MBON
Marine Biodiversity Observation Network

GEO BON

Session: Monitoring Essential Variables

Essential Ocean Variables for Sustained Observations of Marine Biodiversity and Ecosystems

19 June 2020

GEO GROUP ON EARTH OBSERVATIONS

Frank Muller-Karger
Gabrielle Canonico

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College of MARINE SCIENCE

IOOS Integrated Ocean Observing System

NOAA

#EO4Impact

Frank Muller-Karger

Frank is a biological oceanographer who conducts research on the diversity of life in the sea, factors that drive diversity and production, and the relevance to people. He combines traditional oceanographic methods and satellite remote sensing to study patterns of variation of phytoplankton and of coastal wetlands.

Frank is involved in a number of international working groups including the Marine Biodiversity Observation Network (MBON, as co-chair) of GEO BON, the UNESCO Intergovernmental Oceanographic Commission's (IOC) Global Ocean Observing System (GOOS) Bio-Eco panel, the UNESCO IOC's Ocean Best Practices Steering Committee, and leads the OceanObs Research Coordination Network (RCN).

He holds B.S., M.S. and Ph.D. degrees in marine science and a Master in management. He has authored or co-authored over 250 peer-reviewed scientific publications.

Frank Muller-Karger
Professor

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Gabrielle Canonico

Gabrielle is a member of the U.S. Integrated Ocean Observing System (U.S. IOOS) Program Office, housed in NOAA. Her professional interests include integration of biological observing data and capability into U.S. IOOS and the Global Ocean Observing System, development of information products to ensure wide use of biodiversity observations by resource managers and the public, and advancing efforts to ensure sustained monitoring of ocean life and biodiversity. Gabrielle led development of the U.S. Marine Biodiversity Observation Network (MBON) - established in 2013 – and is an active participant in development of global MBON and other biological observing efforts.

Gabrielle serves as co-chair of the Global Ocean Observing System (GOOS) Biology and Ecosystem Panel and of the US National Oceanographic Partnership Program Biodiversity Working Group.

Gabrielle Canonico

Biology Lead and MBON Manager

The MBON vision:

Good and timely information on marine biodiversity sustains the long-term health and use of marine ecosystems

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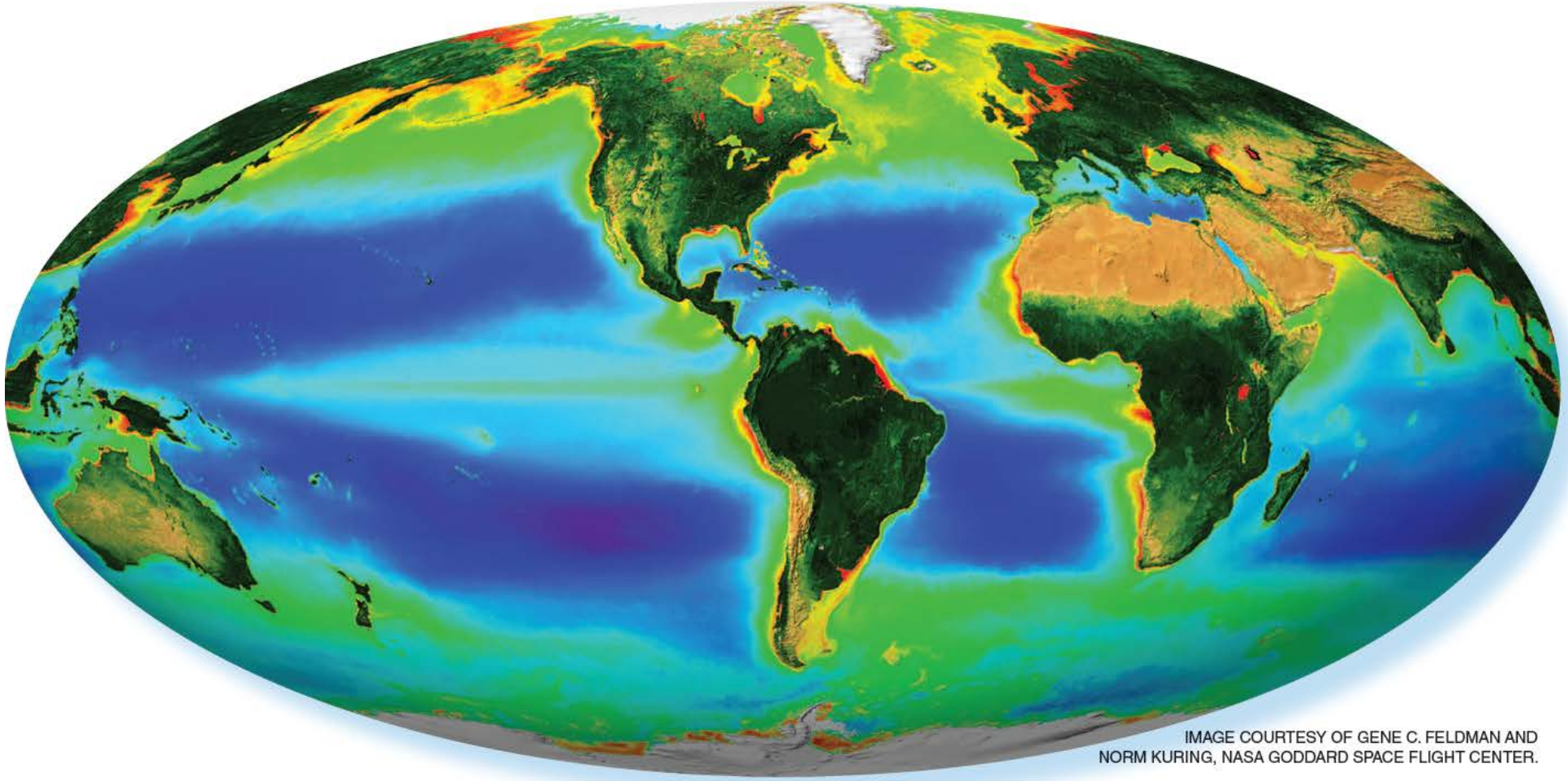
Huge investments have gone into ocean observing systems —
But there is no systematic effort to observe life in the sea

