



# SeaDataCloud

## European Marine Data Exchange



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Technical coordinator SeaDataCloud, ODIP, EMODnet HRSM,  
EMODnet Chemistry, and EMODnet Ingestion

SDB Day, Herrsching - Germany, 6 June 2018



**EuroGOOS**  
European Global Ocean  
Observing System

**Copernicus**

# Oceans and seas are important



Climate, Energy, Food, Tourism, Shipping, Health, ....

# Marine data relevant for many uses:

- Scientific Research to gain knowledge and insight
- Monitoring and assessment (water quality, climate status, stock assessment)
- Coastal Zone Management
- Modelling (including hindcast, now-cast, forecast)
- Dimensioning and supporting operations and activities at sea (shipping, offshore industry, dredging industry, ..)
- Implementation and execution of marine conventions for protection of the seas
- Implementation of international Directives, such as in Europe directives for water (WFD), marine strategy (MSFD), coastal zone management

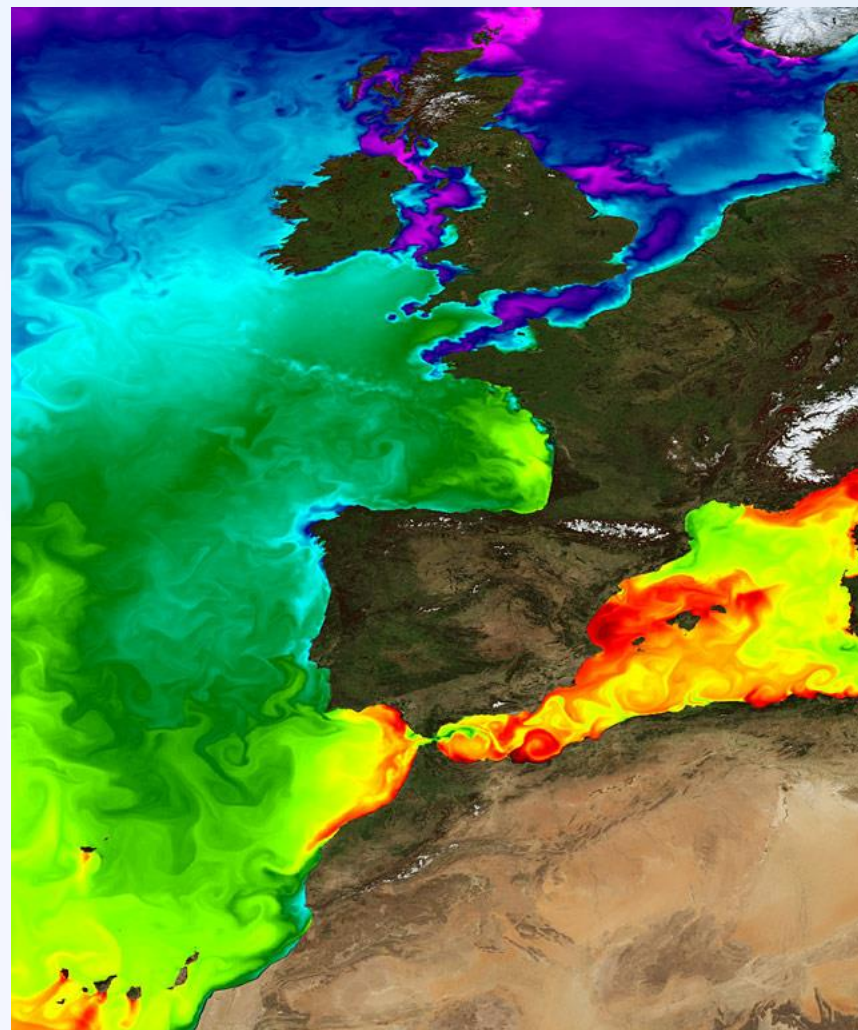
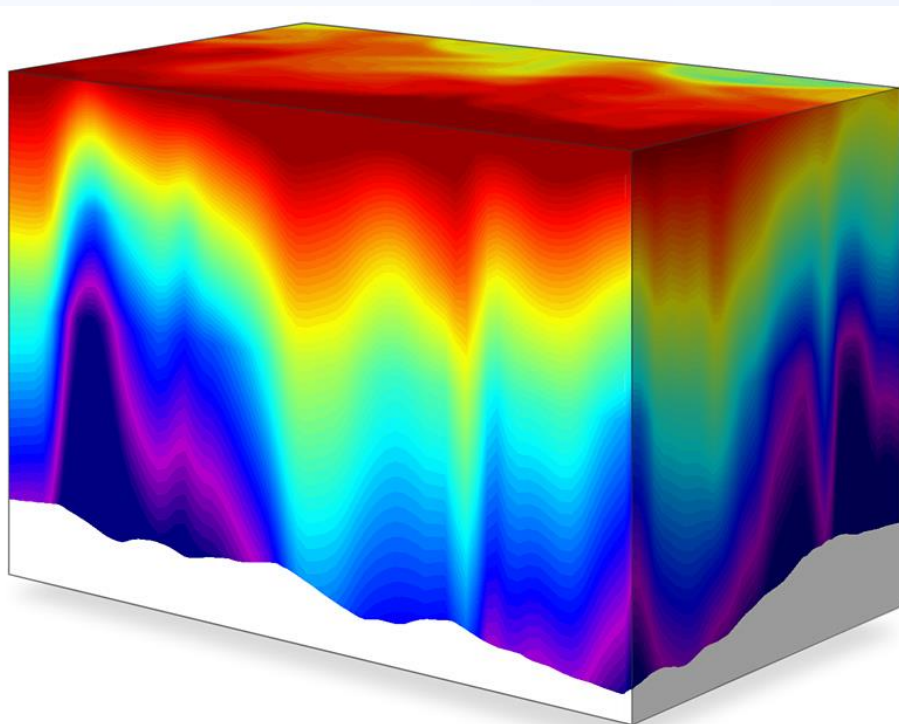


Users originate from government, science sector, and industry, nationally and internationally



