The Global Ocean Observing System

OCG Task Team on Observational Network Metrics (TT-Metrics) Report

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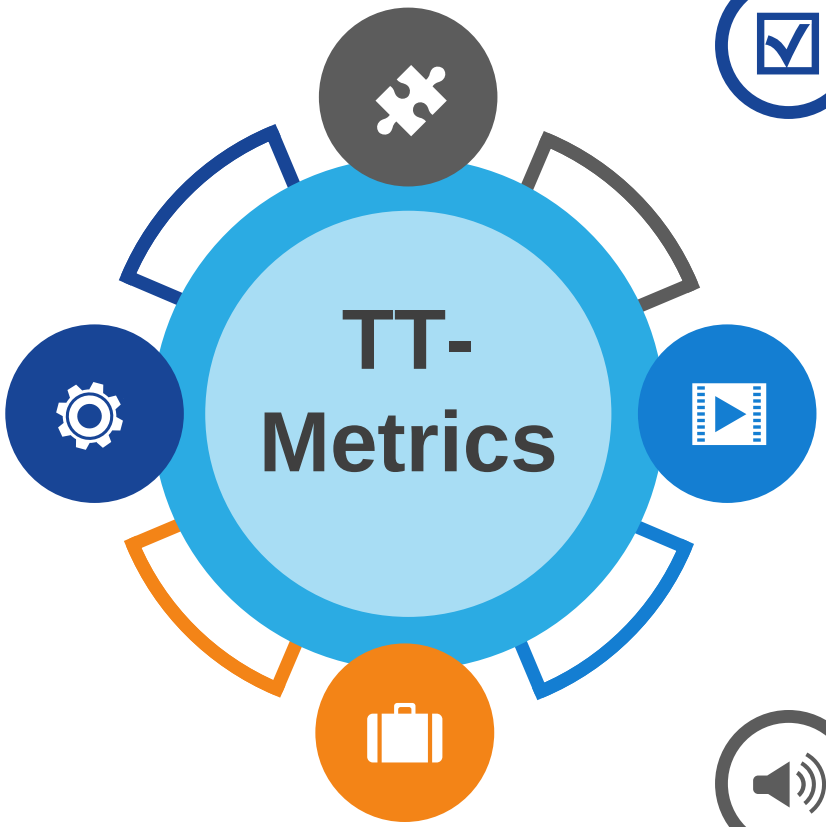
The Fifteenth Session of Observations Coordination Group [OCG-15]
Victoria, BC, Canada, 13-17 May 2024

Establishment and timeline

Timeline

October 2023	First meeting
November 2023	Make workplan
December 2023	Data/Metadata
January 2024	Governance
February 2024	Best Practices and Capacity Building
March 2024	Implementation/ Sustainability
April 2024	Report/Metrics Production and Review
May 2024	Overall Review - Final Delivery



Established upon the decision of OCG-14

Action agreed at OCG-14: OCG-14 Summary Report · Page 14.

Terms of Reference

https://docs.google.com/document/d/1p8UTKjfyzNIDS6vRFnu80-WnNxAYUtX_n7BROLQrl54/edit

Co-Chairs

Johannes Karstensen, Chair of OceanSITES
Mathieu Belbeoch, Head of OceanOPS

First meeting convened on 3 Oct. 2023

OCG Chair attended, highlighted the importance of the task. *Running agenda and notes*.