MBON Goal: Enable the effort to characterize how marine biodiversity is changing and how it affects us

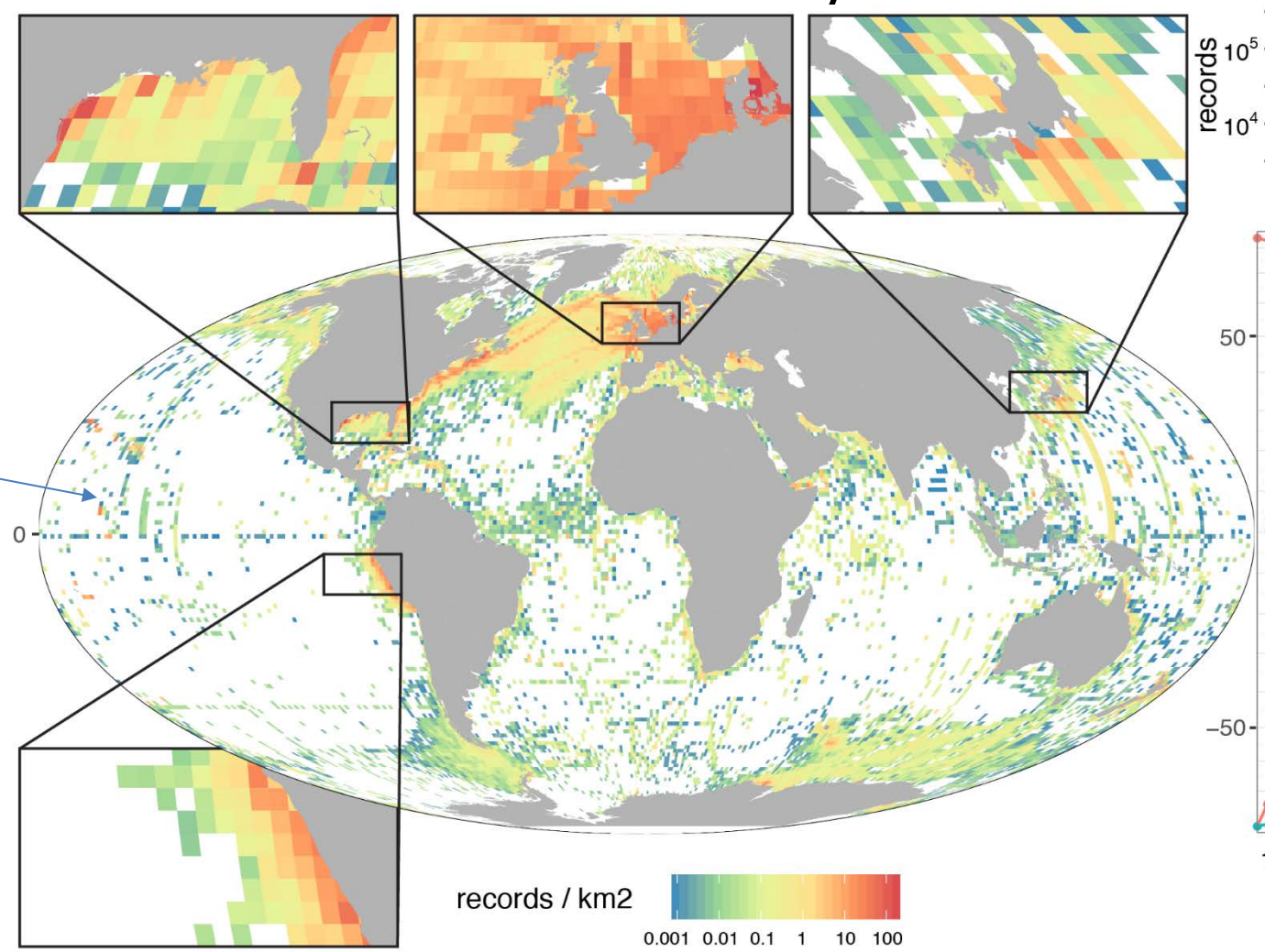
Our best sustained synoptic global biological observations look like this today. But, how do we move 'beyond chlorophyll'?