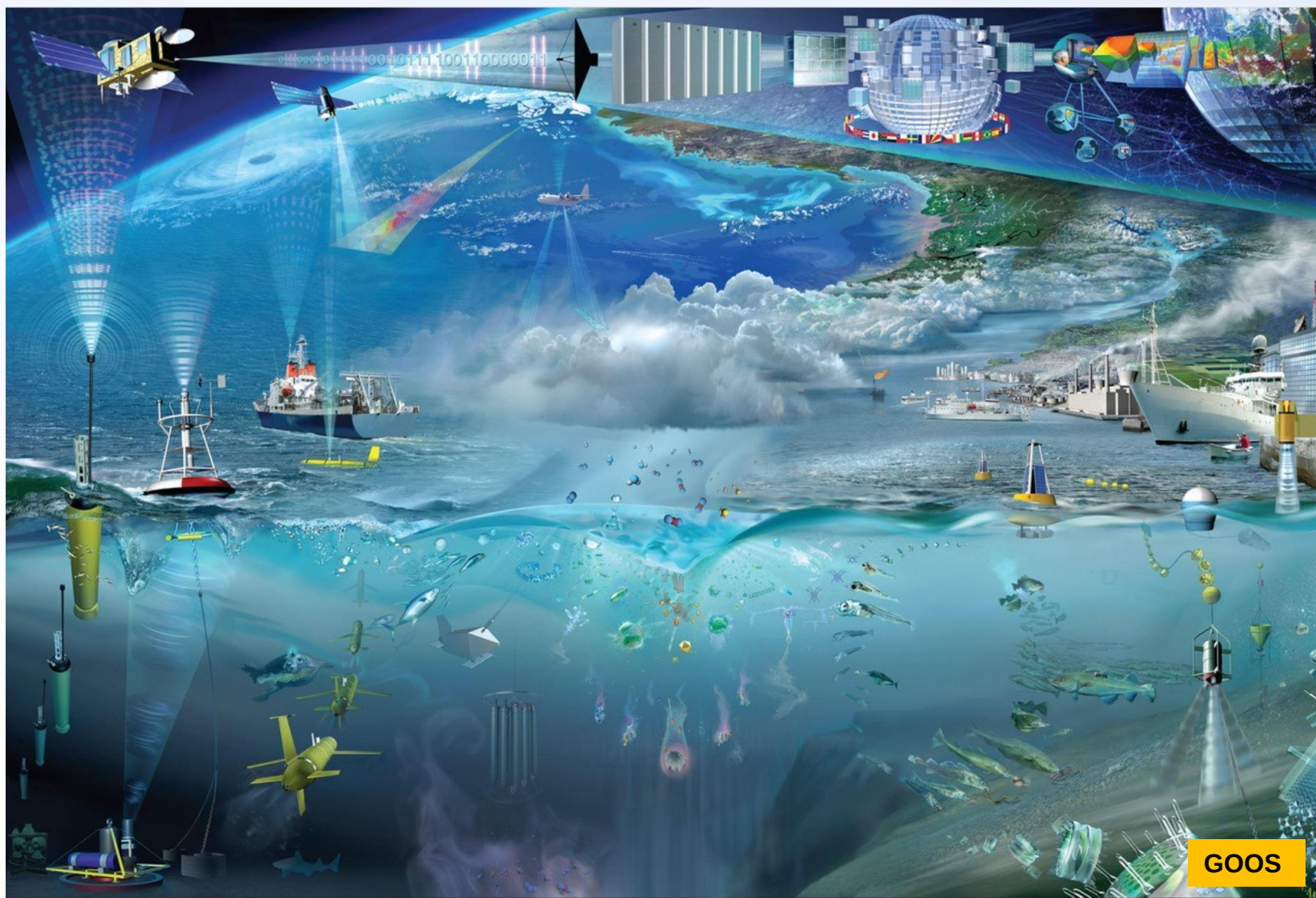
# Input for models: analyses and forecasts :

- Operational oceanography
- Physical and meteorological modelling
- Ecosystem modelling



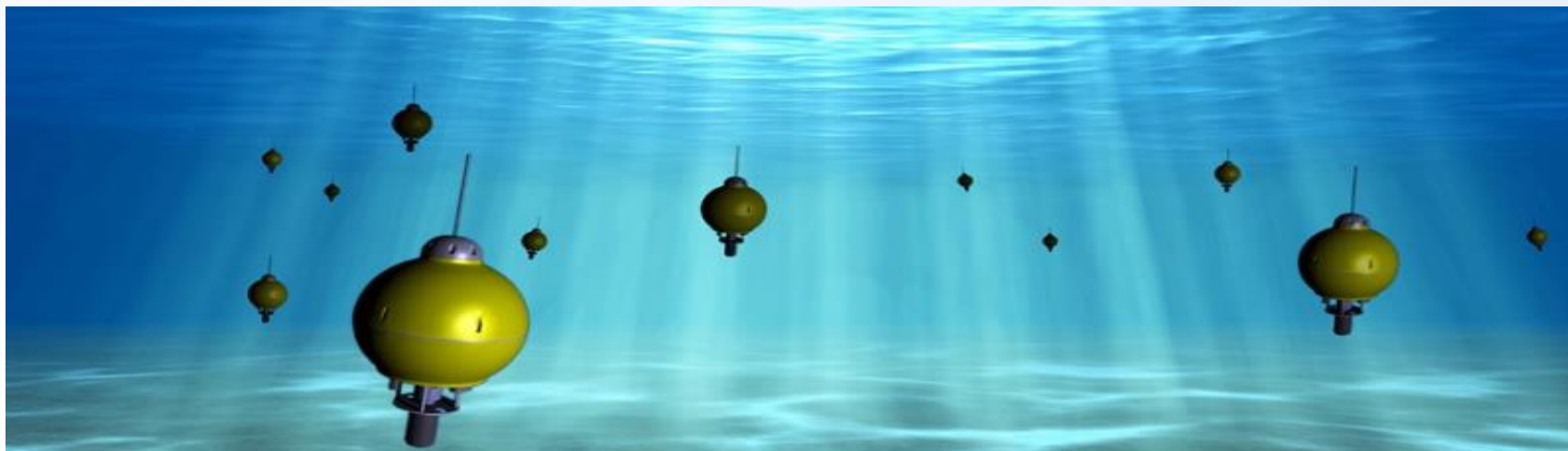


# Acquisition of ocean and marine data



# Economy of data acquisition

- Data are collected by governments, research institutes, and private industry (in Europe already more than 1.000 organisations)
- Data for physics, geophysics, meteorology, chemistry, biology, geology, bathymetry
- Acquisition of oceanographic and marine data is expensive; annual costs in Europe estimated at **1.4 Billion Euro** (1.0 = in-situ; 0.4 = satellites)



Professional data management is required with agreements on standardisation, quality control protocols, long term archiving, catalogues, and access



