| **Version:** 0.0 Month Year |
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| Essential Ocean Variable Specification Sheet | |  |
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| Background and justification |  |  |
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| Contributes to: | |

| **1. EOV information** |
| --- |

| **ESSENTIAL OCEAN VARIABLE (EOV)** |  |
| --- | --- |
| **DEFINITION** |  |
| **EOV SUB-VARIABLES -**  key measurements that are used to estimate the EOV |  |
|
| **SUPPORTING VARIABLES -** other measurements that are useful to provide scale or context to the sub-variables of the EOV | Environmental |
| EOV related |
| **DERIVED PRODUCTS -** outputs calculated from the EOV and sub-variables, often in combination with the supporting variables |  |

| **2. Phenomena to observe - what we want to observe with this EOV** This section presents examples of priority phenomena for GOOS that can be (partly) characterised by this EOV’s sub-variables. This list is not exhaustive but serves to provide general suggestions on how observation efforts can structure their planning and implementation to observe certain phenomena.  The GOOS application area(s) the phenomena are relevant for are depicted as follows: Climate , ocean health , operational services | | | | |
| --- | --- | --- | --- | --- |
|  | | | | |
| **PHENOMENA TO OBSERVE** | | **Phenomena #1** | **Phenomena #2** | **Phenomena #3** |
| **PHENOMENA**  **EXTENT** | **HORIZONTAL** |  |  |  |
| **VERTICAL** |  |  |  |
| **TEMPORAL** |  |  |  |
| **RESOLUTION TO OBSERVE PHENOMENA** | **HORIZONTAL** |  |  |  |
| **VERTICAL** |  |  |  |
| **TEMPORAL** |  |  |  |
| **SIGNAL TO CAPTURE** | |  |  |  |
| **SUB-VARIABLES NEEDED TO MEASURE** | |  |  |  |
| **SUPPORTING VARIABLES NEEDED** | |  |  |  |

| **3. GOOS Observing Specifications or Requirements** This section outlines ideal measurements for an optimal observing system for this Essential Ocean Variable (EOV). It offers guidance on creating a long-term system to observe key phenomena related to the EOV. These values are not mandatory, and no single system is expected to meet all requirements. Instead, the combined efforts of various observing systems should aim to meet these goals. Observations at different scales are also valuable contributions to global ocean observation if shared openly. | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EOV** |  | | | | | | | | | |
|  | |  | | | | | | | | |
| **PHENOMENA** |  | | | | | | | | | |
| **EOV SUB-VARIABLE** |  | | | | | **DEFINITION** | |  | | |
|  | **Resolution** | | | | **Timeliness** | **Uncertainty**  **Measurement** | **Stability** | **Sampling approach** | **References** | |
| **Spatial Horizontal** | | **Spatial Vertical** | **Temporal** |
| **IDEAL** |  | |  |  |  |  |  |  |  | |
| **DESIRABLE** |  | |  |  |  |  |  |  | |
| **MINIMUM** |  | |  |  |  |  |  |  | |

| **EOV SUB-VARIABLE** |  | | | | **DEFINITION** | |  | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Resolution** | | | **Timeliness** | **Uncertainty**  **Measurement** | **Stability** | **Sampling approach** | **References** |
| **Spatial Horizontal** | **Spatial Vertical** | **Temporal** |
| **IDEAL** |  |  |  |  |  |  |  |  |
| **DESIRABLE** |  |  |  |  |  |  |  |
| **MINIMUM** |  |  |  |  |  |  |  |

| **EOV SUB-VARIABLE** |  | | | | **DEFINITION** | |  | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Resolution** | | | **Timeliness** | **Uncertainty**  **Measurement** | **Stability** | **Sampling approach** | **References** |
| **Spatial Horizontal** | **Spatial Vertical** | **Temporal** |
| **IDEAL** |  |  |  |  |  |  |  |  |
| **DESIRABLE** |  |  |  |  |  |  |  |
| **MINIMUM** |  |  |  |  |  |  |  |

| **4. Observing approach, platforms and technologies This table provides examples of approaches and technologies used to collect this EOV to help observe priority phenomena** | | | |
| --- | --- | --- | --- |
| **APPROACH / PLATFORM** | **APPROACH #1** | **APPROACH #2** | **APPROACH #3** |
| **EOV SUB-VARIABLE(S) MEASURED** |  |  |  |
| **TECHNIQUE / SENSOR TYPE** |  |  |  |
| **SUGGESTED METHODS AND BEST PRACTICES** |  |  |  |
| **SUPPORTING VARIABLES MEASURED** |  |  |  |

| **APPROACH / PLATFORM** | **APPROACH #1** | **APPROACH #2** | **APPROACH #3** |
| --- | --- | --- | --- |
| **EOV SUB-VARIABLE(S) MEASURED** |  |  |  |
| **TECHNIQUE / SENSOR TYPE** |  |  |  |
| **SUGGESTED METHODS AND BEST PRACTICES** |  |  |  |
| **SUPPORTING VARIABLES MEASURED** |  |  |  |



This section needs to include information that is standard across all EOVs on:

* Where to deposit your data (OBIS for BioEco, OOPC and IOCCP to define where)
* Where to add your meta-data (BioEco Portal for BioEco/ OceanOPS for the others?)
* Instructions for submission and data ingest (standards and conventions)
* Data QC

Individual EOVs to include information on

* Data exchange conventions and standards
* Data products
* Data schemas

# References

**Background information**

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Muller-Karger, F. 2018. Advancing Marine Biological Observations and Data Requirements of the Complementary Essential Ocean Variables (EOVs) and Essential Biodiversity Variables (EBVs) Frameworks. Frontiers in Marine Science. https://doi.org/10.3389/fmars.2018.00211.

