

# Powering the European Marine Data Ecosystem

For a digital and green future

EMODnet OPEN CONFERENCE 2023



## Townhall: EMODnet Best Practices and Interoperability

Co-Chairs: **Marie-Francoise Voidrot**  
(OGC) and **Conor Delaney** (EMODnet)



# Townhall: EMODnet, Ocean Best Practices and Interoperability



## Townhall introduction

- **Objectives:**

The primary objective of the Townhall is to **gather valuable stakeholder feedback and recommendations** regarding the **future evolution of EMODnet** content and services for the period up to 2030 and beyond.

This Townhall will foster a discussion on **data and metadata standardisation, harmonisation, flows and digital services best practices**. The session will gather **community recommendations on existing and emerging EMODnet best practices and how EMODnet can increase engagement with other regions worldwide to increase data interoperability for a Global Ocean Data Ecosystem**.

- **Reporting to Plenary:**

The insights and key messages obtained from the Townhall will be collated and presented to the Plenary on November 30th.

# Townhall: EMODnet, Ocean Best Practices and Interoperability



## Agenda

**16:45-16:50 Townhall Introduction (5')**

• **16:50-17:20 (20')**: Presentations (4' each) on best practices on data products publishing and data services, and how to improve interoperability. Q&A (1-2 questions after each presentation), if needed for clarification purposes.

- **Conor Delaney**, EMODnet – technologies overview
  - **Marie-Francoise Voidrot**, OGC, OGC standards
  - **Frederic Leclercq**, VLIZ, EMODnet CP - OpenDAP
  - **Virgine Van Dongen-Vogels**, EuroGOOS, OBPS and EMODnet
  - **Pier Luigi Buttigieg**, AWI, semantics and publishing, OIH
- **17:20-17:55 (35')**: Open discussion in plenary
- **18:00: Closing of the Townhall**

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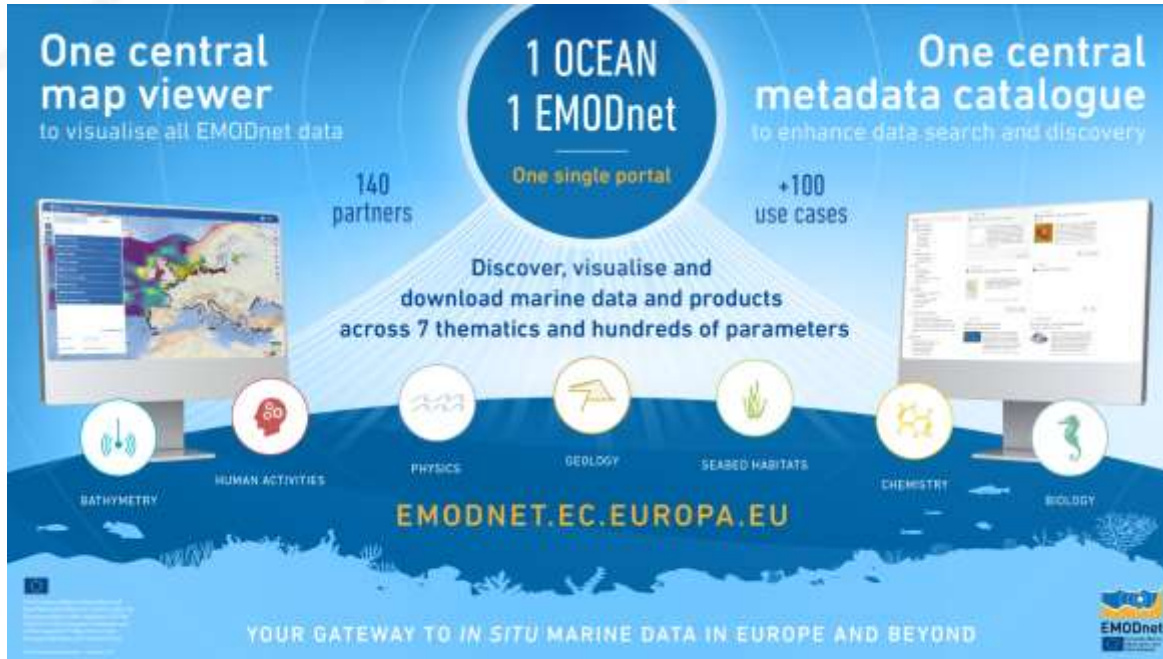


## EMODnet, Ocean Best Practices and interoperability: An overview

Conor Delaney, EMODnet

# EMODnet centralised 7 distinct portals into 1

## EMODnet is a federated Spatial Data Infrastructure



Built on standards and best practices

Efficient use of time - Don't reinvent the wheel

Collaborative opportunities

Improved systems interoperability

Data comparability

Greater trust in data

Streamlined regulatory approval

Higher funding success



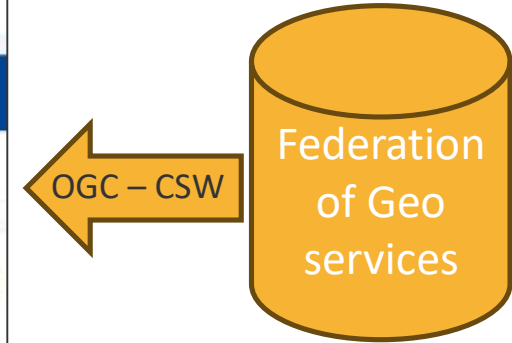
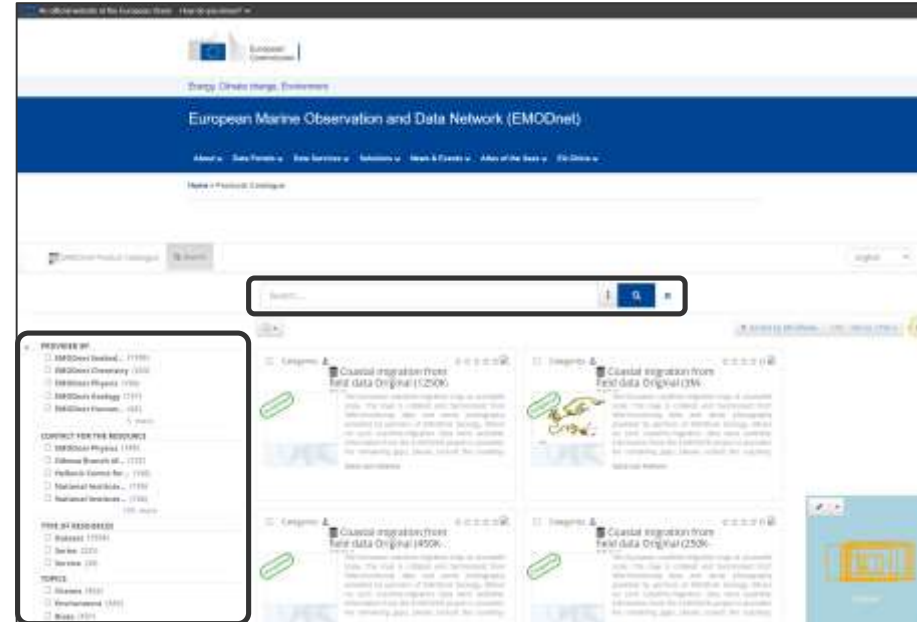
*Ocean Best Practices* of the International Oceanographic  
Data and Information Exchange (IODE)  
Virginie van Dongen-Vogels