Existing documents as the basis

OCG Network Attributes

Global coverage, EOVs and ECVs, standards and BP, CB, ES, …

GOOS Report No. 266
https://oceanexpert.org/document/24002

Framework for Ocean Observing

Maturity of system/ networks/ elements, page 8, 10 and 11,

(http://www.ioccp.org/images/D2backgroundDoc/Framework%20for%20Ocean%20Observing.pdf)

Report Cards

Data and Metadata Implementation status

- Report Card 2023, link: https://www.ocean-ops.org/reportcard/
- Report Card- Network Status

OCG Cross-Network Data Implementation Strategy

Data and metadata Best practice

GOOS Report No. 296
https://goosocean.org/document/33970

Concepts of new, incremental stages

Concept of new, engagement to GOOS

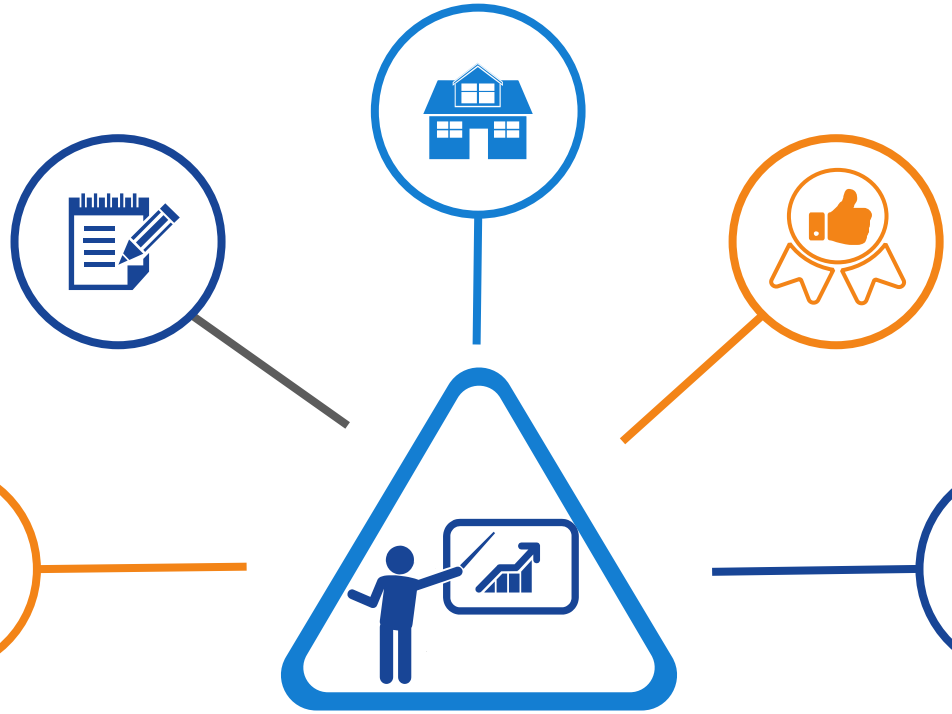
…

Metrics development

The TT-Metrics has now discussed 8 areas out of the foreseen 10 areas highlighted in the OCG Network Attributes, plus others that came from the OCG-14 discussion, namely sustainability.

Governance and Organization

Governance structures
Succession planning and inclusivity
Transparency
Easy to answer, YES or NO.



Data and Metadata

Clarification needed on terminology discrepancies
Central role of OceanOPS
Simple is the key

Best Practices

1) Governance ToR
2) Data (variable/instrument) quality control (QC)
3) Field operations

SIMPLE & STRAIGHTFORWARD

Scoring the level of maturity

Based on existing Report Card Rating?
YES or NO?
Percentage?
Descriptive + quantitative

Definition of Sustainability

Complexity of funding of network and its assessment
RRR
International cooperation and sustainability

Mature	Level 9 Sustained
	Level 8 Mission qualified
	Level 7 Fitness for purpose
Pilot	Level 6 Operational
	Level 5 Verification
	Level 4 Trial
Concept	Level 3 Proof of concept
	Level 2 Documentation
	Level 1 Idea

