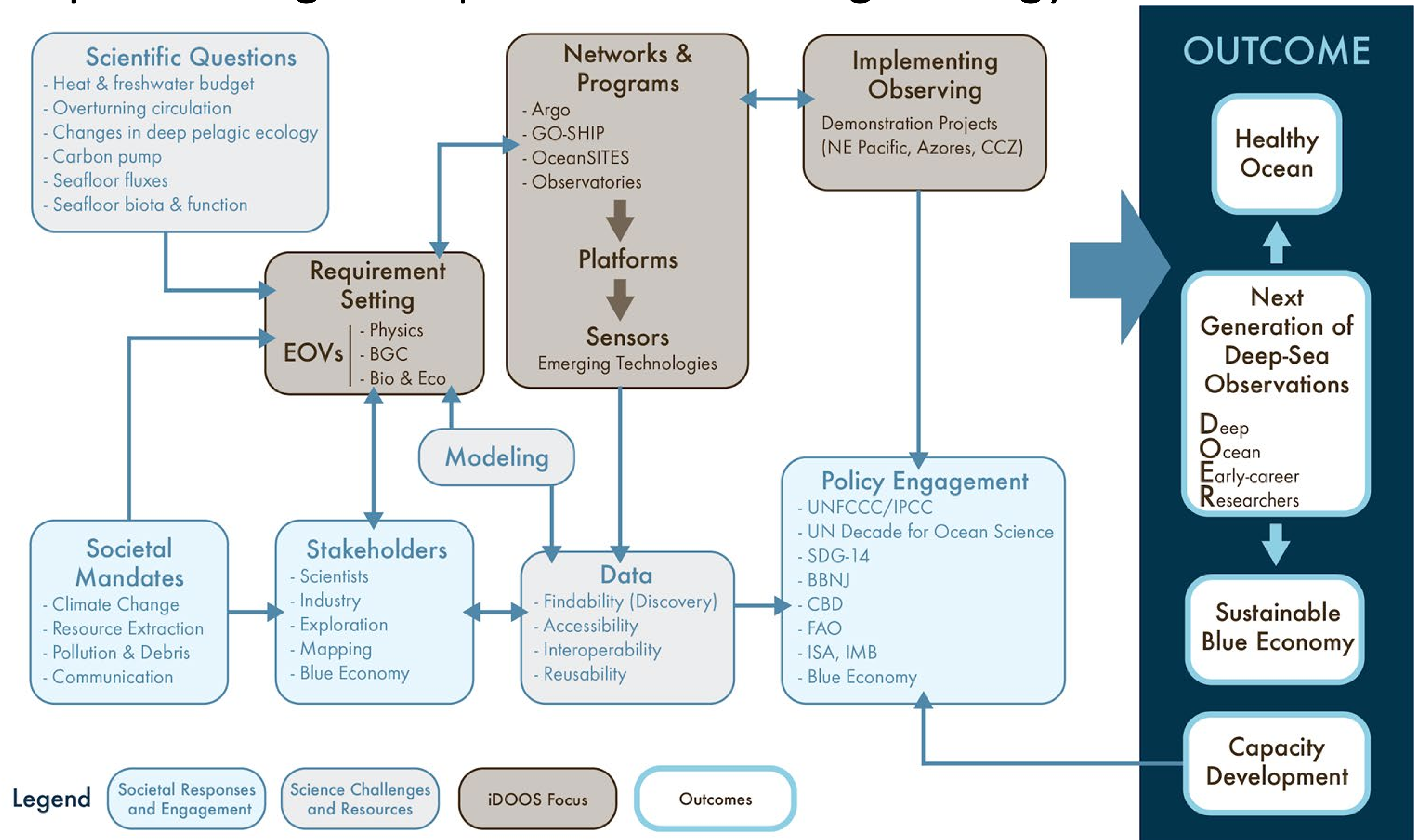
- **Understand global deep- and bottom-water formation** rates, variability, & the time scales of property changes while assessing heat, & circulation dynamics
- **Document deep-ocean transport and ventilation processes** & assess their impact on ocean BGC processes on the seafloor and in the water column
- **Understand marine deep-sea biodiversity & ecosystem services** in light of human-induced & natural changes
- Understanding these processes will **contribute to sustainability efforts and climate policy decisions**