# EMODnet centralised 7 catalogues portals into 1

## EMODnet GeoNet catalogue depends on OGC Catalogue Services for the Web (CSW)



Map Viewer –  
JavaScript application

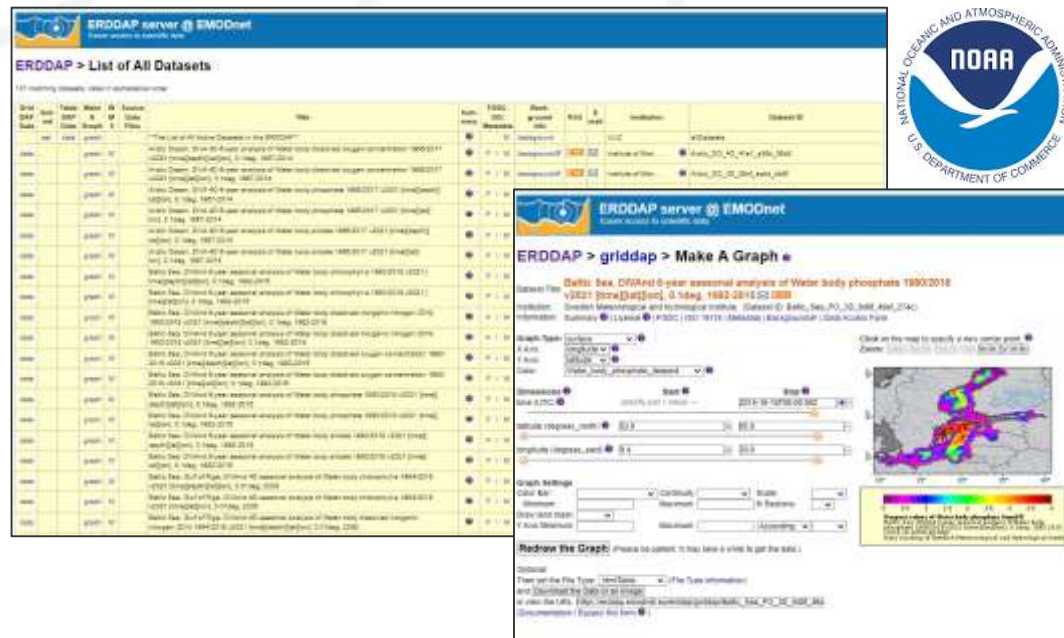


Marie-Francois Voidrot from the *Open Geospatial Consortium*



# EMODnet follows best practises

## Leverages Open-source Project for a Network Data Access Protocol



The image shows two screenshots of the ERDDAP server interface. The top screenshot displays a table titled 'ERDDAP > List of All Datasets' with columns for ID, Name, Date, and other metadata. The bottom screenshot shows the 'ERDDAP > griddap > Make A Graph' tool, which includes a map of the North Atlantic and various configuration options for data visualization.



Frederic Leclercq from Flanders Marine Institute (VLIZ) to explain the benefits of using OPeNDAP?



Pier Luigi Buttigieg from Ocean Info Hub of IODE



British Oceanographic Data Centre (BODC) Controlled Vocabulary

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**EMODnet, Ocean Best Practices and interoperability:  
The Open Geospatial Consortium**

**Marie-Francoise Voidrot, OGC**



# Townhall “EMODnet, Ocean Best Practices and interoperability”

Co Chair: Marie-Francoise Voidrot, OGC, Europe Director with the OGC Innovation Program



- Focus on initiatives related to Earth Observations and strongly involved in several initiatives of importance to GEO, the Group on Earth Observations, including the European projects ILIAD, E-SHAPE, and NextGEOSS. OGC representative to the GEO Program Board and Co-Chair of the GEOSS Infrastructure Development Task Team (GIDTT) and of the GEO Data Sharing and Data Management Working Group.
- Prior to joining OGC, Senior Project Manager at Meteo-France for numerous meteorological operational information systems for use by Meteo-France and by major customers in spatial, defense and aeronautical activities developing a global end-to-end view of information systems, from production to a large variety of community application activities.



# The Open Geospatial Consortium - OGC

Speaker: Marie-Francoise Voidrot, OGC, Europe Director with the OGC Innovation Program



## What is OGC?

A hub for thought leadership, innovation, and standards for all things related to location

### Our Vision

Building the future of location with community and technology for the good of society

### Our Mission

Make location information Findable, Accessible, Interoperable, and Reusable (FAIR)

### Our Approach

A proven collaborative and agile process combining consensus-based standards, innovation project, and partnership building

Copyright © 2023 Open Geospatial Consortium



ogc.org

# Location information and the Standardization bodies landscape

- The Open Geospatial Consortium (OGC) is a not-for-profit international consensus organization comprised of over 550 industry, government, academic, research, and not-for-profit organizations. OGC standards and best practices enable seamless discovery, sharing, integration, and application information in a **location context** across networks, systems, enterprises, organizations, and jurisdictions.
- OGC cooperates with ISO, in particular via ISO/TC211, but also with IEEE, IHO, WMO, UNGGIM, JRC/INSPIRE, W3C....as needed