Satellite-derived
Chlorophyll distribution

OBIS – THE Ocean Biodiversity Information System

The reality: in situ surface ocean records of biodiversity in over 100 years



Fewer records offshore

Records drop off in last few years

Records drop off in high latitudes

We need better coverage and baselines to evaluate changing diversity, abundances, ranges, and connectivity

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Vision and Goal

Develop a community of practice to understand changes in marine biodiversity

Focus:

- “Ocean Observing Systems” and networks
- Coastal zones, Exclusive Economic Zones, High Seas
- Marine Protected Areas
- Community resilience and the blue economy

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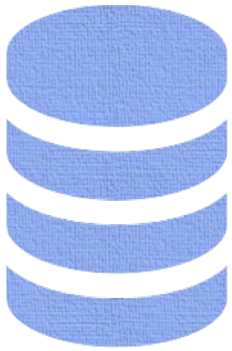
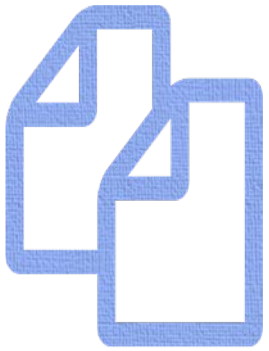
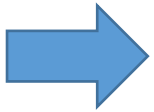


Databases



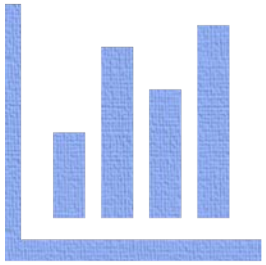
Datasets



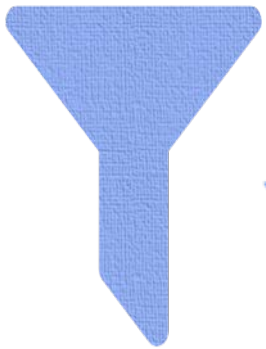
Produce:

Maps

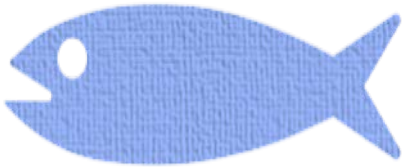
Abundance



Trends



Filter:



Taxonomy

Space

Time

The Need for Information Leads to Essential Variables:

-Essential Climate Variables (ECVs)
-Essential Ocean Variables (EOVs)
-Essential Biodiversity Variables (EBVs)