# What is SeaDataNet?



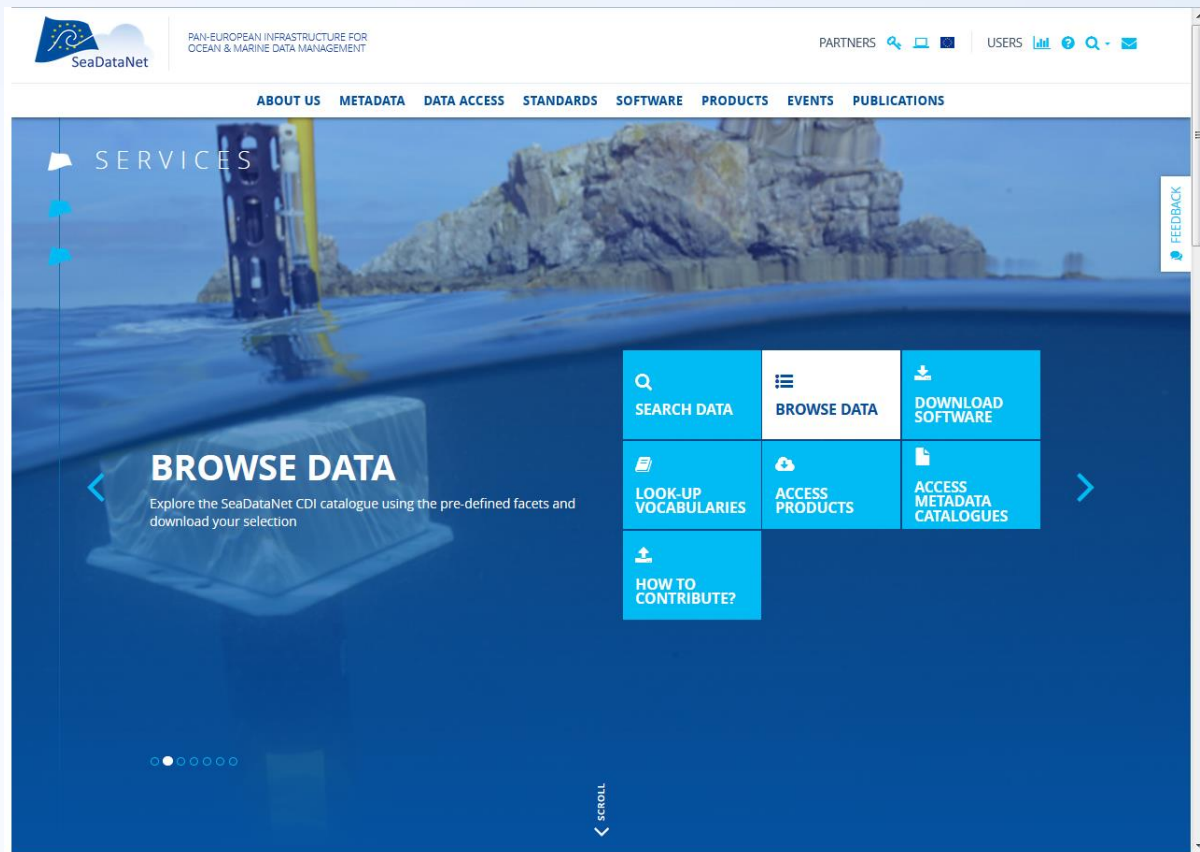
A pan-European infrastructure set up and operated for managing marine and ocean data in cooperation with the NODCs and data focal points of 34 countries bordering the European seas

|           |                                        |
|-----------|----------------------------------------|
| 90s       | Metadata directories<br>Medar/MedAtlas |
| 2002-2005 | Sea-Search (FP5)                       |
| 2006-2011 | SeaDataNet (FP6)                       |
| 2011-2015 | SeaDataNet II (FP7)                    |
| 2016-2020 | SeaDataCloud (H2020)                   |

# SeaDataNet portal

Giving access to

- Standards, tools both for data centres and other users
- Data and metadata
- Products



<http://www.seadatanet.org>



# SeaDataNet standards

- Set of common standards for the marine domain, adapting ISO and OGC standards and achieving INSPIRE compliance
  - **Adoption of ISO 19115 – 19139 standard for describing metadata** on data sets, research cruises, monitoring networks, and research projects => marine metadata profiles, schemas, schematron rules
  - **Controlled vocabularies** for the marine domain (>65,000 terms in 82 lists), with international governance and web services
  - **Standard data exchange formats** : ODV ASCII and NetCDF (CF) fully supported by controlled vocabularies
- Maintenance and dissemination of standard QA-QC procedures, together with IOC/IODE and ICES



# SeaDataNet services and tools

- **Set of tools** to be used each data centre and freely available from the SeaDataNet portal: metadata editor, data conversion software, data analysis software (ODV), data interpolation software (DIVA)
- **Capacity building** by training workshops for uptake of standards and tools by the data centres in order to achieve standardisation
- **Pan-European services** for harmonised discovery, access, visualisation of data and data products
- **Common SeaDataNet Data Policy** and License

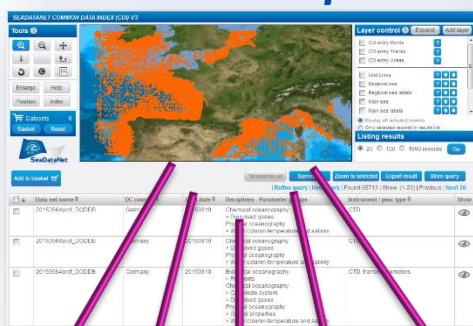






# CDI Data Discovery and Access service

## SeaDataNet portal



Search  
and  
Shop



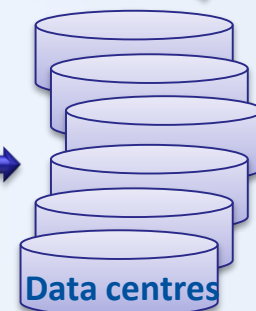
Data  
Add

Already 110 data centres connected and more underway



Metadata

+ transaction data



European data sources  
data centres ← ≈ 650 originators

# CDI Data Discovery and Access service



PAN-EUROPEAN INFRASTRUCTURE FOR  
OCEAN & MARINE DATA MANAGEMENT

**SEADATANET COMMON DATA  
INDEX (CDI) V3**

**TOOLS**










[ENLARGE](#)
[HELP](#)

[POSITION](#)
[INDEX](#)

[Datasets](#)
0

[BASKET](#)
[RESET](#)



**SEARCH**

Free search

Disciplines - Topics

☒ All  
☐ Administration and d...  
☐ Administration and o...  
☐ Atmosphere  
☐ Atmospheric chemis...