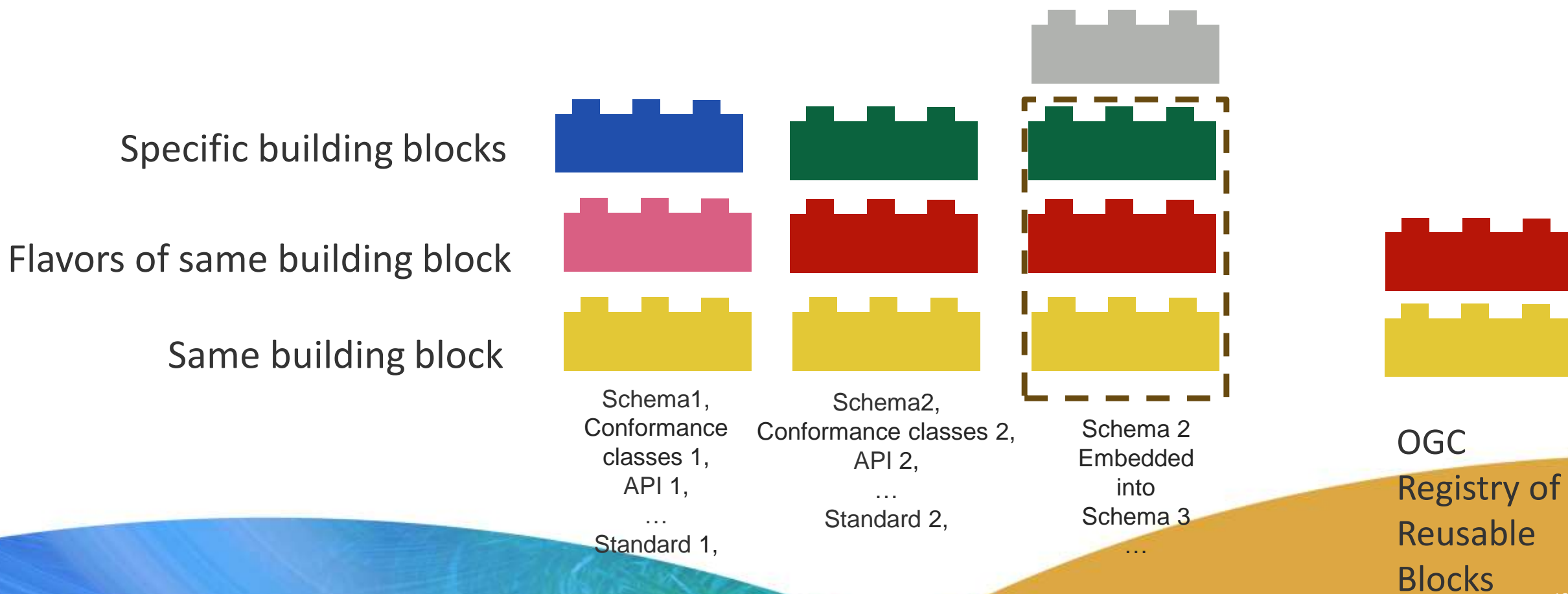
IEEE



ogc.org

# Ongoing major evolution

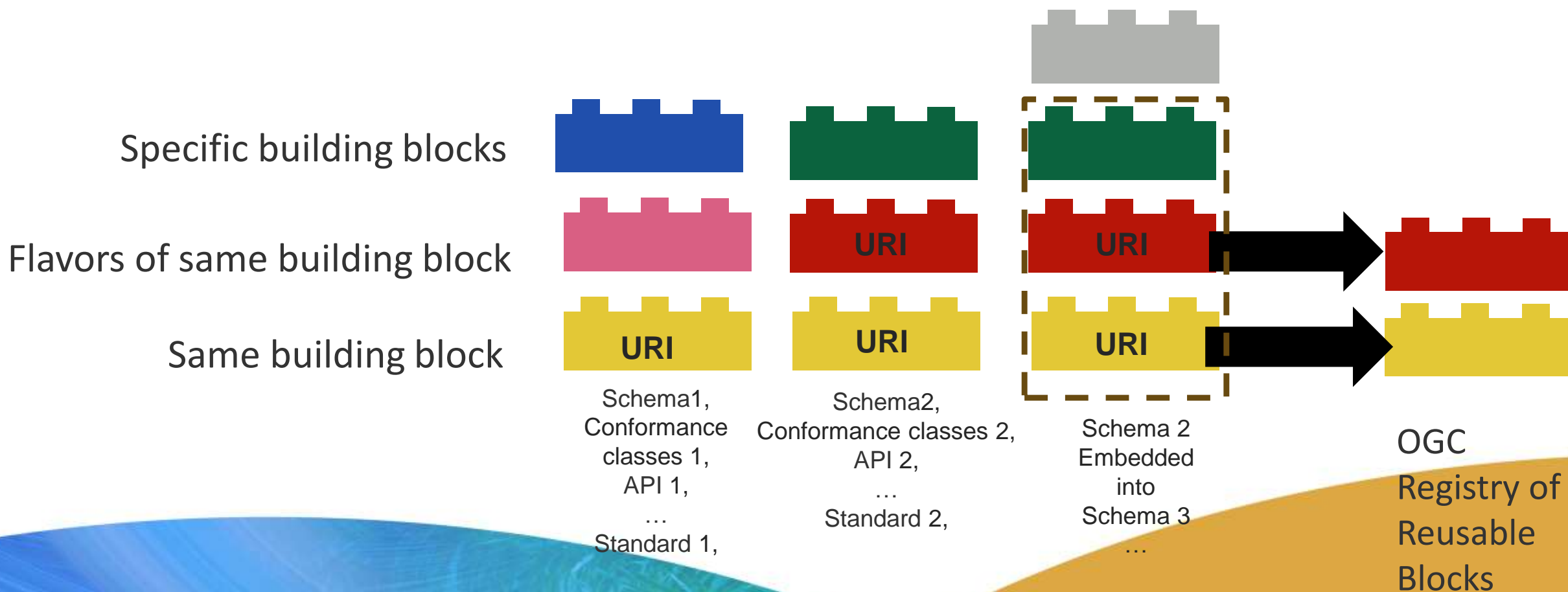
## From Web Services Standards to APIs relying on modular Building Blocks