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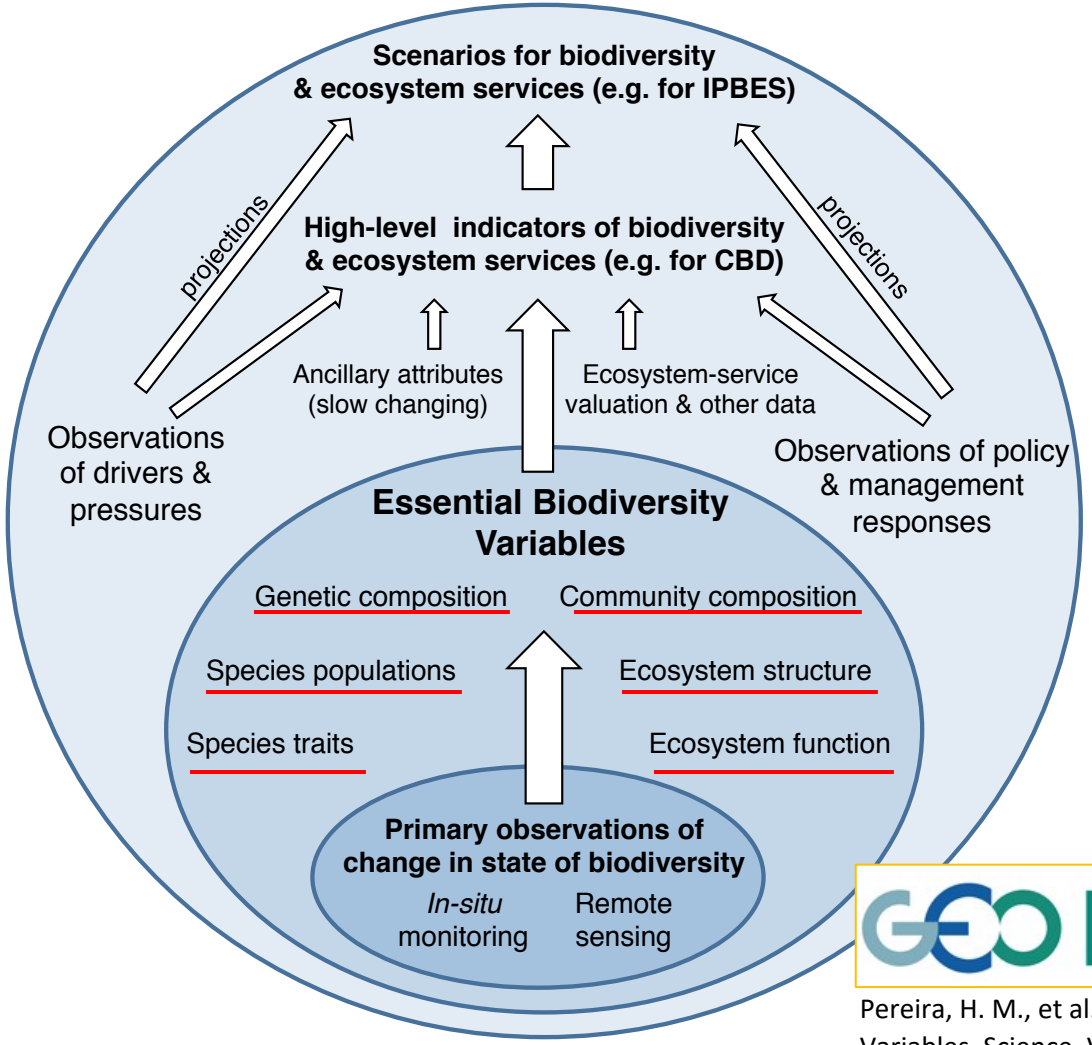
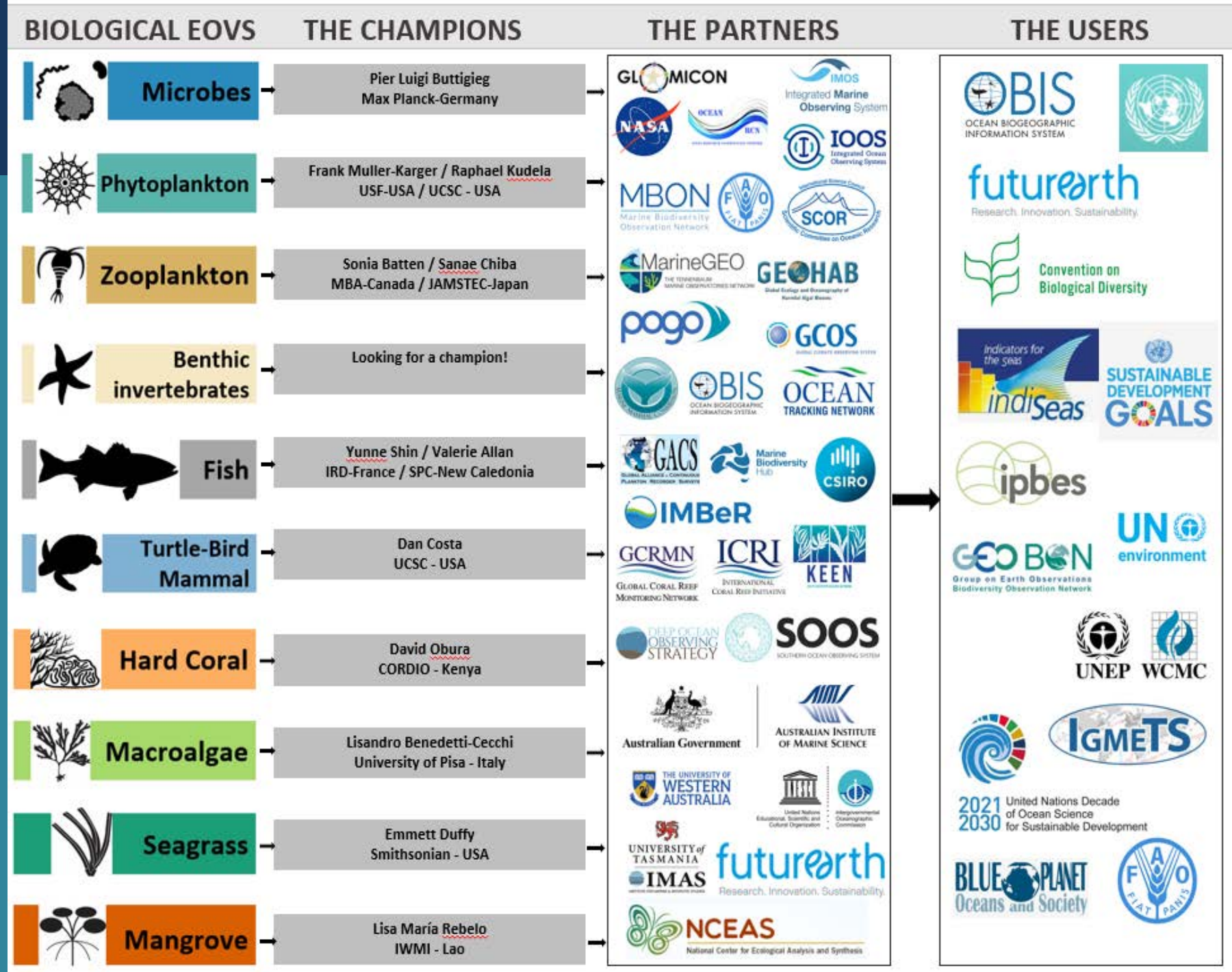
INTERNATIONAL LINKAGES