Discovery parameters

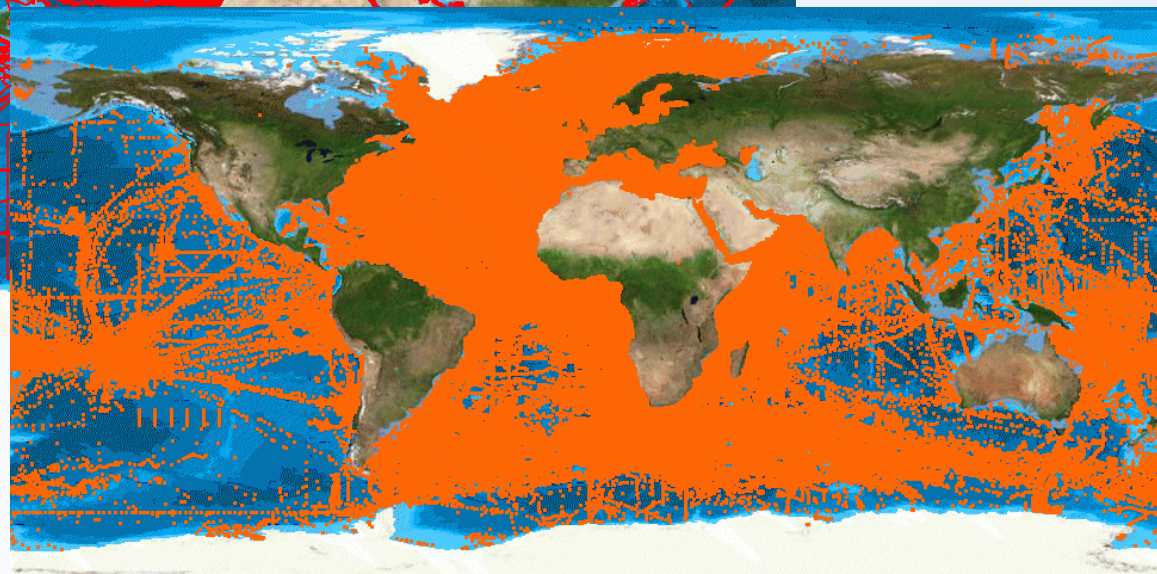
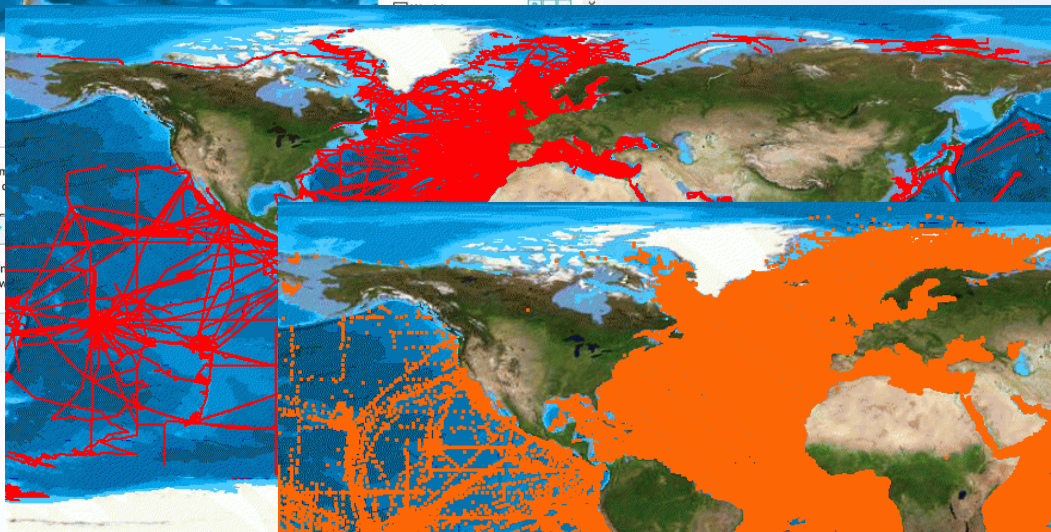
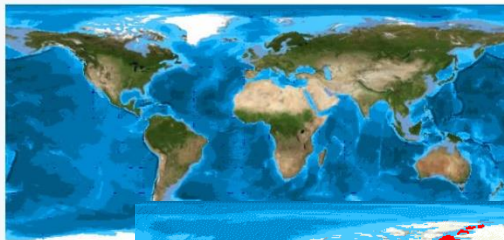
☒ All  
☐ Acoustic backscatter in...  
☐ Acoustic noise in the v...  
☐ Air pressure  
☐ Air temperature

Cruise/Station name

Projectname

**LAYER CONTROL**

☐ Grid Lines  
☐ Regional sea  
☐ Regional sea labels  
☐ Main sea  
☐ Main sea labels  
☒ Bathymetry  
☒ Blue Marble



# SeaDataNet as driver and contributing to many portals

Total collection



Data discovery  
And access



> 110 data centres



NODCs; HOs; GEOs; BIOS; ICES;