# Ongoing major evolution

## From Web Services Standards to APIs relying on modular Building Blocks

### Transparency of interoperability by referencing



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## EMODnet Centralization and OpenDAP

Frederic Leclerq, VLIZ

# EMODnet Centralization

## EMODnet | Technical Architecture - OPeNDAP

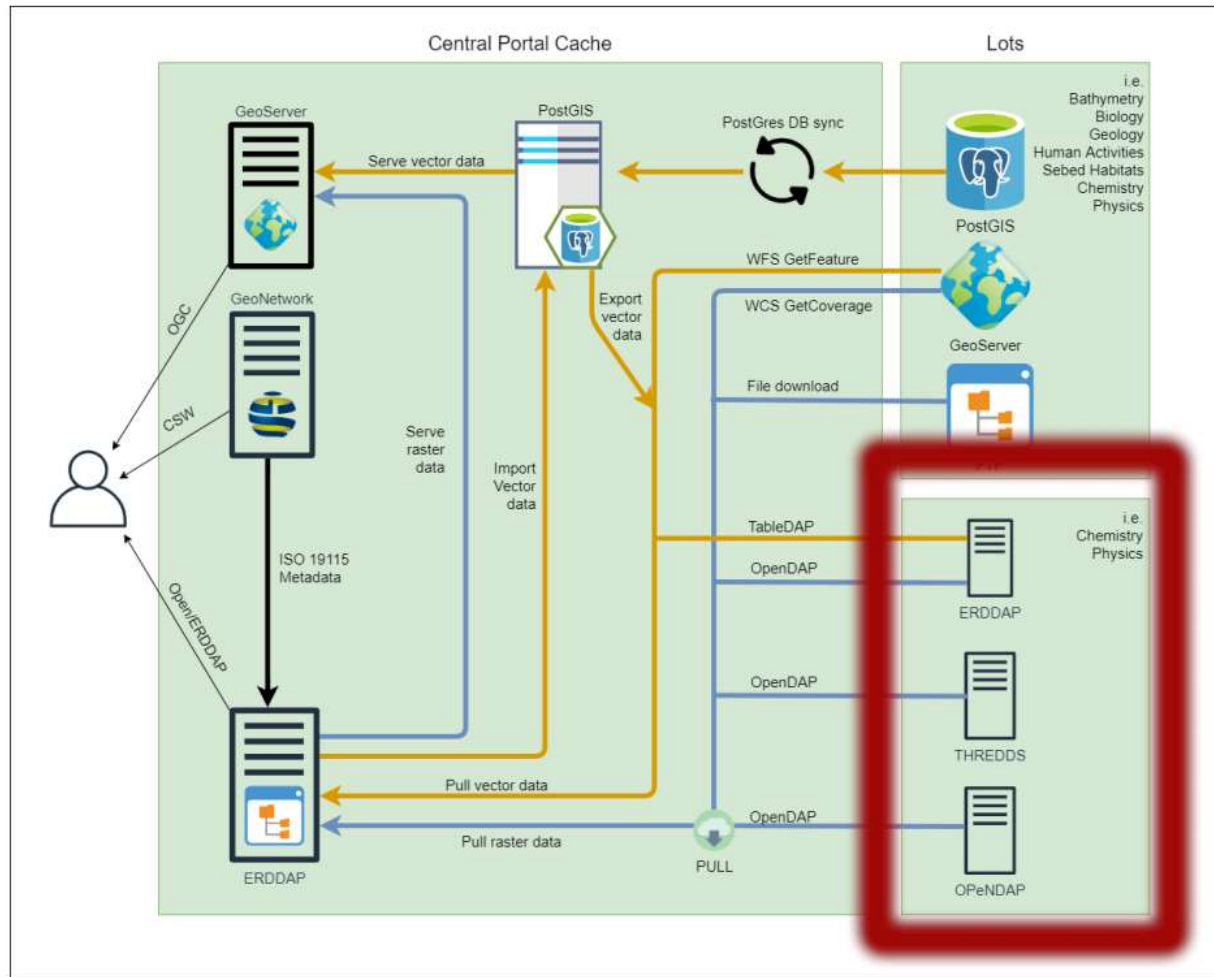


Figure 1: proposed architecture for EMODnet Central Portal

Open-source Project for  
a Network Data Access Protocol

- Facilitates efficient and flexible data access over the internet

## Interoperability

- o Enables interoperability among various data formats (NetCDF, GeoTIFF, ...)
- o Seamlessly integrates with different scientific data systems (caching)
- o Scalability (large files/datasets)

## Efficient data transfer:

- o Optimizes data transfer for large datasets
- o Reduces bandwidth usage through smart data access mechanisms
- o Sub-setting of large data files.



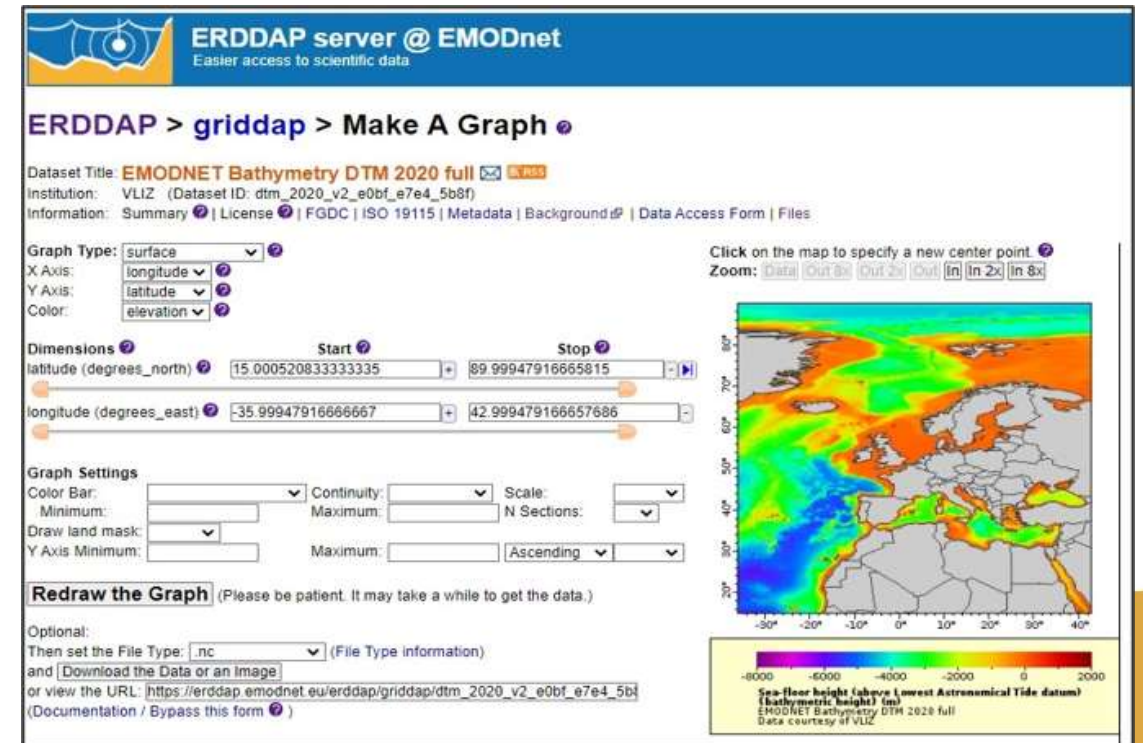
### Multi-dimensional data support:

- o Handles multi-dimensional data support effortlessly
- o Ideal for scientific datasets with complex structures
- o Generates a searchable meta-data catalogue

### Adaptable to diverse platforms:

- o Works across different operating systems
- o Support various programming languages, enhancing accessibility (REST API)
- o Does on demand conversion of data from original file formats in the user requested file format


- NASA, NOAA, Copernicus, ..
- Multiple implementations: ERDDAP, THREDDS, Hyrax (RDF description => semantic web)
- Multiple OPeNDAP clients: Python/R -
  - MATLAB, Panoply, Ferret ...
- Metadata in json/XML



The screenshot displays the ERDDAP server interface for the dataset "EMODNET Bathymetry DTM 2020 full". The interface includes a header with the EMODnet logo and the text "ERDDAP server @ EMODnet Easier access to scientific data". Below the header, the dataset title and institution (VLIZ) are shown. The main section is titled "ERDDAP > griddap > Make A Graph". It features several interactive elements: a "Graph Type" dropdown set to "surface", X and Y axis dropdowns set to "longitude" and "latitude" respectively, and a "Color" dropdown set to "elevation". The "Dimensions" section shows latitude ranging from 15.000520833333335 to 89.99947916665815 and longitude from -35.99947916666667 to 42.999479166657686. The "Graph Settings" section includes options for "Color Bar", "Continuity", "Scale", "Minimum", "Maximum", "N Sections", "Draw land mask", and "Y Axis Minimum". A "Redraw the Graph" button is present, along with an "Optional" section for setting the file type to ".nc" and a URL to download the data. On the right side, there is a map of the Mediterranean region with a color scale for bathymetry ranging from -8000 to 2000 meters. The map is titled "Sea-floor height (above Lowest Astronomical Tide datum) (Bathymetric height) (m)" and "EMODNET Bathymetry DTM 2020 full".

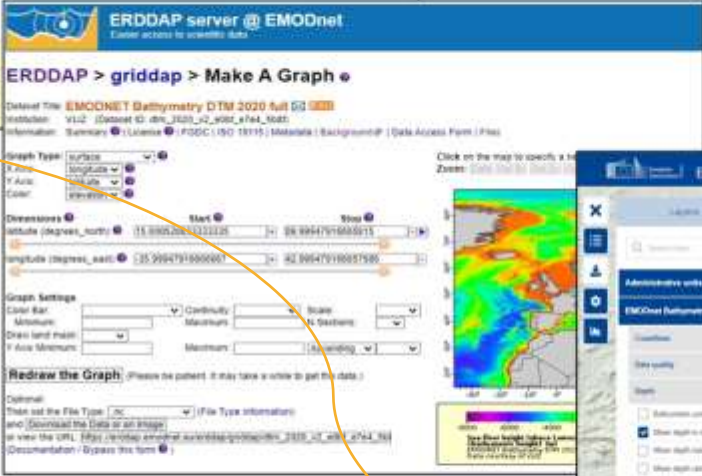
# EMODnet Centralization

OPeNDAP | Provided features which we could call from Map Viewer



ERDDAP > Search  
Do a Full Text Search for Datasets:

Year	Year	Year	Year	Year	Year
2019	2019	2019	2019	2019	2019
2019	2019	2019	2019	2019	2019
2019	2019	2019	2019	2019	2019
2019	2019	2019	2019	2019	2019



ERDDAP > griddap > Make A Graph

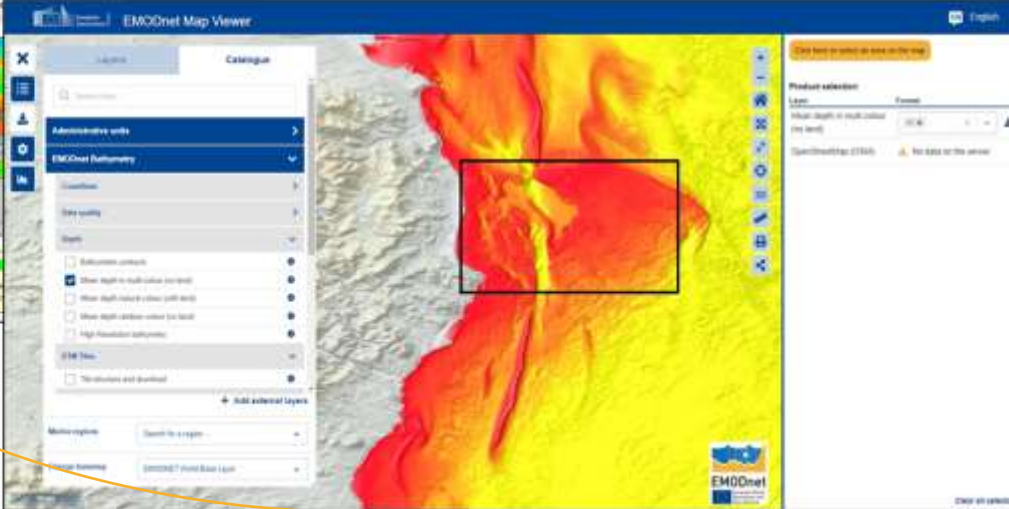
Default Title: EMODNET Bathymetry DTED 2020 full DG

Dimensions: latitude (degrees\_north) [15.000000000000000] to [42.866470100000000] longitude (degrees\_east) [35.200000000000000] to [42.866470100000000]

Graph Settings: Color Bar: Maximum Minimum: No Systems: Draw land mask: Maximum: Minimum: Auto: Y Axis Minimum: Maximum: Auto

Redraw the Graph (Please be patient, it may take a while to get the data.)