Satterthwaite et al. 2021. Establishing the Foundation for the Global Observing System for Marine Life. *Front. Mar. Sci. 8.* <https://doi.org/10.3389/fmars.2021.737416>

**Guides, best practices and methods**

**Standards and reference materials**

**Integrated EOV products and visualisations**

# Contributors

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# Acronyms and Abbreviations

**CBD:** Convention on Biological Diversity

**EBV:** Essential Biodiversity Variables

**ECV:** Essential Climate Variables

**EOV:** Essential Ocean Variables

**GCOS:** Global Climate Observing System

**GEO BON:** Group on Earth Observations Biodiversity Observation Network

**GOOS:** Global Ocean Observing System

**IOCCP:** International Ocean Carbon Coordination Project

**MBON:** Marine Biodiversity Observation Network

**OBIS:** Ocean Biodiversity Information System

**ODIS:** Ocean Data Information System

**OCG:** Observation Coordination Group

**OOPC**:Ocean Observations Physics and Climate Panel

**SDG**: Sustainable Development Goals

**ABCD:** Lorem Ipsum Dolor Sit

**EFG:** Lorem ipsum dolor sit amet consecteteur

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# Glossary of terms

| **Derived products:** outputs calculated from the EOV and sub-variables, often in combination with the supporting variables, that contribute to evaluating change in phenomena. For example, evaporation can be determined from sea surface temperature measurements; air-sea fluxes of CO2 can be derived from inorganic carbon EOV; fish stock productivity can be determined from fish abundance.  **Indicators:** An indicator can be defined as a ‘measure based on verifiable data that conveys information about more than just itself’. This means that indicators are purpose dependent - the interpretation or meaning given to the data depends on the purpose or issue of concern. (BIP definition)  **Measurement Uncertainty:** the parameter, associated with the result of a measurement, that characterises the dispersion of the values that could reasonably be attributed to the measurand (GUM)[1](https://wmoomm-my.sharepoint.com/personal/bmartinmiguez_wmo_int/Documents/WORK/GCOS/GCOS%20TT/ECVs%20Rationalization/Definitions%20and%20Adoption%20Process/ECVs%20Adoption%20process_2024_clean.docx#_bookmark3). It includes all contributions to the uncertainty, expressed in units of 2 standard deviations, unless stated otherwise  **Phenomena:** properties (e.g., of a species such as distribution), processes (e.g., of the ocean such as surface ocean heat flux), or events (e.g., such as algal blooms) that have distinct spatial and temporal scales, and when observed, inform evaluations of ocean state and ocean change  **Stability**: The change in bias over time. Stability is quoted per decade.  **Supporting variables**: other measurements that are useful to provide scale or context to the sub-variables of the EOV (e.g., pressure measurements to provide information on the depth at which subsurface currents are estimated, sea temperature to understand dissolved inorganic carbon, water turbidity to support estimations of hard coral cover ).  **Sub-variables**: key measurements that are used to estimate the EOV (e.g., counts of individuals to provide an estimate of species abundance (such as fish, mammals, seabirds or turtles), partial pressure of carbon dioxide (pCO2)to estimate ocean inorganic carbon, or wave height to estimate sea state).  **Timeliness:** The time expectation for availability of data measured from the data acquisition time. |  | **Lorem Ipsum:** Lorem ipsum dolor sit amet consecteteur  **Lorem Ipsum:** Lorem ipsum dolor sit amet consecteteur  **Lorem Ipsum:** Lorem ipsum dolor sit amet, consectetur adipiscing elit. In fringilla bibendum risus sit amet molestie. Quisque rhoncus blandit orci. Nullam viverra erat at euismod venenatis. Quisque porta sodales lectus.**Lorem Ipsum:** Lorem ipsum dolor sit amet consecteteur  **Lorem Ipsum:** Lorem ipsum dolor sit amet, consectetur adipiscing elit. In fringilla bibendum risus sit amet molestie. Quisque rhoncus blandit orci. Nullam viverra erat at euismod venenatis. Quisque porta sodales lectus.  **Lorem Ipsum:** Lorem ipsum dolor sit amet consecteteur  **Lorem Ipsum:** Lorem ipsum dolor sit amet, consectetur adipiscing elit. In fringilla bibendum risus sit amet molestie. Quisque rhoncus blandit orci. Nullam viverra erat at euismod venenatis. Quisque porta sodales lectus. |
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**Appendix -** Additional information

| **A1. Applications This table provides examples of applications of this EOV, including, contribution to other essential variable frameworks, multilateral environmental agreements, contribution to indicators and GOOS applications** | | |
| --- | --- | --- |
| **EOV** | |  |
| **CORRESPONDING ESSENTIAL VARIABLES** | ECV |  |
| EBV |  |
| **GLOBAL INDICATORS EOV CAN CONTRIBUTE** | **SDG** |  |
| **CBD** |  |
| **CLIMATE** |  |
| **OTHER** |  |
| **GOOS APPLICATIONS** | |  |



| Essential Ocean Variable Specification Sheet Sponsored by:  A star in the sky  Description automatically generated with low confidence Logo, company name  Description automatically generated Logo  Description automatically generated with low confidence Shape  Description automatically generated with low confidence |
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