> 650 European data  
originators



GEOSS portal

Aggregated collection



IODE ODP portal



Black Sea portal



Caspian portal

Regional subsets



Geo-Seas portal

Thematic subsets

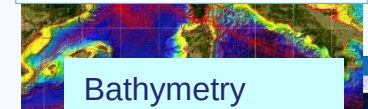
Thematic subsets

Thematic subsets

Thematic subsets

Thematic subsets

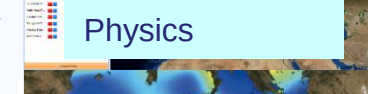
Thematic subsets



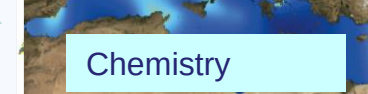
Bathymetry



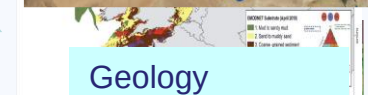
Physics



Chemistry



Geology

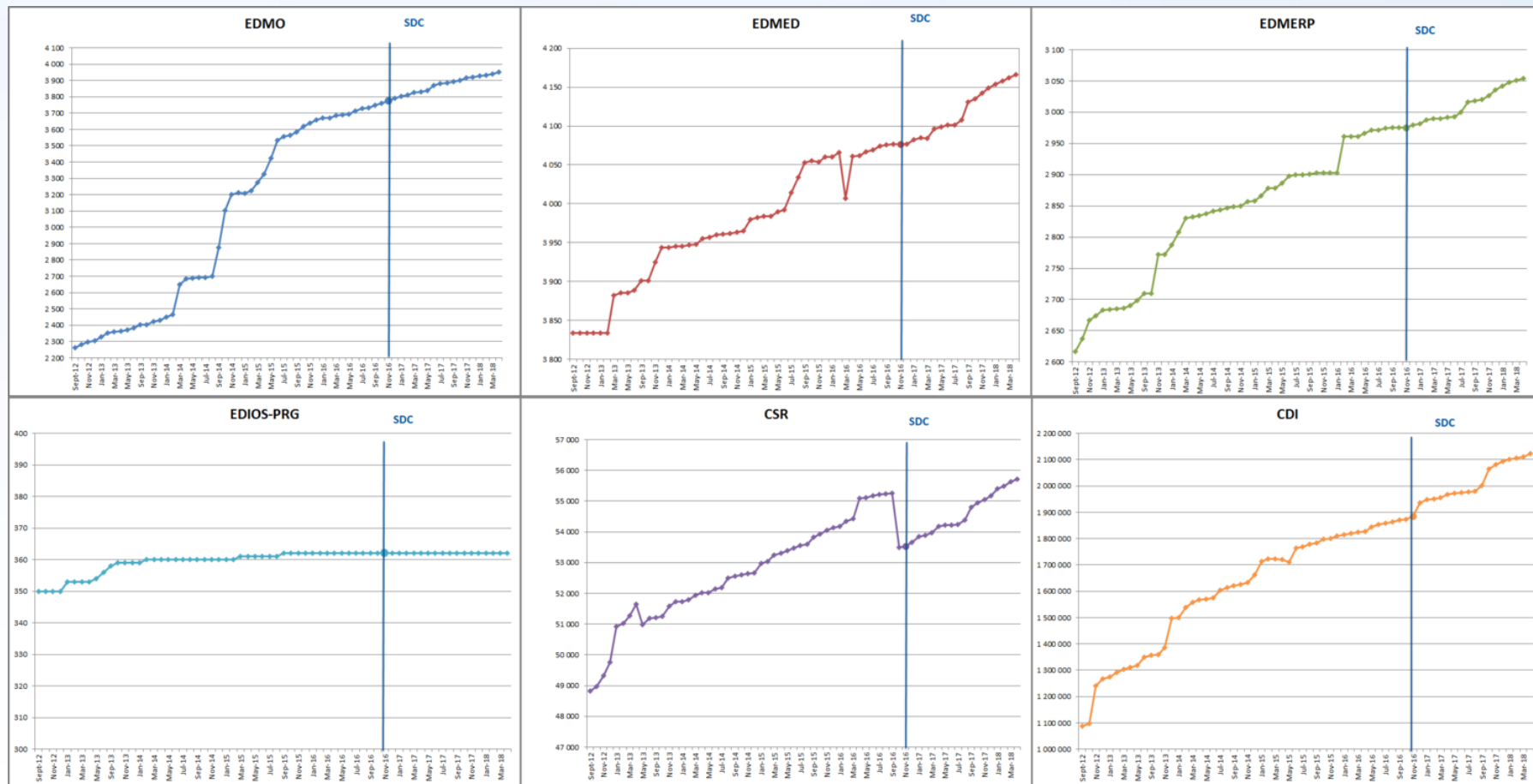


Biology

**CDI Data Discovery  
and Access service**



# SeaDataNet directories increase



# Data Products and viewers

[Products](#)

## DATA PRODUCTS

SeaDataNet provides aggregated datasets (ODV collections of all SeaDataNet measurements of temperature and salinity by sea basins) and climatologies (regional gridded field products based on the aggregated datasets) for all the European sea basins.

[DESCRIPTIONS & DOCUMENTATION](#)

[FEEDBACK](#)

[CATALOG](#)

[MY DOWNLOADS](#)

[<](#)

[>](#)

Results 1 to 17 on 17 : 20 by page

Sort by: Popularity

North Atlantic Ocean - Temperature and salinity observation coll...

Mediterranean Sea - Temperature and Salinity Climatology V1.1

SeaDataNet Temperature and Salinity historical data collection, including quality flags after quality control with ODV. For access please register at <http://www.marine-geo.org>

Source: Seadatanet

Black Sea - Temperature and salinity observation collection V2

The Black Sea historical dataset includes all access temperature and salinity in situ data from the Black Sea and Sea of Marmara for the period 1868-2014. The data were retrieved from the SeaDataNet database.

Source: Seadatanet

**SeaDataNet products**  
Viewing and Downloading service

[Horizontal Section](#)

[Vertical Section](#)

[Select data products](#)

[Report a problem](#)

[About](#)

[Help](#)

Temperature masked using relative error threshold 0.3

10 15

depth: [meters] [-0.0]

time: [month] 01

Remove Update

Animate

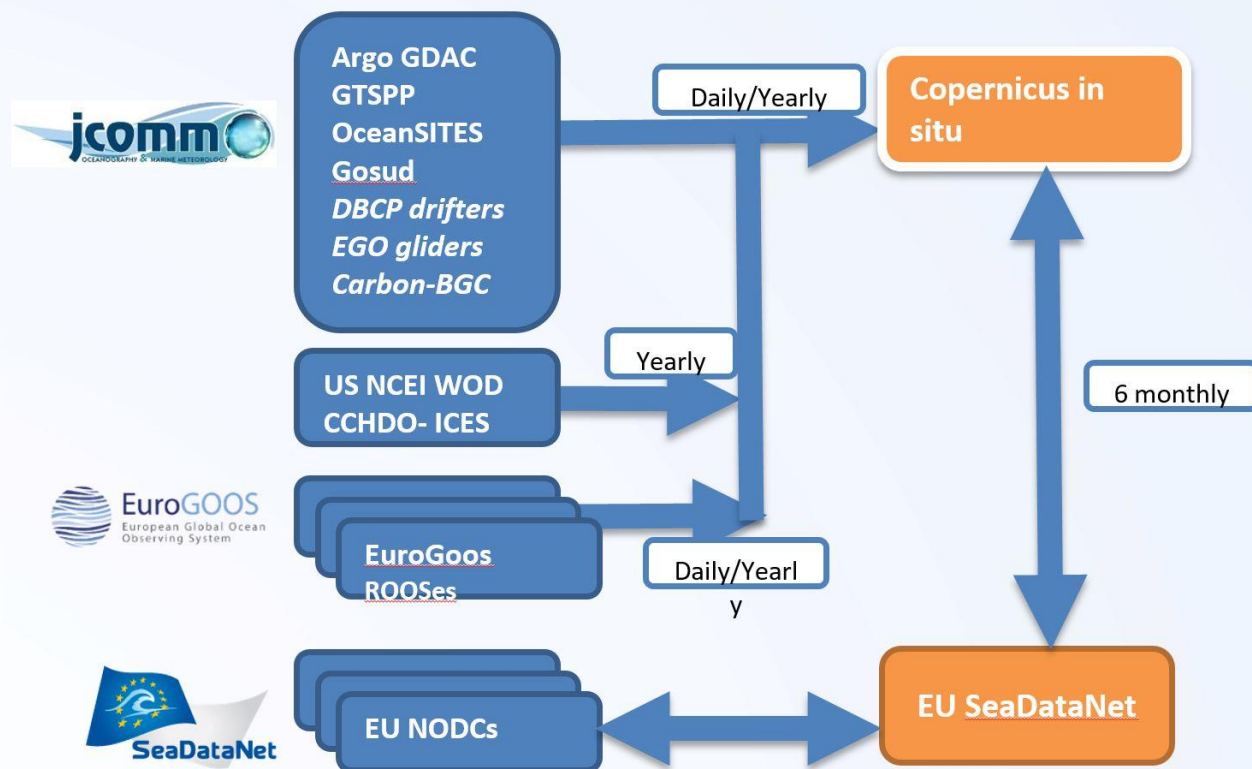
10.02197, 38.74268

# SeaDataNet cooperation

- **Marine Strategy Framework Directive (MSFD):** providing infrastructure, standards and data collections for several indicators
- **Large ocean monitoring systems (EuroGOOS, AtlantOS, Euro-ARGO, JERICO-Next, ..):** providing standards and validation + long-term archiving services
- **GEOSS - EuroGEOSS:** Maintaining the GEOSS portal with SeaDataNet in-situ data collections from large community of European data holders
- **Copernicus:** Data exchange with Copernicus Marine Environmental Monitoring Services (CMEMS) and providing standards:



## Copernicus Marine Environmental Monitoring Services (CMEMS)



**SeaDataNet providing long-term archives and standards**

# Ocean Data Interoperability Platform (ODIP - ODIP II)

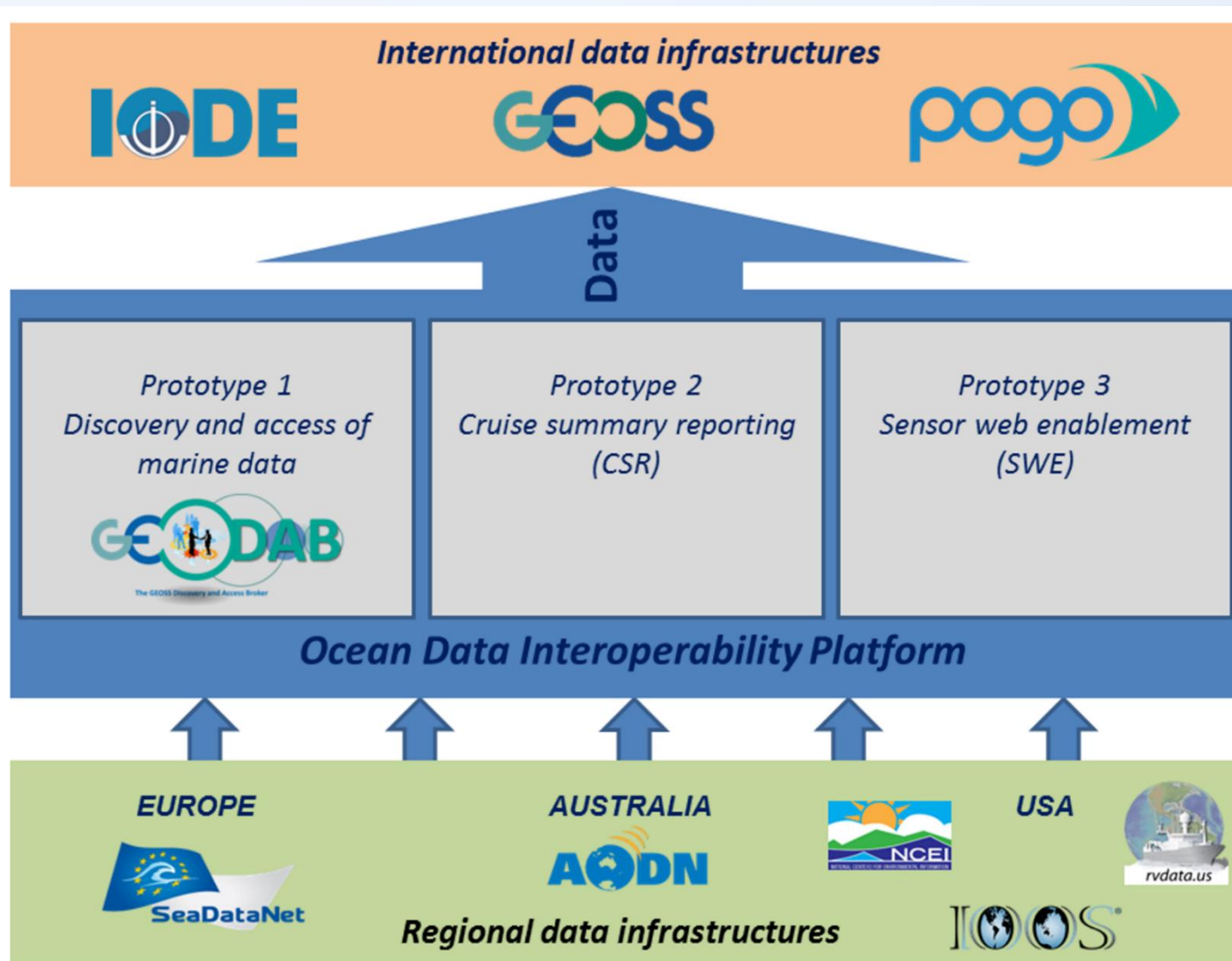
- European-USA-Australia collaborative project
- Supported by:
  - European Commission
  - National Science Foundation (NSF)
  - Australian Government
- Promoting the development of a common global framework for marine data management by developing interoperability between existing regional e-infrastructures of Europe, USA and Australia and towards global infrastructures such as GEOSS, IOC-IODE and POGO.
- In practice by organising international workshops with leading experts to present, compare and discuss approaches and standards applied.
- Developing prototypes for interoperability solutions or common standards to overcome identified differences. Prototypes projects are worked out in order to evaluate and test solutions.