Optional: Then set the File Type [OC] (File Type information) and [Download the data as an image] or view the OPeNDAP description [www.ropensci.org/doi/10.21955/2021.2305\\_01\\_0001\\_0741\\_01](#) Documentation / Bypass this form



EMODnet Map Viewer

Administrative units: EMODnet Bathymetry

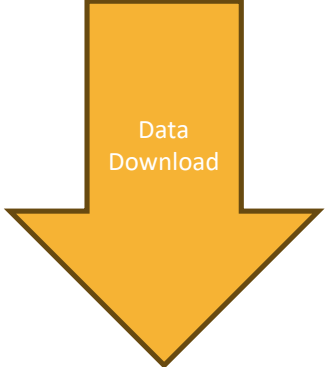
Layer selection: Bathymetry

Product selection: Bathymetry

Map: Bathymetry

Download: Download

EMODnet logo



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**EMODnet, Ocean Best  
Practices and  
interoperability:  
OBPS**

**Virginie VanDongen, EuroGOOS  
and OBPS**

# What is the Ocean Best Practices System (OBPS)?

[Link with EMODnet](#)

An International IOC project, co-sponsored by IODE and GOOS

Our Vision: *To have agreed and broadly adopted methods across ocean research, operations and applications.*

[www.oceanbestpractices.org](http://www.oceanbestpractices.org)

## Four Core Capacities

- Repository
- Journal
- Training
- User Support

## Extended Capacities

- Task teams
- Early Career Ocean Practitioner (ECOP) Ambassadors
- International annual workshop
- OceanPractices – a UN Decade of Ocean Sciences for SD Program



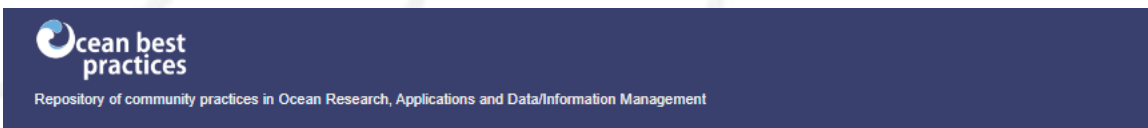
The screenshot shows the website's navigation menu: About, Repository, Journal, Training, Community Engagement, Publications, Projects, Ocean Practices for the Decade, News, Events, Contact/Feedback. The main content area features a banner for 'OBPS Workshop VII more info' and four columns of information:

- Our Vision:** To have agreed and broadly adopted methods across ocean research, operations and applications.
- What is a Best Practice?** A best practice is a methodology that has repeatedly produced superior results relative to other methodologies with the same objective; to be fully elevated to a best practice, a promising method will have been adopted and employed by multiple organizations.
- What is the OBPS?** The OBPS is a global, sustained system comprising technological solutions and community approaches to enhance management of methods as well as support the development of ocean best practices.
- Best Practices in the Repository:** 2039. Includes links for 'Search for a Best Practice', 'Submit a Best Practice', and 'Metrics'.

# The OBPS repository and submission process?

Link with EMODnet

<https://repository.oceanbestpractices.org/>



Repository OceanBestPractices

**OceanBestPractices (OBP)** is a secure, permanent document (and other objects) repository. It aims to provide a discovery point for research groups to search and find community accepted existing ocean best practices. This service also invites the ocean research, observation and data/information management communities to submit their own best practice documents to share globally with their colleagues. More...

**Please note** unless it has been accepted and annotated in OBPS as an Endorsed Practice by an Expert Panel, inclusion of a methodology in the OBPS, does not indicate that the methodology is recommended by OBPS.

## User Guides

- Guidelines for Depositors
- Guidelines for Editors
- Guidelines for Collection Administrators

## Best Practices Document Template Collection

## Communities in OceanBestPractices

Select a community to browse its collections.

- ⇒ CMEMS: Copernicus Marine Service [4]
- ⇒ DBCP: Data Buoy Cooperation Panel [8]
- ⇒ EAF-Nansen Programme [8]
- ⇒ EMB: European Marine Board [2]
- ⇒ EMBRC: European Marine Biological Resource Centre [7]
- ⇒ EMODnet: European Marine Observation and Data Network [11]



Repository OceanBestPractices / ⇒ EMODnet: European Marine Observation and Data Network

⇒ EMODnet: European Marine Observation and Data Network

BROWSE BY

By Issue Date Authors Titles Subjects

Search within this community and its collections:

 Go

The European Marine Observation and Data Network (EMODnet) consists of more than 150 organisations assembling marine data, products and metadata to make these fragmented resources more available to public and private users relying on quality-assured, standardised and harmonised marine data which are interoperable and free of restrictions on use.

[www.emodnet.eu/](http://www.emodnet.eu/)

## Sub-communities within this community

- ⇒ EMODnet Bathymetry [2]
- ⇒ EMODnet Biology [0]
- ⇒ EMODnet Chemistry [9]
- ⇒ EMODnet Physics [0]

11

## Recent Submissions



Improving data reliability to support marine pollution assessment according to MSFD Descriptor 8 in the European Seas: the contribution of EMODnet Chemistry, French, Megan Anne; Lipizer, Marina (2023)  
Introduction: According to the Marine Strategy Framework Directive (MSFD, 2008/56/EC), member states of the European Union (EU) had to develop a common approach in environmental monitoring and assessment. Regarding marine ...

Search

Search OceanBestPractices  
 This Community

What results are displayed?  
Perform Semantic Advanced Search.

