

Illustration courtesy of F. Chavez/K. Lance
(Monterey Bay Research Institute/MBARI)

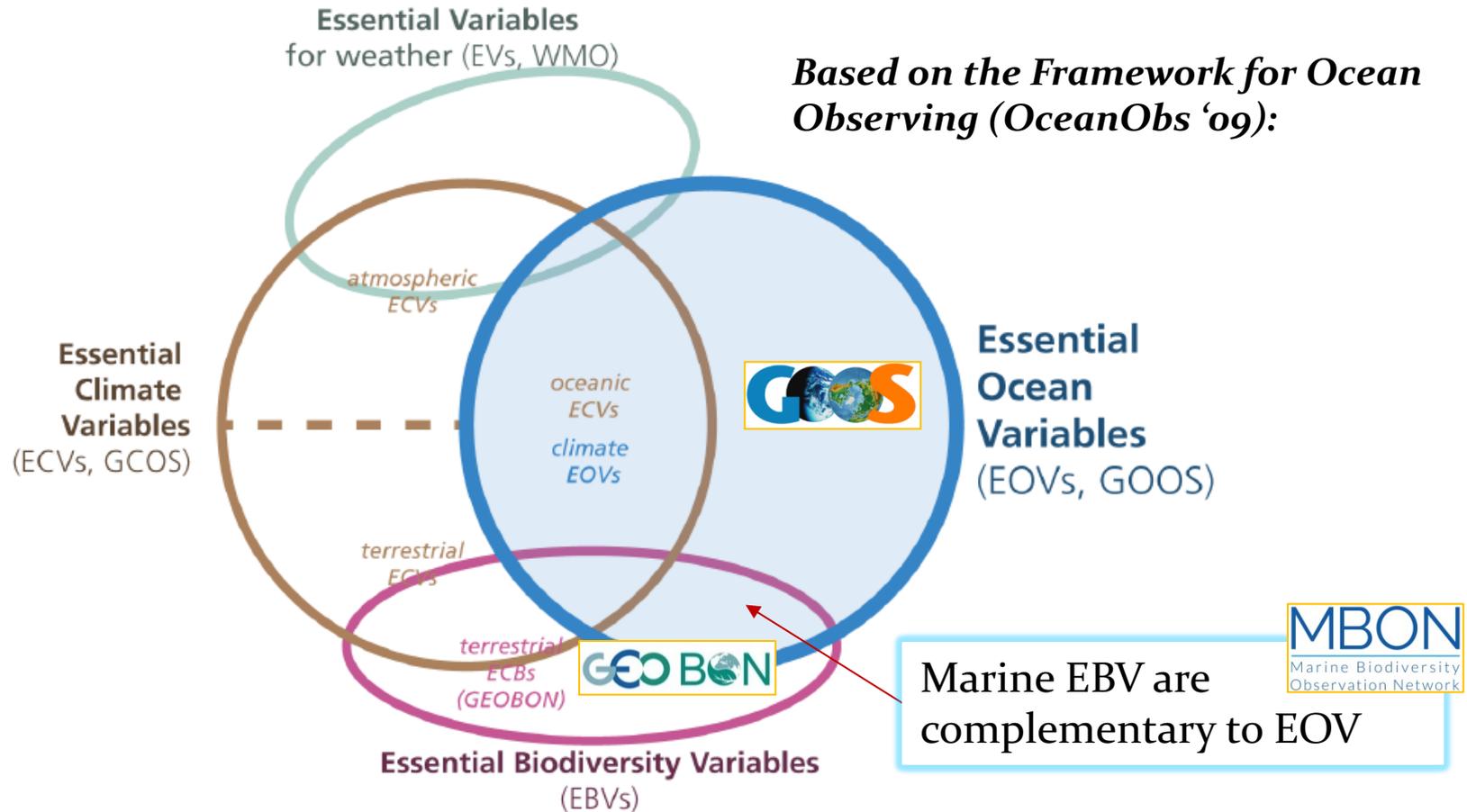


A community of
practice

<http://www.marinebon.org/>

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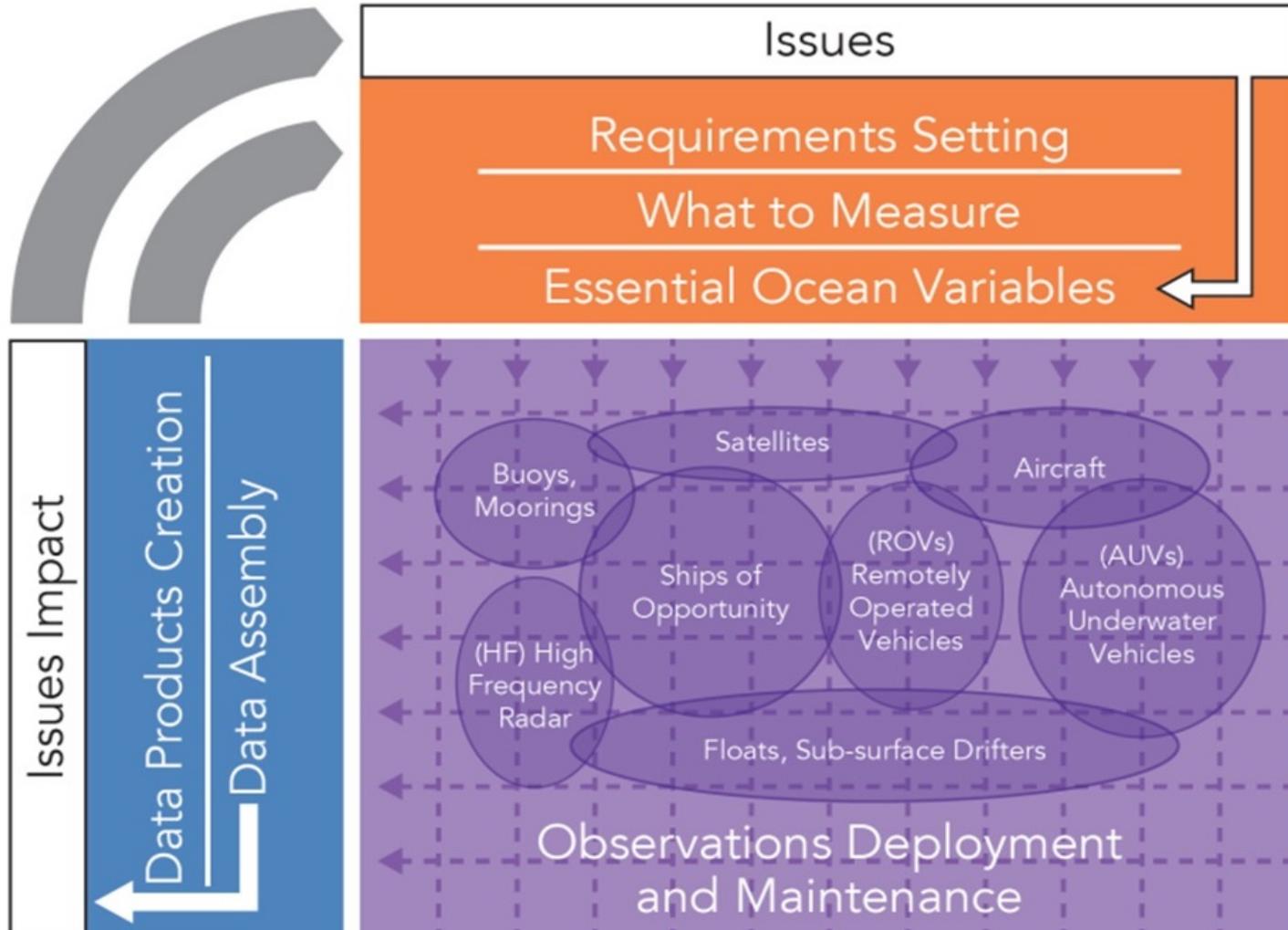
Linking Essential Biodiversity Variables (EBVs) and Essential Ocean Variables (EOVs)



EOVs are central to GOOS strategic planning and implementation

EBVs are central to GEO BON strategic planning and implementation

Framework for Ocean Observing Process Diagram



GOOS Framework for Ocean Observing



Global Ocean Observing System (GOOS) Essential Ocean Variables (EOVs)