Essential Biodiversity Variables (EBVs)



Pereira, H. M., et al. 2013. Essential Biodiversity Variables. Science. Vol. 339. 277-278.

Partnerships & Users



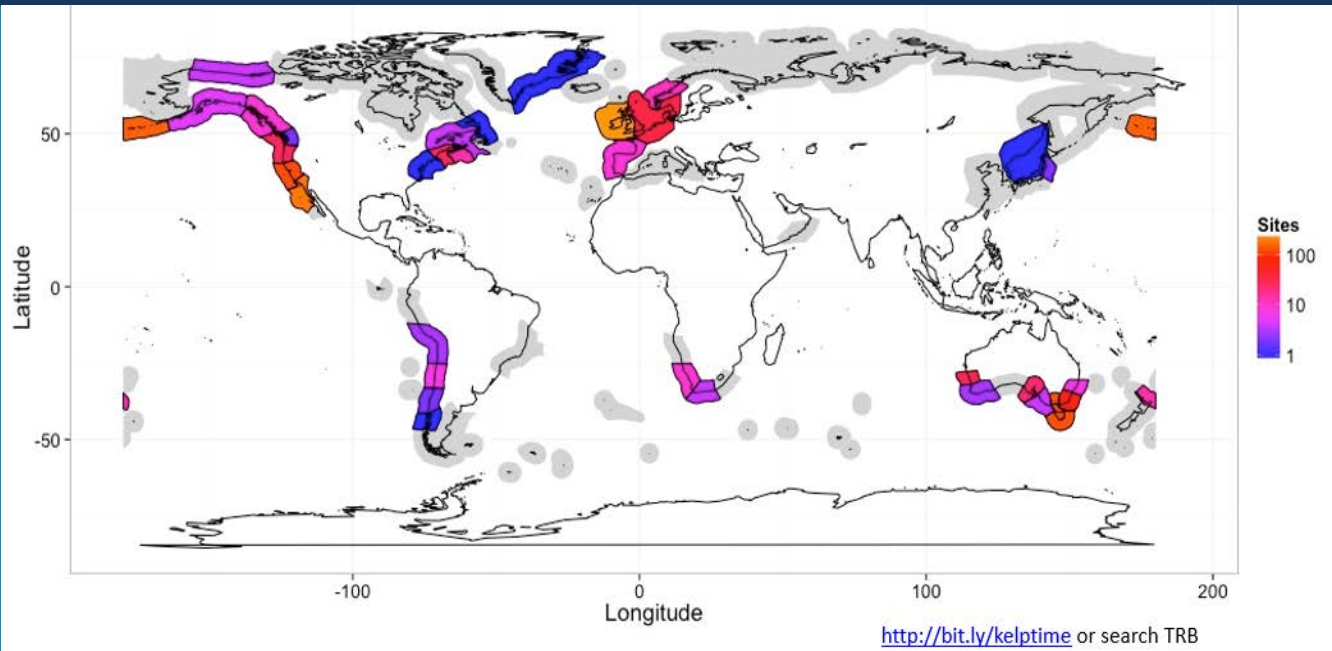
- Science and technology
- Policy and sustainability
- Business and industry
- Civil society and NGOs
- Funders and donors