BROWSE

All of OceanBestPractices

Communities & Collections

By Issue Date

Authors

Titles

Subjects

This Community

By Issue Date

Authors

Titles

Subjects

MY ACCOUNT

Login

Register

DISCOVER

Author

Lipizer, Marina (5)

Giorgetti, Alessandra (4)

# What is the Ocean Best Practices System (OBPS)?

Link with EMODnet



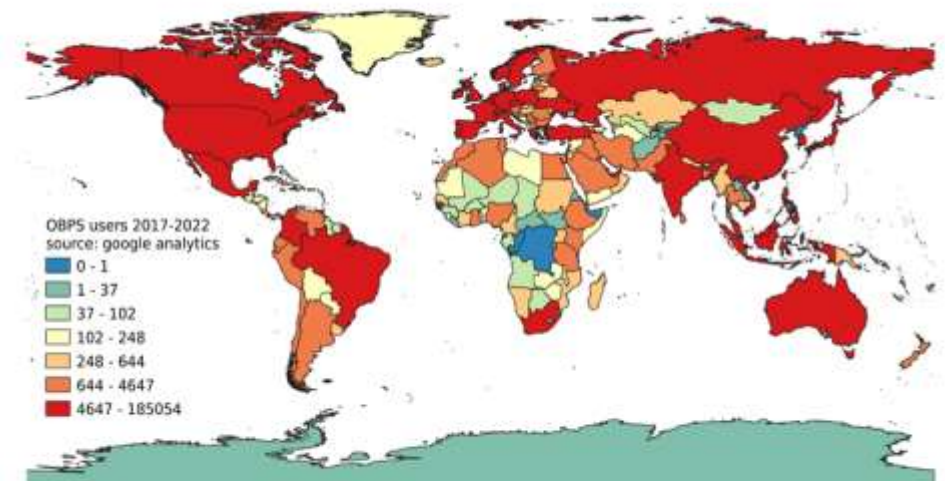
## Why use “Best Practices” ?



- ✓ Efficient use of time
- ✓ Collaborative opportunities
- ✓ Improved systems interoperability
- ✓ Data comparability and collectability
- ✓ Greater trust in data
- ✓ Streamlined regulatory approval
- ✓ Higher funding success

## What are the IMPACTS?


- Best Practices creation and use is now an expected component of most project proposals
- Active ocean best practice community
- Global spread of users
- Training and workflow to find or develop an ocean best practice
- GOOS/OBPS endorsement builds trust



# EMODnet-OBPS linking data to methods: building trust and interoperability

[https://data-erddap.emodnet-physics.eu/erddap/info/ERD\\_EP\\_TS\\_RVFL\\_NRT\\_METADATA/index.html](https://data-erddap.emodnet-physics.eu/erddap/info/ERD_EP_TS_RVFL_NRT_METADATA/index.html)

<http://dx.doi.org/10.25607/OBP-190>



**ERDDAP**  
Easier access to scientific data

**EMODnet**

ERDDAP > info > ERD\_EP\_TS\_RVFL\_NRT\_METADATA

Grid DAP Data	Sub-set	Table DAP Data	Make A Graph	W M S	Source Data Files	Title	Summary	FGDC, ISO, Metadata	Back-ground Info	RSS	E mail	Institution	Dataset ID
	set	data	graph		files	EMODnet Physics - Collection of river flow rate (RVFL) TimeSeries - MultiPointTimeSeriesObservation - METADATA		F I M	background			EMODnet Physics	ERD_EP_TS_RVFL_NRT_METADATA

**The Dataset's Variables and Attributes**

Row Type	Variable Name	Attribute Name	Data Type	Value
attribute	NC_GLOBAL	cdm_data_type	String	Other
attribute	NC_GLOBAL	Conventions	String	COARDS, CF-1.10, ACDD-1.3, NCCSV-1.2
variable	BEST_PRACTICES_DOI		String	
attribute	BEST_PRACTICES_DOI	long_name	String	BEST PRACTICES DOI
variable	DATA_DOI		String	
attribute	DATA_DOI	long_name	String	DATA DOI

Computational techniques for tidal datums handbook.



This handbook is intended to provide education and training for both internal and external audiences to NOAA. It presents the National Ocean Service (NOS) methodology for the computation of tidal datums and explains how to use the Center for Operational Oceanographic Products and Services (CO-OPS) water level data and bench mark information available on the internet for tidal datum computations. Fundamental background for tide measurement and data processing is also reviewed. Detailed descriptions of tidal datum procedures, the background mathematical formulas, and example spreadsheets are interwoven in the various sections. The handbook is designed to be both a technical reference and a guidance document for the practical determination of tidal datums using tide gauge measurements. It does not present methods for surveying, or address the problems associated with instrument installation, calibration.....

**Resource URL**  
 Publisher: <https://tidesandcurrents.noaa.gov/pub.html>  
 Dataset: [https://data-erddap.emodnet-physics.eu/erddap/tabledap/ERD\\_EP\\_TS\\_RVFL\\_NRT\\_METADATA.html](https://data-erddap.emodnet-physics.eu/erddap/tabledap/ERD_EP_TS_RVFL_NRT_METADATA.html)

**View/Open**  
 PDF (2.321Mb)

**Date**  
 2003

**Corporate Author**  
 NOAA NOS Center for Operational Oceanographic Products and Services

**Status**  
 Published

**Pages**  
 98pp. & Appendices

**Metadata**  
 Show full item record

**Publisher**  
 NOAA, NOS Center for Operational Oceanographic Products and Services  
 Silver Spring, MD

**Series/Nr**  
 NOAA Special Publication NOS CO-OPS;2

**Document Language**  
 en

**Essential Ocean Variables (EOV)**  
 Sea surface height

**Best Practice Type**  
 Best Practice  
 Guide

**Citation**  
 NOAA NOS Center for Operational Oceanographic Products and Services (2003) Computational techniques for tidal datums handbook. Silver Spring, MD, NOAA NOS Center for Operational Oceanographic Products and Services, 98pp & Appendices (NOAA Special Publication NOS CO-OPS 2). DOI: <http://dx.doi.org/10.25607/OBP-190>