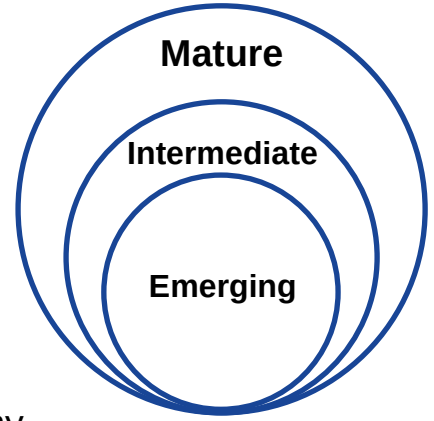
9 Readiness Levels in FOO

Global in scale
Observes one or more EOVs or ECVs
Observations are sustained
Community of Practice
Maintains network mission and targets.
Delivers data that are free, open, and available in a timely manner
Ensures metadata quality and delivery
Develops and follows Standards and Best Practices
Undertakes capacity development and technology transfer
Environmental stewardship awareness

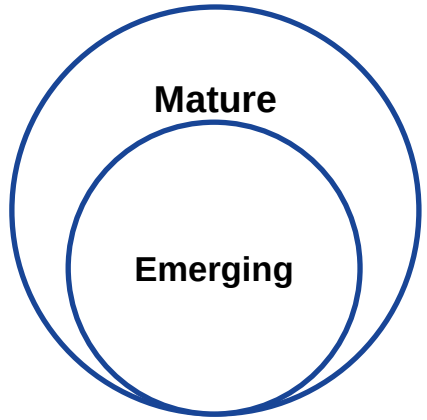
10 OCG Attributes

Governance
Sustainability
Best Practice
Data & Metadata
Capacity Building

How many levels do we want?



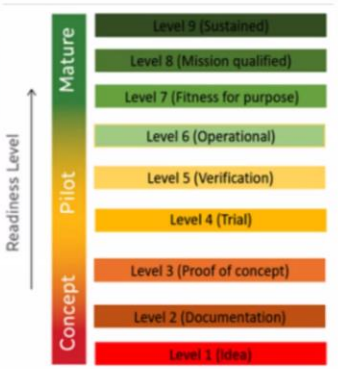
OR



What the FOO!

- TRL levels in the FOO accepted baseline for maturity indicies in ocean observing community:
  - **Increasing network maturity (EuroSeaWP3 Johannes)**
  - **EOV Sensor Development (NOC)**
  - **Observing system maturity for user areas (EuroSea WP1)**
  - **EOV and BioEco Networks (BioEcoOcean)**
- TRL levels not unique to FOO

Phenomenon	Requirements Processes (Input)	Coordination of Observational Elements (Process)	Data Management & Information Products (Output)
Biodiversity & NIS	6	4	3
Food Webs	6	4	4
Eutrophication	6	6	5
Ocean Warming	7	5	4
Ocean Acidification	6	5	4
Ocean Carbon Storage	6	5	5
Ocean Deoxygenation	5	4	2
Non-Carbon GHGs	4	2	2
Contaminants	4	3	3
Plastic pollution	4	3	1
SLR	7	7	7
Sea ice	4	4	4
River inputs	5	4	3
Oil leakage	1	2	1
Sea floor integrity/Bathymetry	5	5	4