The Next Generation

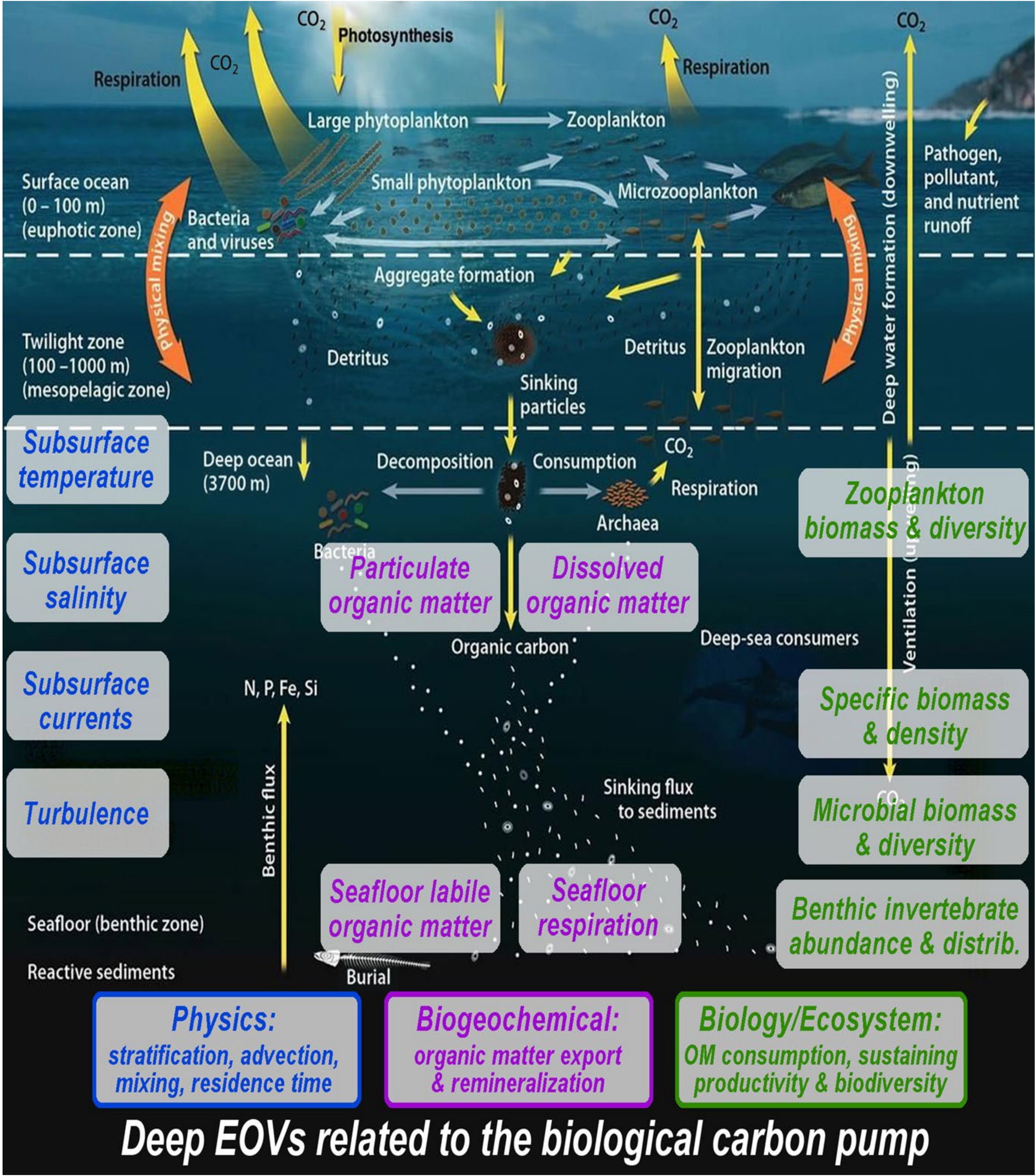
iDOOS will host the Deep-Ocean Early-career Researchers (**DOERs**), a globally diverse & inclusive group of peers from the iDOOS partner networks & the broader deep ocean observing community to:

- **Advocate** for and raise the profile of DOERs
- **Provide transferable skills** in networking, collaboration and outreach
- Cement their inclusion in and position them to become **future leaders** of deep-ocean observing

Implementing a Deep Ocean Observing Strategy



Revision of deep ocean observing requirements adopting the GOOS EOV framework.



Essential Ocean Variables (EOVs)			
	PHYSICS	BIOGEOCHEMISTRY	BIOLOGY AND ECOSYSTEMS
GOOS EOVs	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 & distribution
	Sea surface temperature	Particulate matter	Hard coral cover and composition
	Subsurface temperature	Nitrous oxide	Seagrass cover
	Surface currents	Stable carbon isotopes	Macroalgal canopy cover
	Subsurface currents	Dissolved organic carbon	Mangrove cover
	Sea surface salinity		Microbe biomass and diversity (*emerging)
	Subsurface salinity		Invertebrate abundance and distribution (*emerging)
	Ocean surface heat flux		
	CROSS-DISCIPLINARY		
	Ocean colour	Ocean Sound	
EOVs under consideration by DOOS	Ocean Bottom Pressure	Seafloor labile organic matter	Body size
	Seafloor Fluxes	Seafloor respiration	Seafloor sponge habitat cover
	Ocean Turbulence	Seafloor fluid and gas effluxes (focus on methane)	Connectivity of species
		Litter including microplastics	

Implementing a Deep Ocean Observing Strategy (iDOOS)

within the Global Ocean Observing System (GOOS)

Observing & Exploration Networks

Argo (Core, BGC, Deep)^{^,L}
Challenger 150 (DOSI/SCOR)[#]
EMSO
GEO BON
GO-SHIP^L
iAtlantic^L
MBON
NDSF/UNOLS^{*}
NOAA Ocean Exploration[~]
OceanSITES^{+,~,L}
OECI^{*}
ONC^L
OOI^{*,#,&tilde}
REV Ocean[~]
Schmidt Ocean Institute[~]
JTF SMART Cables
SOOS/SOCCOM
TPOS 2020
US-IOOS

Data & Modelling CI Networks

CCHDO^{*}
CLIVAR GSOP
CLIVAR/OMDP & CMIP^L
ECCO^{*,#}
EMODnet[#]
ESIP/MDC^{*}
Esri^{+,L}
FathomNet
IODE/ODIS[~]
IRIS
ISA DeepData[~]
Mercator Ocean
OBIS^L
OBPS
OceanPredict
Seabed 2030[~]

Management & Policy Users

AtlantOS^L
DOSI^{*,#,L}
GEO-BluePlanet
GOOS
Internat. CLIVAR
InterRidge[~]
ISA^{~,#}
IUCN^{*,#}
POGO
UN Decade⁺
UN Global Compact
U.S. CLIVAR
U.S. OCB
U.S. Sanctuaries
& Monuments

LEGEND

Affiliations
specified in recent
Accelnet Proposal

^L Collaborators in
^{*}PI, Co-PI, Senior
Personnel

⁺Voluntary
collaborators

[^]Hosting ECRs

[#]DOOS Affiliated
Organization

[~]iDOOS Advisory
Committee