Biology and Ecosystems Panel

Lisandro Benedetti-Cecchi
University of Pisa - Italy

Macroalgal Canopy Cover and Composition

- Macroalgae:
  - High production, diverse, useful
  - Undergoing change
- Data not fully aggregated, collected using different methods
- GOOS and MBON workshops



http://bit.ly/kelptime or search TRB

KelpTime Database
1,454 sites 1954-2012
Krumhansl etal. (2016)

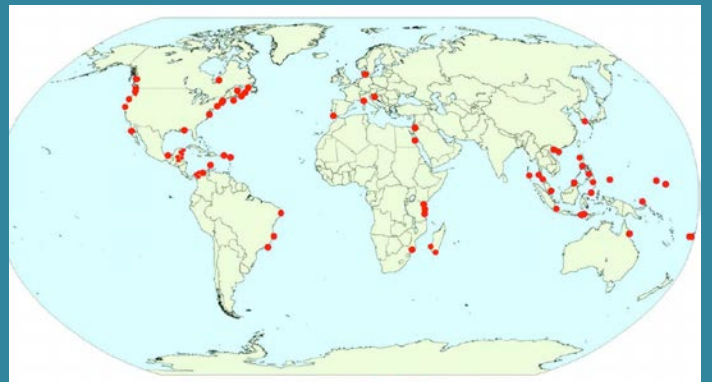
First observation of large quantities of Hypnea sp. in Seychelles – a new arrival or a strong monsoon?

Biology and Ecosystems Panel

Emmett Duffy
Smithsonian-led Tennenbaum Marine Observatories

SeaPlants
Cover and Composition

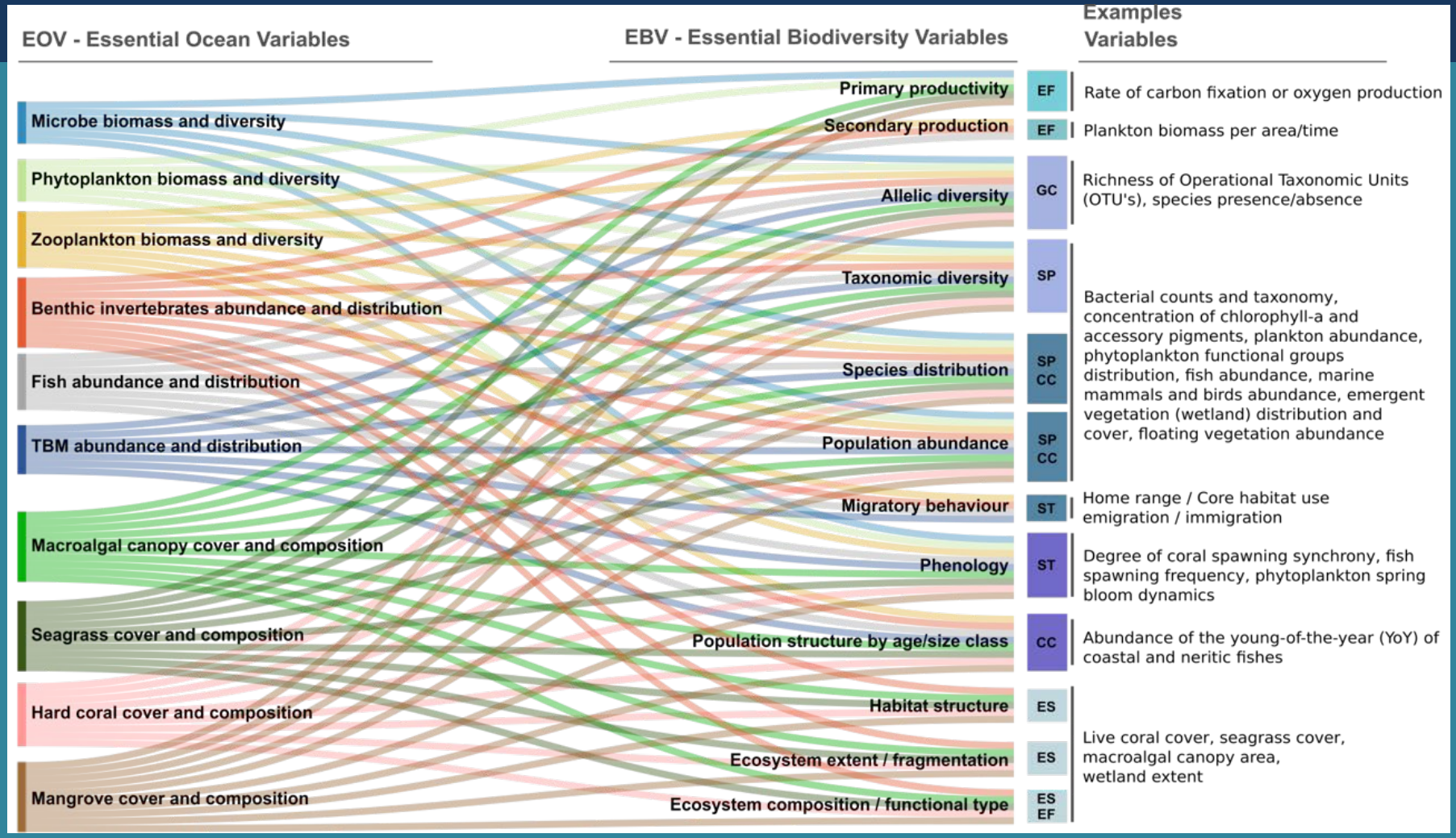
- Seagrass and Mangroves:
  - Foundational to coastal systems
  - Services include carbon storage
  - Rapid loss of cover
- In situ data fragmented, opportunities to make better use of remote sensing
- GOOS and MBON workshop 2019