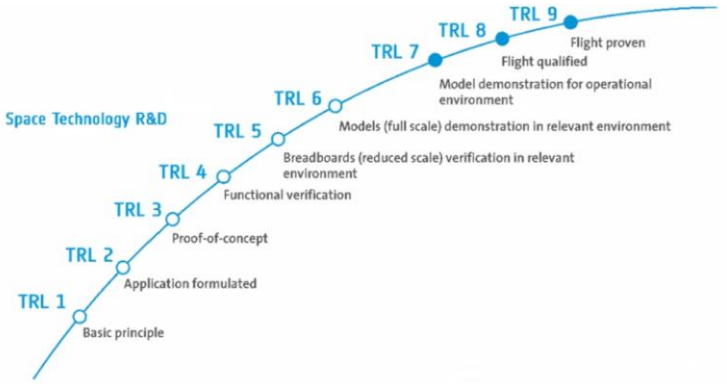
Company /institute	Sensor or instrument name	Application/target /technology	TRL1	TRL2	TRL3	TRL4	TRL5	TRL6	TRL7	TRL8	TRL9	Operational demo	Commercial release
National Oceanography Centre	Chemical Sensors: Hydrocarbons	hydrocarbon	met	met	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17		
National Oceanography Centre	Chemical Sensors: Aptamer sensors	multiple parameters	met	met	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17		
National Oceanography Centre	Biology Sensors: Cytometer	multiple parameters	met	met	Jan-17	Jul-17							
National Oceanography Centre	Physical Sensors: T,C	temperature, conductivity	met	met	met	met	met	met	met	Oct-16	Jun-17		
NKE	SST & SSS sensor*	temperature, salinity											
NORTEK	Signature55 *	acoustic Doppler current profilers	met	met	met	met	met	met	met	met	met	complete	available
NORTEK	Signature250*	acoustic Doppler current profilers	met	met	met	met	met	met	met	met	met	complete	available
NORTEK	Signature500*	acoustic Doppler current profilers	met	met	met	met	met	met	met	met	met	complete	available
NORTEK	Signature1000*	acoustic Doppler current profilers	met	met	met	met	met	met	met	met	met	complete	available
NORTEK	Nortek DVL*	acoustic Doppler instrument	met	met	met	met	met	met	met	met	met	complete	available
Ocean Sonics	icListen Smart Hydrophone*	hydrophone	met	met	met	met	met	met	met	met	met	complete	available
Ocean Sonics	icListen RB9-ETH*	hydrophone	met	met	met	met	met	met	met	met	met	complete	available
Ocean Sonics	Digitial hydrohone array	hydrophone	met	met	met	met	met	met	met	met	met	complete	available
Ocean Sonics	icListen - generation four*	hydrophone	met	met	met								Dec-16
Plocan	A1- Low power multifunctional hydrophone	hydrophone	met	met	met	Jun-16	Oct-16	Nov-16				Jun-17	
Plocan	A2- Real time waveform streaming and preprocessing hydrophone array	hydrophone	met	met	met	Jun-16	Oct-16	Nov-16				Jun-17	

TRLs for EOV sensor development

ng and forecasting 18 ocean phenomena
ery level (1 to 9).

eslop, Emma (2023) *Report on gaps in the European*
, 185 pp. DOI 10.3289/eurosea_d1.9.

Pike, Amy (2016) *Sensors and Instrumentation Roadmap*. AtlantOS Deliverable, D6.1 . AtlantOS, 24 pp. DOI 10.3289/AtlantOS_D6.1.



https://www.esa.int/var/esa/storage/images/esa_multimedia/images/2020/06/technology_readiness_levels_scale/22079020-1-eng-GB/Technology_Readiness_Levels_Scale_article.png

3.1.7. Summary Table

OBSERVING NETWORKS	Argo	Gliders	Vessels	Eulerian	Sea Level	HF-Radar	ASV
Website	yes	yes	yes	yes	yes	yes	no
No. of institutions involved	20	21	9	>25	16	24	4
Terms of reference	yes	yes	yes	yes	yes	yes	no
Governance Structure	yes	yes	yes	yes	yes	yes	no
Representation of EU efforts	High	Medium-High	Medium	High	Medium-High	Medium-High	Low-Medium
Links to Global Observing efforts	Strong	Strong	Medium	Strong	Strong	Strong	Medium
Sensor/Instrument/Hardware Best Practices	yes	no	yes	yes	yes	yes	yes
Data Quality assurance (QA)	yes	yes	yes	yes	yes	yes	no
Data Quality Control (QC)	yes	yes	yes	yes	yes	yes	no
International standards	yes	yes	no	yes	yes	yes	yes
Exchange of metadata and data with data aggregators							
SeaDataNet	yes	???	no	yes	no	yes	no
CMEMS	yes	yes	yes	yes	???	yes	no
Emodnet	yes	???	yes	yes	???	yes	yes
Metadata fed to EU or Intl data base	yes	yes	???	yes	yes	yes	???
Best Practices available at IODE/UNESCO	yes	no	no	yes	yes	no	no
Key Performance Indicators defined	yes	no	no	no	no	no	no
Data to GTS	yes	no	no	partly	partly	no	no
Data Policy	Open	Open	???	Open	Open	Open	???
Drivers for observational activities	Sci, Serv	Sci	R&D	Sci, Serv	Sci, Serv	Sci, Serv	Sci, Serv
Drivers for observational plans	Sci, Serv	Sci, Mon	Sci, Mon	Sci, Serv	Sci, Mon	Sci, Serv	Sci, Serv, Tech
Dialogue/exchange with "thematic networks"	yes	no	yes	yes	no	no	no
Future plan process							
The network in 2030							
Challenges and Opportunities							
Objectives within EuroSea							
cross cutting actions with different observing networks							
workshops/meetings	M18, M24	2020 & 2021	Nov-20	M12, M36	2021 & 2022	M9, M36	Fall20 & Fall22
common issues with other observing networks							