**URI**  
<http://hdl.handle.net/11329/631>  
<http://dx.doi.org/10.25607/OBP-190>

**Collections**  
 NOAA Special Publication NOS CO-OPS [3]



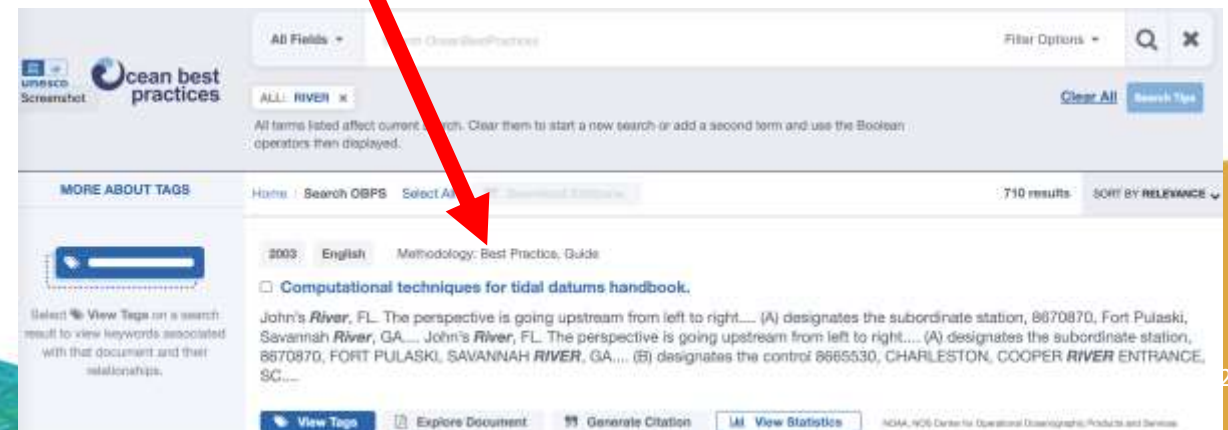
# EMODnet-OBPS linking data to methods: building trust and interoperability

## Link with EMODnet

[https://data-erddap.emodnet-physics.eu/erddap/tabledap/ERD\\_EP\\_TS\\_RVFL\\_NRT\\_METADATA.html](https://data-erddap.emodnet-physics.eu/erddap/tabledap/ERD_EP_TS_RVFL_NRT_METADATA.html)

lists the includes the “data doi” and “method doi” that points to the OPBS

PLATFORMCODE	call_name	latitude degrees_north	longitude degrees_east	firstDateObservation UTC	lastDateObservation UTC	DOI	platform_type_longname
AbbevilleSomme	AbbevilleSomme	50.094498	1.8297544	2022-01-10T12:40:00Z	2022-08-02T11:00:00Z		River Station
AbromollaVegea	AbromollaVegea	56.07419967651367	12.974499702453613	2022-03-16T00:00:00Z	2023-10-17T00:00:00Z		River Station
Abzacisle	Abzacisle	45.02180480957031	-0.12619030475616455	2021-12-28T00:00:00Z	2023-07-11T14:00:00Z		River Station
AgdeHerault	AgdeHerault	43.32530975341797	3.4796884059906006	2021-12-22T00:00:00Z	2023-10-12T06:00:00Z		River Station
AkerselvaNordmarkvassdraget	AkerselvaNordmarkvassdraget	59.96883010864258	10.787599563598633	2022-03-12T00:00:00Z	2023-10-12T22:00:00Z		River Station
AlabaleinsAlabaleins	AlabaleinsAlabaleins	57.8885612487793	-67.60008239748094	2023-01-19T00:00:00Z	2023-10-12T21:00:00Z		River Station
AllnabadStrathmore	AllnabadStrathmore	58.34717559814453	-4.644620895385742	2018-01-01T00:00:00Z	2023-10-17T22:00:00Z		River Station
AlmondbankAlmond	AlmondbankAlmond	56.41527557373047	-3.5135984420776367	2022-06-08T02:30:00Z	2023-10-17T18:30:00Z		River Station
AinessAiness	AinessAiness	57.69601058959961	-4.258760929107666	2018-01-01T00:00:00Z	2023-10-17T23:00:00Z		River Station
AnctevilleAy	AnctevilleAy	49.108009338378906	-1.4670926332473755	2021-12-22T00:36:00Z	2023-10-12T03:30:00Z		River Station
AndelGouessant	AndelGouessant	48.484573	-2.588232	2021-12-22T00:00:00Z	2023-08-23T10:05:00Z		River Station
Anlons-Carballo	Anlons-Carballo	43.21009826680156	-8.692700386047363	2023-07-18T02:00:00Z	2023-10-06T23:50:00Z		River Station



The figure shows a search interface for Ocean Best Practices (OBPS). The search results are filtered by 'RIVER'. The top result is '2009 English Methodology: Best Practice, Guide' with the title 'Computational techniques for tidal datums handbook'. The description mentions 'John's River, FL' and 'Savannah River, GA'. A red arrow points from the 'Method DOI' column of the table to this search result.

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**EMODnet, Ocean Best Practices and interoperability: An overview**

**Pier Luigi Buttigieg, AWI**

# Townhall: EMODnet, Ocean Best Practices and Interoperability



## Sli.do questions

1. Before this meeting which data sharing and data publishing (best practice) standards were you familiar with? (multiple choice)
  - a. Open Geospatial Consortium web services.
  - b. OpenDap standards for searching gridded data.
  - c. The concept of metadata catalogue services (numerous standards)
  - d. Ocean Best Practises of IODE
2. Which other Data publishing best practice standards do you recommend for EMODnet to improve interoperability (free text for word-cloud).
3. How have you interacted with the OBPS repository (multiple choice)
  - a. Not used
  - b. Recommended to colleagues as a resource for best practices
  - c. Used it to consult and implement best practices
  - d. Contributed best practices developed by my organisation

# Townhall: EMODnet, Ocean Best Practices and Interoperability



## Structured questions

- **EMODnet uses best practices and standards to publish and distribute marine data and marine data products, how can they be improved?**
- **What can EMODnet do to become a reference use case as a global data ecosystem?**
- **What are the main barriers in the interoperability of data and metadata to prevent data sharing with other regional initiatives that can be overcome with best practice?**
  
- **How can EMODnet work with OBPS to record best practices across the marine knowledge value chain and to develop a community of best practice?**

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[emodnet.ec.europa.eu](https://emodnet.ec.europa.eu)  
Stay up-to-date with  
the latest news



The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) 2021/1139 of the European Parliament and of the Council of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund and its predecessor, Regulation (EU) No. 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.