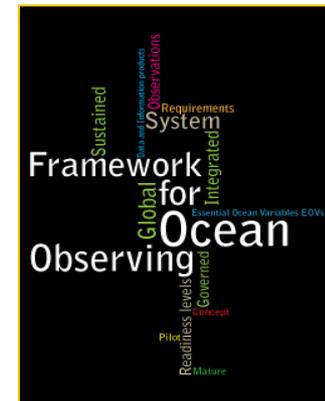
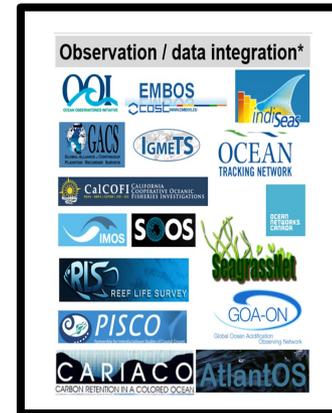
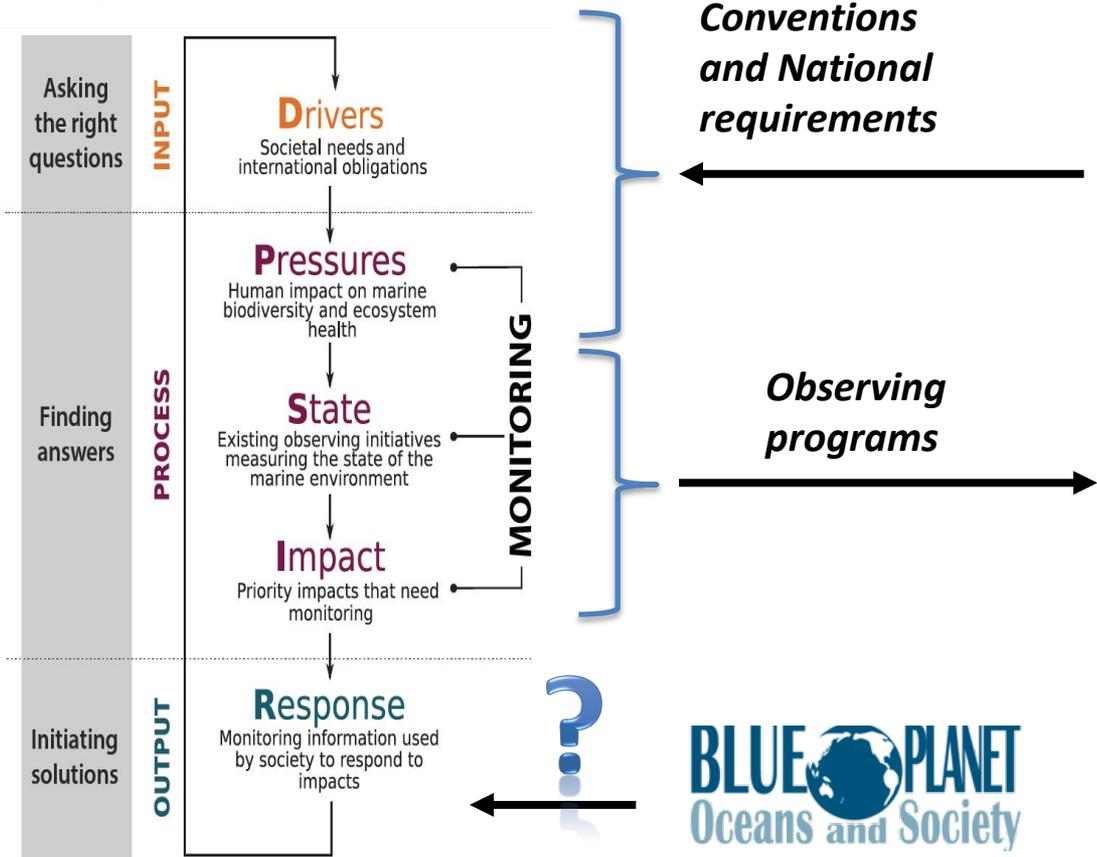


PHYSICS	BIOGEOCHEMISTRY	BIOLOGY AND ECOSYSTEMS
Sea state	Oxygen	Phytoplankton biomass and diversity
Ocean surface stress	Nutrients	Zooplankton biomass and diversity
Sea ice	Inorganic carbon	Fish abundance and distribution
Sea surface height	Transient tracers	Marine turtles, birds, mammals abundance and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



Defining Essential Ocean Variables: *Biology EOVS*

Based on the Framework for Ocean Observing (OceanObs '09):



Courtesy of Nic Bax and Patricia Miloslavich

Bio-Eco Panel online

http://www.goosocean.org/index.php?option=com_content&view=article&id=79&Itemid=273

http://www.goosocean.org/index.php?option=com_content&view=article&id=14&Itemid=114