SeagrassNet - 139 sites

Seagrass Watch

Users & Partnerships



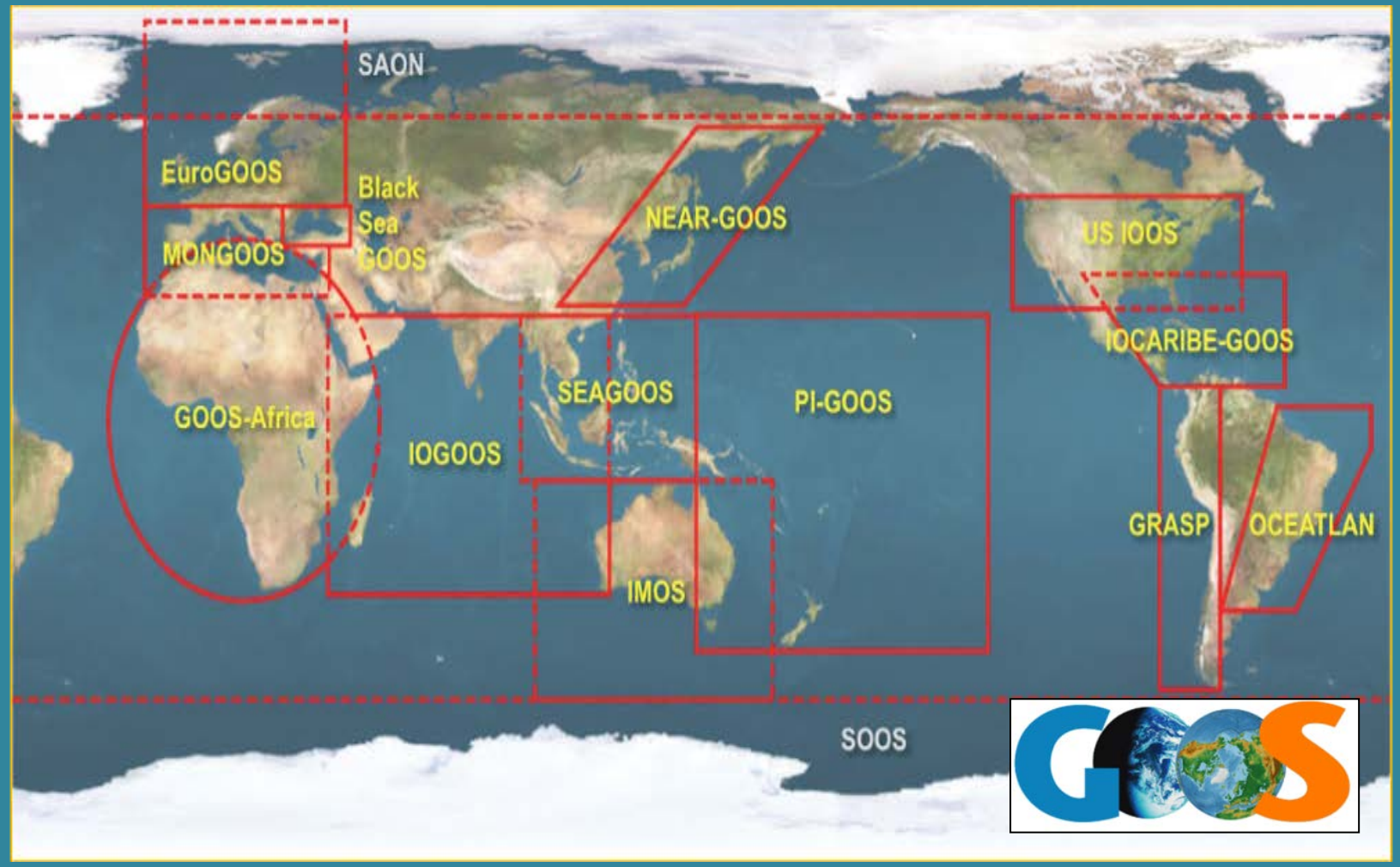
Conceptual, complementary relationship between EOVs and EBVs