SeaDataCloud

# ODIP – Prototype projects



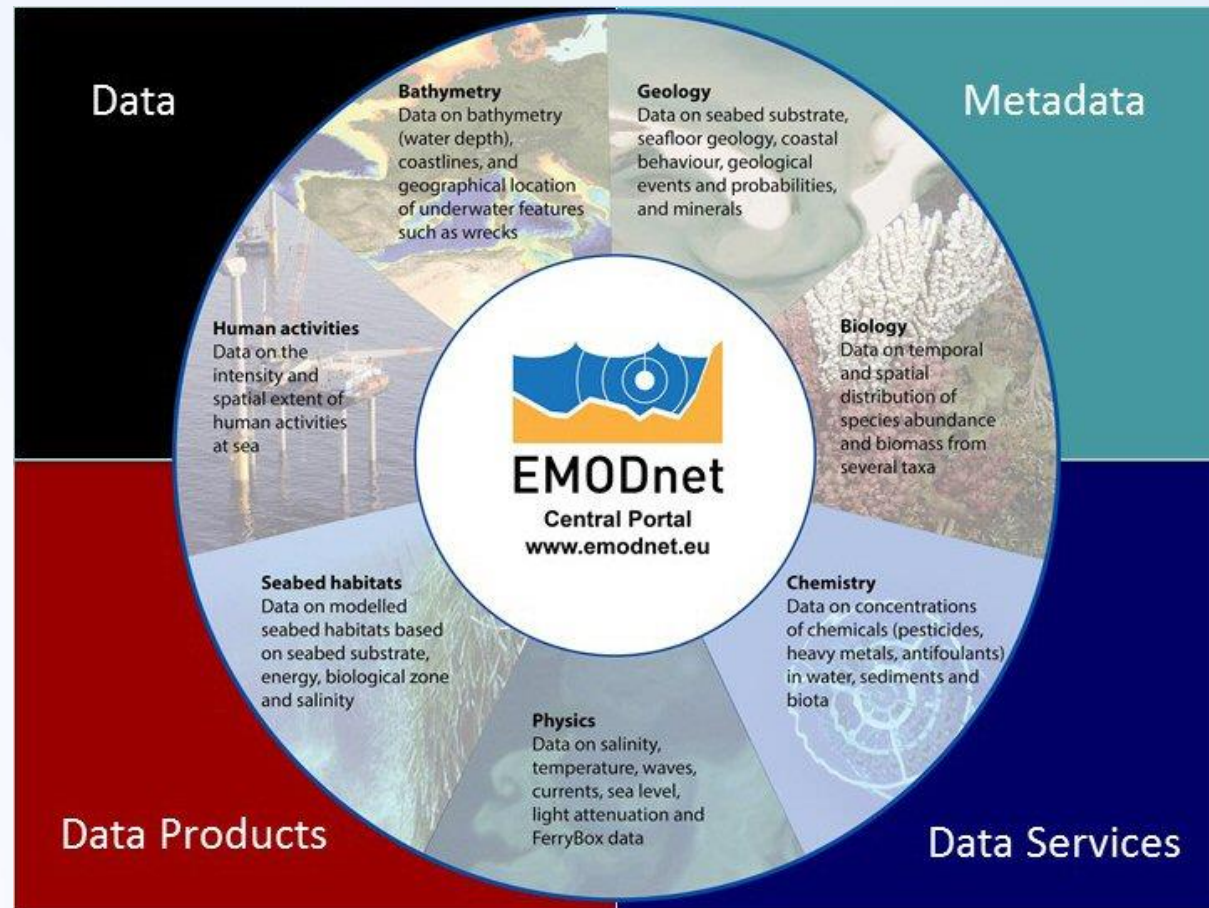


# SeaDataNet and EMODnet

- EU initiative for an overarching **European Marine Observation and Data Network (EMODNet)** driven by Marine Knowledge 2020 and Blue Growth
- SeaDataNet qualified as a leading infrastructure for the EMODnet data management component and is driving several thematic portals from the start in 2008
- *‘Bottom-up meets top-down’*
- This synergy has resulted in many more data centres adopting SeaDataNet standards and connecting to the CDI Data Discovery and Access service while it gave a flying start to EMODnet

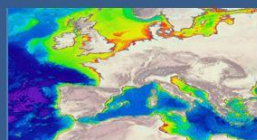
# European Marine Observation and Data Network

- Central portal
- Thematic portals for physics, biology, geology, bathymetry, chemistry, seabed habitats and human activities
- Checkpoints for analysing fitness for purpose



# EMODnet thematic portals

## Bathymetry



Minimum cell water depth

Maximum cell water depth

Average cell water depth

Standard deviation of cell water depth

Number of values used for interpolation of cell water depth

Horizontal coordinate reference system

Depth reference system

Lowest Astronomical Tide

## Geology



Seabed substrate

Sediment accumulation rate

Sea-floor geology

Seabed lithology

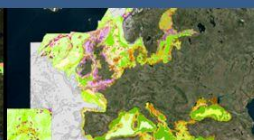
Stratigraphy

Coastline migration

Aggregate resources

Geological events

## Seabed Habitats



Data on modelled seabed habitats (depth, seabed substrate, broad scale biological zone, T, S, light, oxygen, energy due to waves & current)

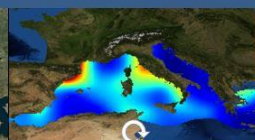
Broad-scale physical habitat map

Detailed habitat maps from surveys

Individual habitat modelling outputs

Habitat point data

## Chemistry



Pesticides & Biocides

Antifoulants

Pharmaceuticals

Heavy Metals

Hydrocarbons

Radionuclides

Fertilizers

Acidity

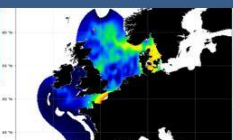
Dissolved Gasses

Plastics

Marine Litter Beach litter Seafloor litter Micro litter

Chlorophyll  
Silicates  
Organic Matter

## Biology



Biomass

Abundance

Gridded Abundance maps

*species groups:*

- phytoplankton
- zooplankton
- angiosperms
- macro-algae
- invertebrate bottom fauna
- birds
- mammals
- reptiles
- Fish