Example: EOV Spec sheet: Phytoplankton biomass and diversity:

http://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=175

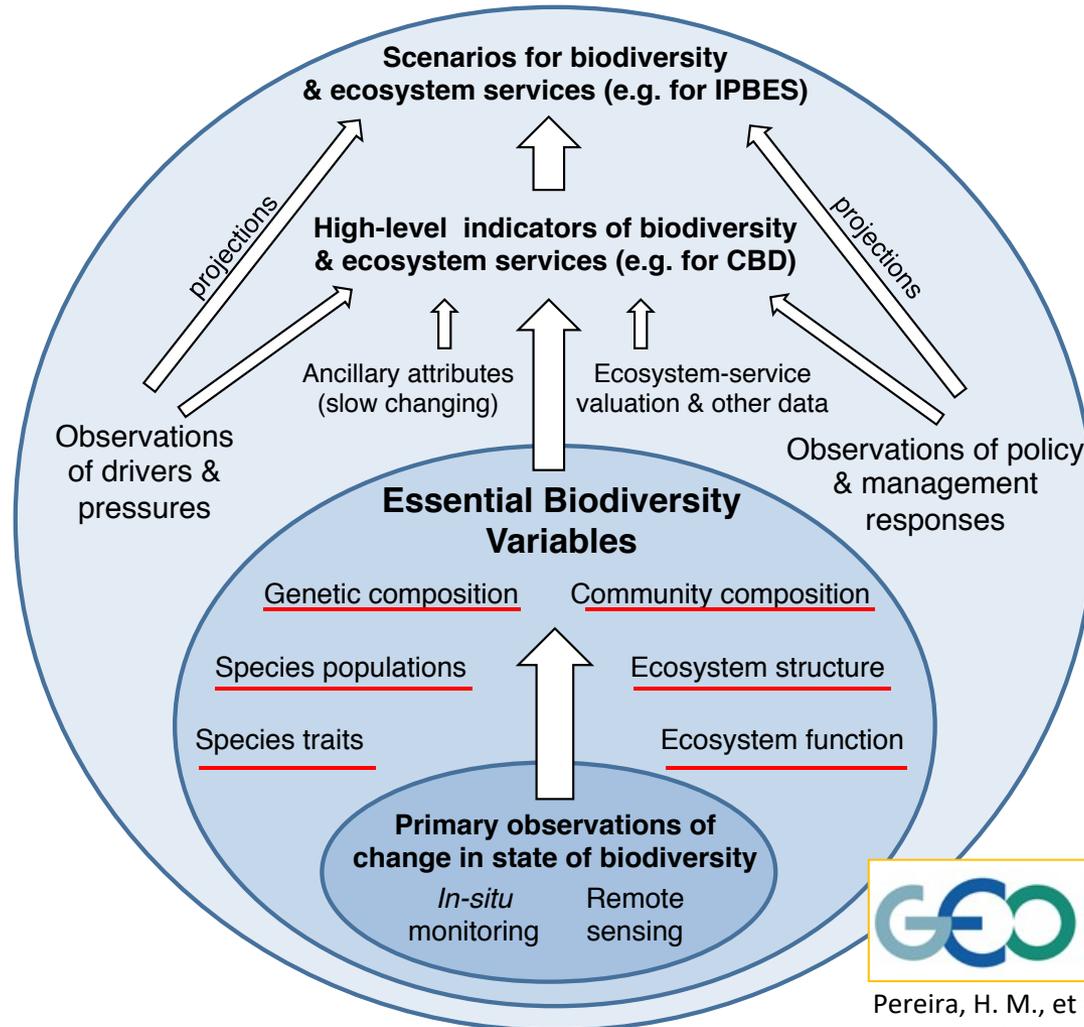
Essential Ocean Variable (EOV): Ocean Colour