Karstensen, Johannes , Petihakis, George and Fernandez, Vicente (2020) *Observing Networks initial Assessment.* . EuroSea Deliverable, D3.2 . EuroSea, 29 pp. DOI 10.3289/eurosea_d3.2.

ORL Index for Ocean Data

The need for a consolidated approach

The value of an Ocean Forecasting platform is heavily dependent on the data that is available to it.

Difficulty in finding or accessing data, or latency issues with the receipt of data will affect the ability of the system to provide timely forecasts, and it will impact the user experience of the person interacting with the platform.

Achieving ease of access to the necessary data, and ensuring a low latency, requires that the data, from the time of measurement through to the time of ingest to the platform be FAIR (Findable, Accessible, Interoperable, and Reusable) and that it be adequately described by metadata that is fit for purpose.

A universally endorsed Operational Readiness Level (ORL) index for Ocean data is needed to guide adoption of (metadata) standards that identify the readiness of data for ingestion forecasting systems

- Identify gaps that should be addressed to further mature the data management of an observing network.
- Improving implementation best practices and standards
- Enhance the overall value of the observing network.

Metrics vs. Maturity

- Original idea – more towards some more mature metrics for the networks
  - Beyond the Report Card
  - Link to FOO, link Attributes
- 2 flaws with this approach –1) to fast, OCG does not have a clear definition of what makes a mature network, 2) target/audience not clear
- Recommend:
  - **Networks maturity levels defined first**
  - **Use the FOO – pilot and mature, TRL levels**
  - **OCG adjust/evolve FOO - better match attributes & networks today**

Mature	Level 9 Sustained
	Level 8 Mission qualified
	Level 7 Fitness for purpose
Pilot	Level 6 Operational
	Level 5 Verification
	Level 4 Trial
Concept	Level 3 Proof of concept
	Level 2 Documentation
	Level 1 Idea

Questions to OCG

Easy to track

Simple

RRR

Collaboration

Core indicators

Transparency

Rating

OceanOPS

Intended use

What are the intended uses of these metrics?

- Mapping of all global ocean observing systems and their maturity levels (sponsors, stakeholders)
- Strict rules to guide development, recognition, branding, inclusion in GOOS? (networks, GOOS)
- GOOS reporting and comms structured around these tiers of maturity? (networks, GOOS)

Complexity and preferred pathway

How many tiers/levels do we want?

For each tier/level, how many element/category to tack?

How strict will this process be? why?

Need input from the networks

In what ways does the OCG envision engaging with network leaders/operators and stakeholders to gather input and feedback on the proposed metrics?

How to refine and validate the metrics to ensure their relevance and effectiveness in addressing the needs of the ocean observing community?

The Global Ocean Observing System

Thank you

goosocean.org

unesco
Intergovernmental Oceanographic Commission

WORLD METEOROLOGICAL ORGANIZATION

UN environment programme

International Science Council