Workshop 8

Connecting climate, ocean and ecosystem observation – Ocean observation futures

Implementation of the biological and ecosystem components

Patricia Miloslavich, Nicholas Bax, Samantha Simmons, Eduardo Klein, Frank Muller-Karger, Daniel Dunn, Ward Appeltans and GOOS BioEco Panel

http://goosocean.org/
Tasks of GOOS Expert Panels

Physics – Biogeochemistry – Biology and Ecosystems

Identification of and requirement setting for Essential Ocean Variables (EOVs)

Development of EOV implementation strategies and coordination of observations

Promotion of standards and interoperability of data and information products

FOR BIOLOGY: BUILD THE GLOBAL NETWORKS

Photo credits: Dan Costa, Alistair Cheal, Eduardo Klein, Katrin Iken
Process to identify biological Essential Ocean Variables

“Drivers-Pressures-State-Impact-Response”

Impact

- Relevant to help solve science questions and address societal needs
- Contribute to improve management of marine resources

Feasibility

- Scientifically credible
- Technically practical, cost effective and within human capabilities
Process to identify biological Essential Ocean Variables

“Drivers-Pressures-State-Impact-Response”
Process to identify biological Essential Ocean Variables

N=24 conventions
Papers (1995-2016):
Drivers: 12000+
Pressures: 65000+
Variables: 7000+

Process to identify biological Essential Ocean Variables
Process to identify biological Essential Ocean Variables

EOV Validation Integration Implementation

PRODUCT DELIVERY

Initiate Solutions deliver to requirements

Drivers

Societal needs and international obligations

On marine biodiversity and ecosystem health

State

Establishing feasibility

Impact

Observations addressing societal needs

Prioritize based on feasibility and impact of EOVs

Survey of Observing Programs spatial and temporal extent of biological variables

Process

Review of International Conventions identify requirements
Observing programs: spatial and temporal scales

Spatial Extent
- >1,000 km
- 100-1,000 km
- 10-100 km
- 1-10 km
- <1 km

Relative no. of programs (cumulative)

- Phytoplankton diversity
- Phytoplankton abundance
- Zooplankton abundance
- Zooplankton diversity
- Fish abundance
- Fish distribution
- TBM abundance
- TBM distribution
- Benthic Invert. abundance
- Benthic Invert. diversity
- Coral cover
- Maceralgal cover
- Seagrass cover
- Mangrove cover

EOV type
- Benthic
- Ecosystems
- Nekton
- Plankton

Miloslavich et al. (2018) GCB
Impact and scalability of prioritized variables

**Societal drivers and pressures (from conventions)**

Scalability: Weights temporal and spatial scales
Emerging EOVs:
- Microbial diversity and biomass
- Benthic invertebrate distribution and abundance
Value of EOVs for the global CLIMATE observing system GCOS

**ECV IN BRIEF**

**Domain:** Ocean  
**Subdomain:** Biological/Ecosystems  
**Scientific Area:** Biosphere  
**Products:** Phytoplankton, Zooplankton

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**ECV IN BRIEF**

**Domain:** Ocean  
**Subdomain:** Biological/Ecosystems  
**Scientific Area:** Biosphere  
**Products:** Coral Reefs, Mangrove Forests, Seagrass Beds, Macroalgal Communities

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**PRODUCT**

<table>
<thead>
<tr>
<th>Definition</th>
<th>Requirements</th>
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<tbody>
<tr>
<td>Frequency</td>
<td>Resolution</td>
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</table>

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**Plankton**

**Marine Habitat Properties**

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**GCOS**

The Global Observing System for Climate Implementations

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**GCOS**

Biology and Ecosystems Panel

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**GCOS**

The Global Observing System for Climate Implementations
Value of EOVs for the global ocean observing system

Examples of links between some observing systems and GOOS BioEco EOVs

EOVs:
- Phytoplankton
- Zooplankton
- Fish
- Turtles, birds, mammals
- Coral
- Macroulge
- Seagrass
- Mangrove

Systems:
- NCRIS
- Integrated Marine Observing System (IMOS)
- Integrated Ocean Observing System (IOOS)
- SOOS
- MBON
- ATN

Organizations:
- Australian Government
- ICSU
- National Research Infrastructure for Australia
- NOAA
- SCOR
- SCAR
INTEGRATION

BioEco-MBON-OBIS
IMPLEMENTATION – drafting the plans
- global coordination and coverage
- intercomparable: best practices
- open access data
- support international reporting needs
- aiming to build a network around each EOV

EOV IP Workshops

- Vision and mission
- Needs and requirements
- Capabilities
- Impact - capacity development
- Funding
- Governance
Biological ocean networks: 
The Global Alliance of Continuous Plankton Recorders

**Variables**
Zooplankton diversity, abundance and distribution

**Duration**
80 years

5050804  258305  6647274  3230971
Total Nautical Miles Sampled  Total Samples Analysed  Total Nautical Miles Towed  Taxonomic Abundance Entries
Variables

- Coral cover and composition
- Macroalgal cover and composition
- Fish diversity, abundance, size

Duration
10 years – Australia
Biological ocean networks:
The Global Coral Reef Monitoring Network

- A programme of the International Coral Reef Initiative (ICRI)

- Secretariat rotating every 2 years: 2016-18, France
  2018-20, Australia, Monaco, Indonesia

- Members: 26 countries + 37 other entities, including UNESCO-IOC, CBD, etc.

  Regional reports – e.g. Caribbean 2014, West Indian Ocean 2017
  Manuals and guidance

- New Implementation and Governance Plan supported by EN Environment under ICRI
<table>
<thead>
<tr>
<th>RESPONSIBLE</th>
<th>&quot;NETWORK&quot;</th>
<th>Global spatial scale</th>
<th>Temporally sustained</th>
<th>Globally coordinated</th>
<th>International data standards / open access</th>
<th>Contributing to (EXV) requirements</th>
<th>Clear mission, targets</th>
<th>Agreed best practices / QC</th>
<th>Technological readiness</th>
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<tr>
<td>ICRI</td>
<td>Coral GCRMN</td>
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- **Concept**: Red
- **Pilot**: Yellow
- **Mature**: Green
Link to strategic mapping for case example “Bleaching”
Challenges of developing global biological EOV networks

- Communities of practice rather than networks
- Most mature networks are local/regional (IMOS in Australia, IOOS in the USA)
- Many “individual” efforts contributing to a common good
- Sustainability not global but on a case to case basis
- Heterogeneity in technology, capacity and funding – automatization very limited
- Best practices in discussion – collection of, rather than one method
- Some of the “networks” only compile data from observations rather than doing the observations (e.g. IGMETS)
- Similar efforts (e.g. Seagrass Net and Seagrass Watch) with intention to merge but need more support
- Rely on volunteer work (e.g. Reef Life Survey)