Table 1: EOV Information

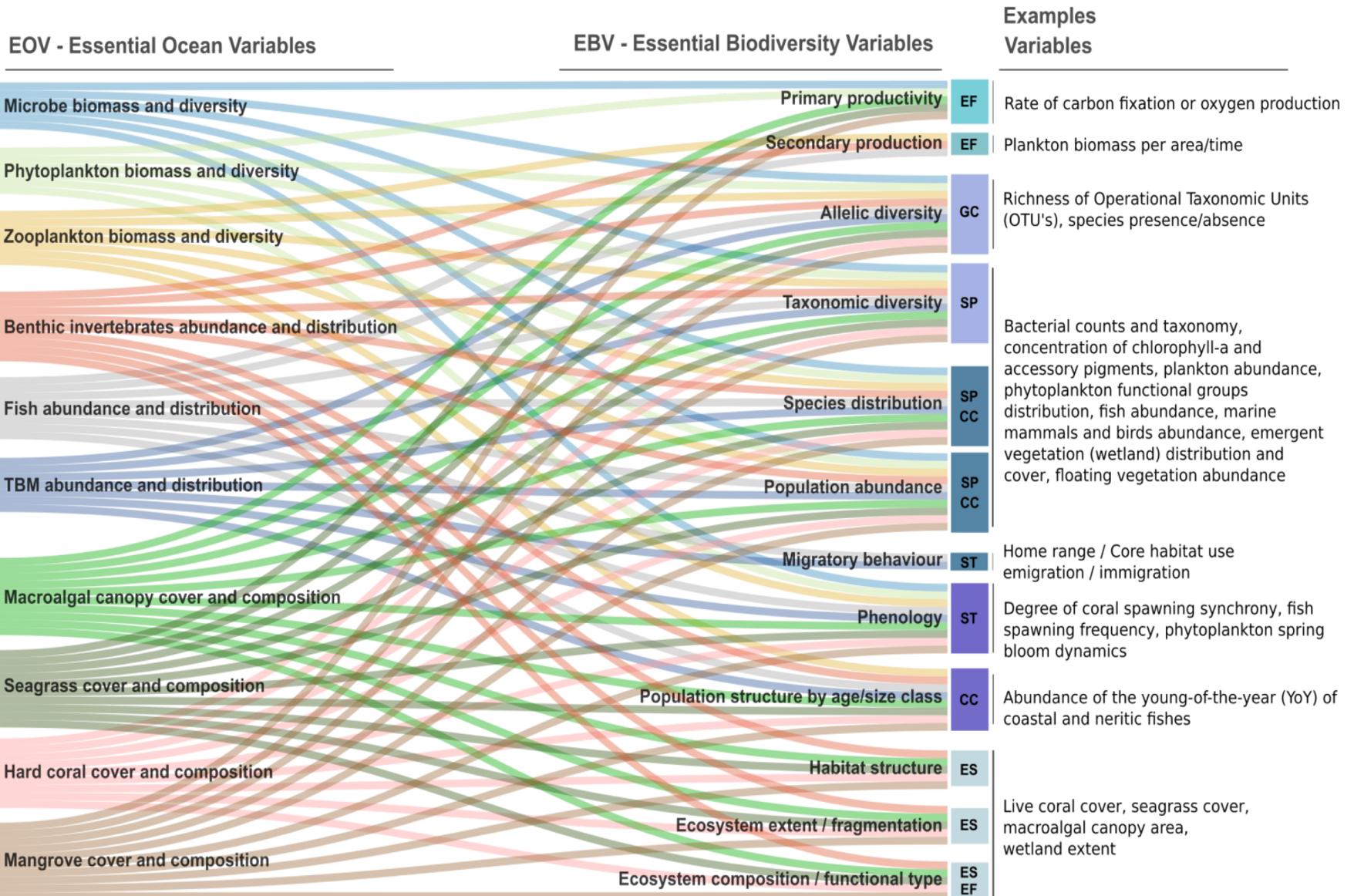
Name of EOV	Ocean Colour
Sub-Variables	<ul style="list-style-type: none"> - Top-of-atmosphere (TOA) radiance - Remote sensing reflectance ($R_{rs}(\lambda)$) - Downward spectral irradiance (E_d)* - Upward spectral radiance (L_u)*
Derived Products	<ul style="list-style-type: none"> - Water-leaving radiance and normalized water-leaving radiance [spectral $L(\lambda)$ and $nL(\lambda)$] - (Incident) Photosynthetically Available* Radiation (PAR) - Chlorophyll-a <p><u>Inherent Optical Properties (IOPs)</u></p> <ul style="list-style-type: none"> - Total absorption coefficient-a; - Absorption coefficient due to phytoplankton pigments (a_{ph}) - Absorption coefficient due to colored dissolved and detrital organic matter (a_{dg})