(TBM = turtles, birds, mammals)

Muller-Karger et al., 2018. Frontiers in Marine Science, https://doi.org/10.3389/fmars.2018.00211]

Biology and Ecosystems Panel

Building a Global Ocean Biodiversity Observing System



Use existing infrastructure:

-GOOS Regional Alliances
-GO-SHIP
-OceanSites
-OBIS
-Ocean Best Practices System
-Other global networks

The Need: Address Social and Economic Challenges

- Biodiversity time series
- Common methods
- Lower cost of technologies
- Capacity development

Best Practice Challenges

- Capacity development to link observers and users
- Interoperability
- Multidisciplinary integration
- Open science, open data

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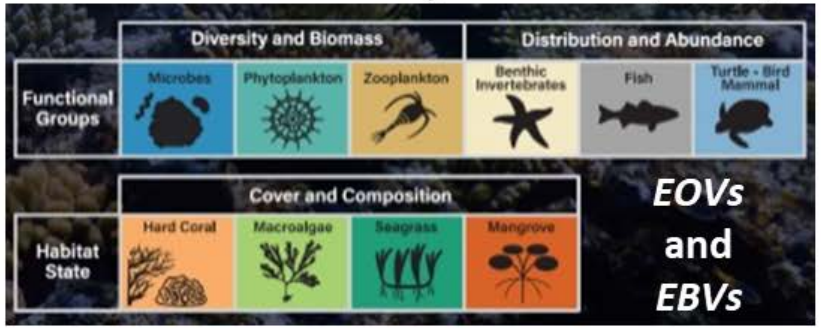
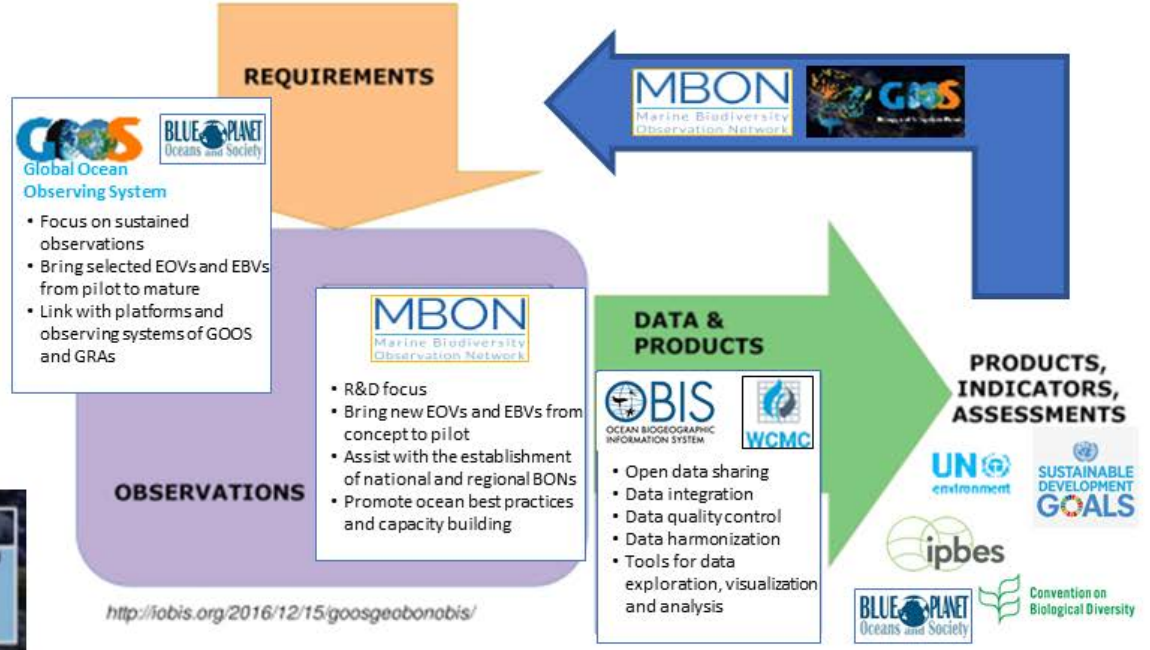
Monitoring biodiversity is fundamental to managing ecosystem uses and human health

Join our community of practice to develop a global capacity to collect and use biological observations for conservation and ecosystem-based management

Addressing the challenge and benefits of observing life in the sea, by measuring Essential Ocean Variables (EOVs) and Essential Biodiversity Variables (EBVs)





See Canonico et al (2019): https://www.frontiersin.org/articles/10.3389/fmars.2019.00367/full

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19 June 2020

Thank You!

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Collaborate and communicate with GEO:

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http://marinebon.org