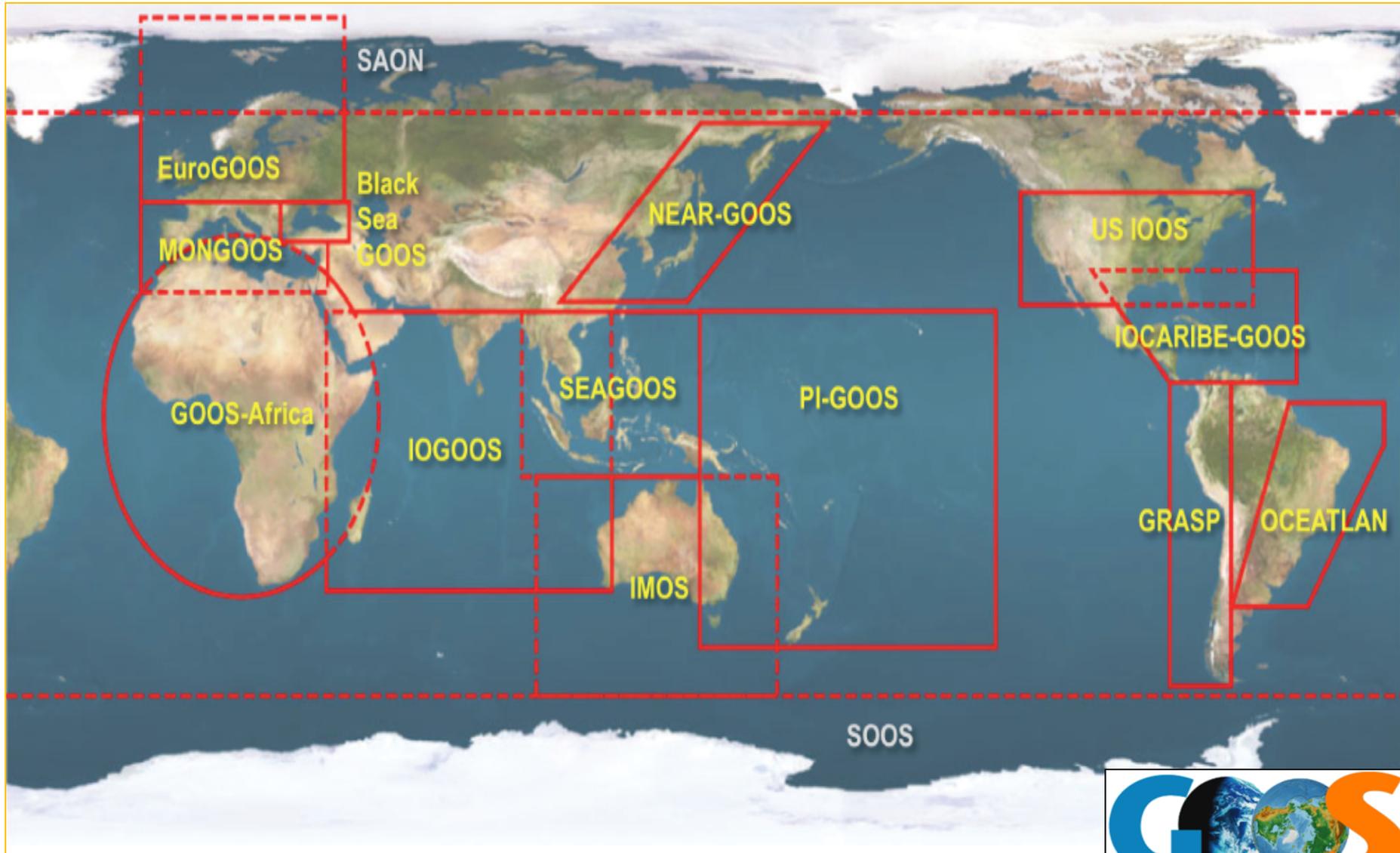
Essential Biodiversity Variables (EBV)



EBV and EOV are Complementary



15 GOOS Regional Alliances



A Global Collaboration: IOC (OBIS + GOOS) and GEO (MBON)

GEO BON/MBON – GOOS BioEco – OBIS partnership

**Building a globally coherent, consistent and coordinated
sustained global ocean observing system to assess the state of
the ocean's biological resources and ecosystems**

Requirements



- Focus on sustained observations
- Bring selected EOVs from pilot to mature
- Link with platforms and observing systems of GOOS and GRAs

Observations



- R&D focus
- Bring new EOVs from concept to pilot
- Assist with the establishment of national and regional BONs

Data &
Products



- Open data sharing
- Data integration
- Data quality control
- Data harmonization
- Tools for data exploration, visualization and analysis

Products,
Indicators,
Assessments



e.g.: <http://iobis.org/2016/12/15/goosgeobonobis/>

MBON

INTERNATIONAL LINKAGES

OBSERVING LIFE IN THE OCEANS FOR SOCIETAL BENEFIT (- INFORMATION FLOW -)



United Nations Educational, Scientific and Cultural Organization
Intergovernmental Oceanographic Commission



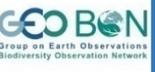
GROUP ON EARTH OBSERVATIONS

Global Ocean Observing System



The Global Ocean Observing System

Biodiversity Observation Network (BON)



Group on Earth Observations Biodiversity Observation Network

GOOS: ESSENTIAL OCEAN VARIABLES

Focus on EOVs driven by societal needs

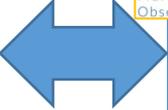
- Global implementation -

MBON
Marine Biodiversity Observation Network

ESSENTIAL BIODIVERSITY VARIABLES

Focus on EBVs driven by science questions and other user needs (policy, societal)

- National and regional implementation -



MARINE OBSERVATION NETWORK

National — Regional — Global — Thematic

National Governments • Non Government Organizations • Agencies • Institutions • Citizen Science

Data integration and dissemination



OBIS OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM
WCMC

+ other national, international data systems

OTHER DATA PROVIDERS AND USERS

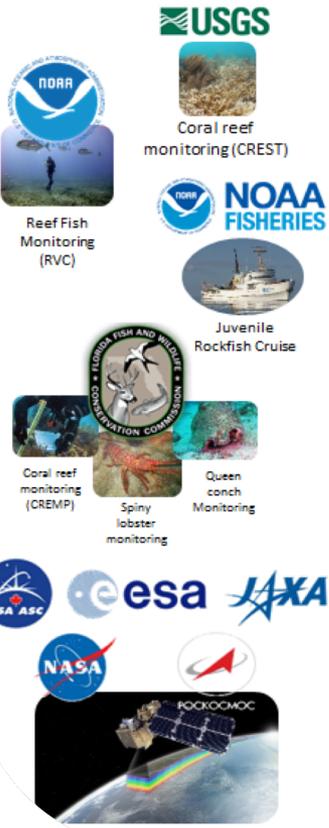
- ✓ National Governments and Organizations
- ✓ International Organizations
- ✓ Non Government Organizations
- ✓ Research Institutions
- ✓ Citizen Scientists



Smithsonian TMON - MarineGEO
SUSTAINABLE DEVELOPMENT GOALS
UNDP
UNEP
UN environment
WCMC
IMBeR
GEO BON Group on Earth Observations Biodiversity Observation Network
BLUE PLANET Oceans and Society
ipbes
futureearth research for global sustainability
Convention on Biological Diversity

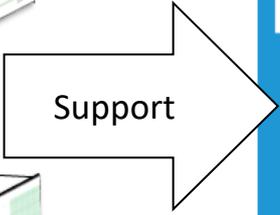


Marine Biodiversity
Observation Network



Explorer

Infographics



Plans for 2018

- Publish/Published EOV concept papers (Miloslavich et al., Bax et al., Muller-Karger et al.)
- Work on EOV-EBV relationship and implementation plans
- Meetings:
 - Feb 8-9: OBIS/IOOS/GOOS Darwin core training (Seattle)
 - (Feb 11, 2018, OSM) NSF OceanObs Research Coordination Network
 - (Apr 16-19, 2018) IMBeR / SCOR meeting (Integrated Marine Biosphere Research project)
 - (May 1-3) IOCARIBE, Mexico (Sargassum + oil spill)
 - (May 13-17) WCMB, Montreal
 - EOV implementation meetings (Plankton (Jun 25-28), Macroalgae, Coral scheduled). Sponsors: RCN, MBON, GOOS, UN Environment, POGO
 - (Jul 2-7, 2018) SBSTTA, Montreal
 - (Jul 9-14) GEO BON, China
 - (Aug 6-9, 2018) Pole to Pole MBON in the Americas (capacity building)
 - (Nov, 2018) CBD, Egypt
- Global 'omics observatories
- SCOR P-OBS Working Group: Integration of Plankton-Observing Sensor Systems to Existing Global Sampling
- CMAR corridor: MBON is working with Ecuador, Panama, Colombia and Costa Rica to help define research needs in this EBSA.
- NOAA Ocean Exploration Research