## Physics



Waves

Water temperature

Water salinity/conductivity/density

Currents

Light attenuation/fluorescence

Sea level

Atmospheric parameters

Wind

Underwater noise

Rivers

Ice

## Human activities



Aggregate Extraction Dredging

Fisheries

Hydrocarbon Extraction Main Ports

Mariculture

Ocean Energy Facilities

Pipelines and Cables

Protected Areas

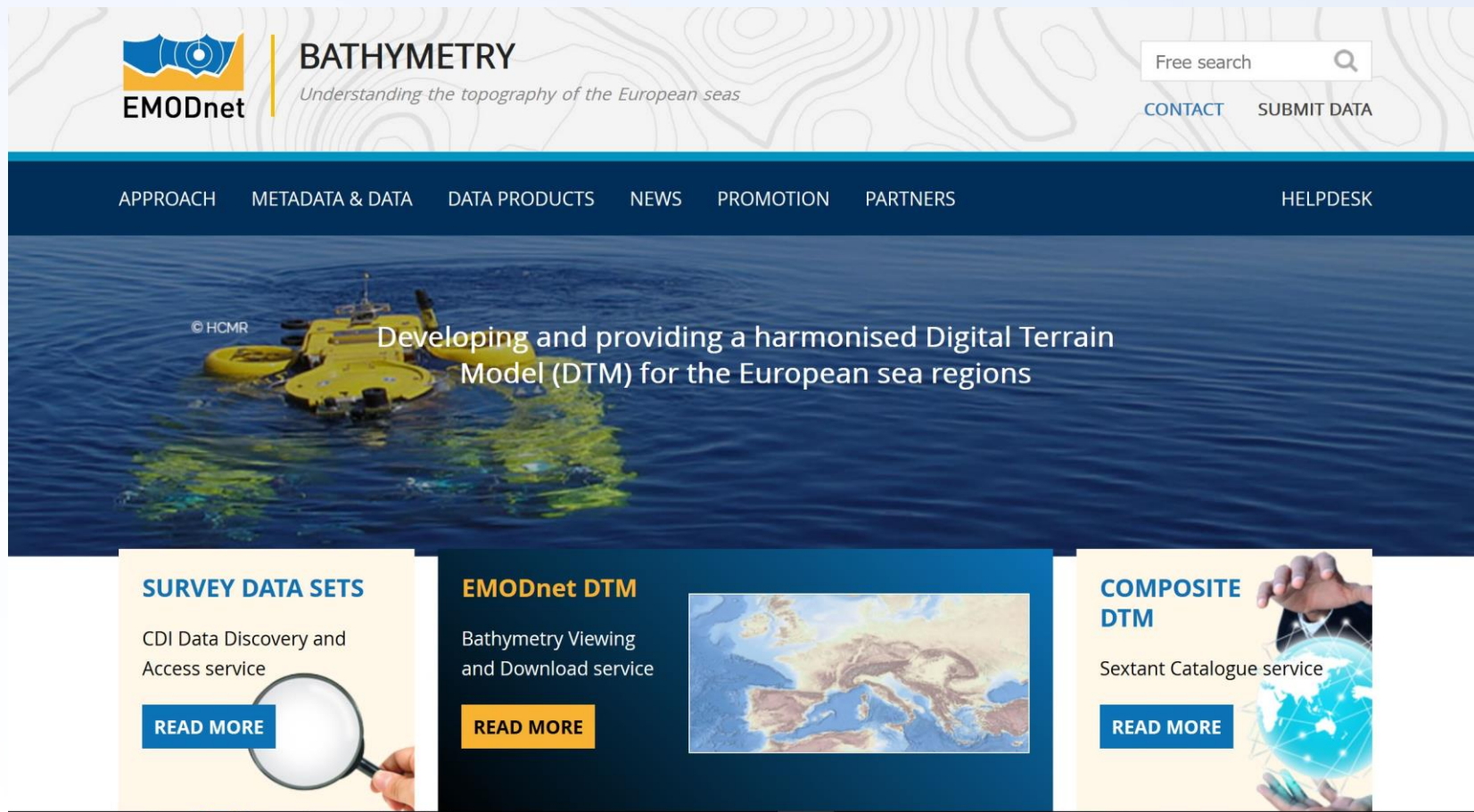
Waste Disposal

Wind Farms

Other Forms of Area Management / Designation



# EMODnet Bathymetry portal



The banner features a background image of a yellow autonomous underwater vehicle (AUV) operating on the surface of the ocean. The AUV is equipped with various sensors and is surrounded by a green and yellow wake. The text "© HCMR" is visible in the top left corner of the banner image.

**EMODnet** | **BATHYMETRY**  
*Understanding the topography of the European seas*

Free search  

[CONTACT](#) [SUBMIT DATA](#)

[APPROACH](#) [METADATA & DATA](#) [DATA PRODUCTS](#) [NEWS](#) [PROMOTION](#) [PARTNERS](#) [HELPDESK](#)

Developing and providing a harmonised Digital Terrain Model (DTM) for the European sea regions

**SURVEY DATA SETS**  
CDI Data Discovery and Access service  
[READ MORE](#)

**EMODnet DTM**  
Bathymetry Viewing and Download service  
[READ MORE](#)

**COMPOSITE DTM**  
Sextant Catalogue service  
[READ MORE](#)



# Bathymetry CDI data discovery and access service



**BATHYMETRY**  
Understanding the topography of the European seas  
**CDI Data Discovery and Access Service**

 Dataset(s) 0 [Proceed to basket](#) [Reset basket](#)

[Reset all steps](#)

**Layer control**

- ☐ CDI entry Points
- ☐ CDI entry Tracks
- ☐ CDI entry Areas
- ☐ Coastlines
- ☐ Mean depth full coverage with land coverage
- ☐ Grid Lines
- ☐ Regional sea
- ☐ Regional sea labels
- ☒ Display all selected records
- ☐ Only selected records in results list

[Zoom to selected](#)

**Search by:**

**Geographical Box**

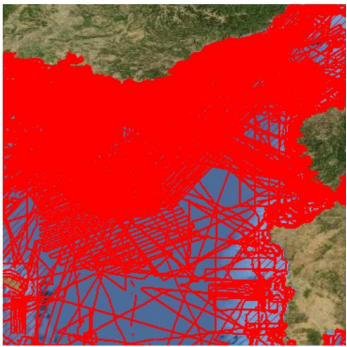
**Time period**

**Measuring area type**

- surface (25232)
- curve (1829)
- point (5)

**Parameter categories**

- Gravity, magnetics and bat... (27066)
- Terrestrial (27066)



**ADD TO BASKET** ☐ 20 ☐ 100 ☐ 1000 Records

| #                        | Data set name  |
|--------------------------|----------------|
| <input type="checkbox"/> | S196900100-016 |
| <input type="checkbox"/> | S196900100-014 |

**Details** | [Results](#) | Found 27066 | Show 26501 | [Previous](#) | [Next](#)

[XML](#) [Shopping cart](#) [Print](#)

**WHAT?**

Data set name

Discipline

Parameter groups

Discovery parameters

GEMET-INSPIRE themes

Abstract

Data format

Data set creation date

TIR96

Marine geology  
Terrestrial

Gravity, magnetics and bathymetry  
Terrestrial

Bathymetry and Elevation

Oceanographic geographical features

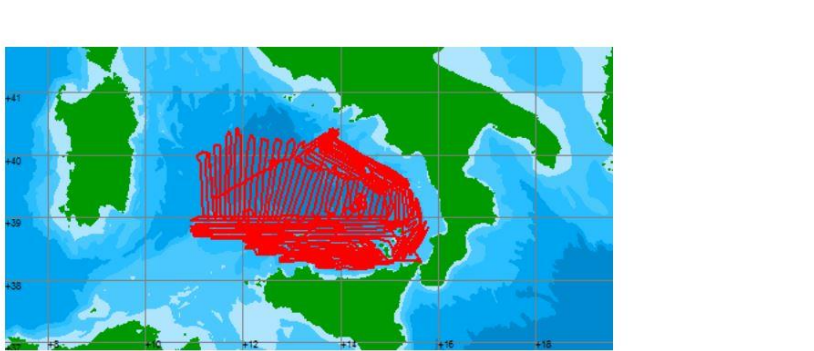
The data have been acquired with a Simrad EM120 S Multi Beam echosounder aboard the Russian R/V Gelendzhik in order to survey the Tyrrhenian sea for geological and seafloor mapping in the framework of an Italian project funded by CNR and APAT (Geological Survey Agency). Sea state was rough at times. Results, maps can be found in the book: Marani M. P., Gamberi F., Bonatti E. (2004). Editors: From seafloor to deep mantle: architecture of the Tyrrhenian backarc basin. Memorie Descrittive Della Carta Geologica d'Italia, (pp. 1-194).

Climate and Forecast NetCDF **Version 3.5**

20170831

**WHERE?**

Map



GML id

GML objects

mc01

| Name                    | Description             |
|-------------------------|-------------------------|
| Track T960016 for TIR96 | Track T960016 for TIR96 |
| Track T960017 for TIR96 | Track T960017 for TIR96 |

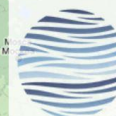


## PHYSICS

Oceans Physics at your fingertips

[CONTACT US](#)
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[CATALOGUE](#)
[ABOUT](#)
[HELPPESK](#)
[SUBMIT DATA](#)
[CENTRAL PORTAL](#)
[WAVES](#)
[WATER TEMPERATURE](#)
[WATER SALINITY](#)
[CURRENTS](#)
[OPTICAL PROPERTIES](#)
[SEA LEVEL](#)
[ATMOSPHERIC](#)
[WATER CONDUCTIVITY](#)
[WINDS](#)
[RIVER](#)
[UNDER WATER NOISE](#)

in collaboration with



DATA  
INGESTION

PRODUCTS

THREDDS

ERDDAP

GEOSERVER

API REST SOAP

WMS WFS

DASHBOARD

GITHUB

VIDEOS



# Pillars under EMODnet Physics



The European Global Ocean Observing System, association and its regional components (ROOSs)



Copernicus Marine Environment Monitoring System (CMEMS)



SeaDataNet, pan-European marine data management infrastructure and network of NODCs

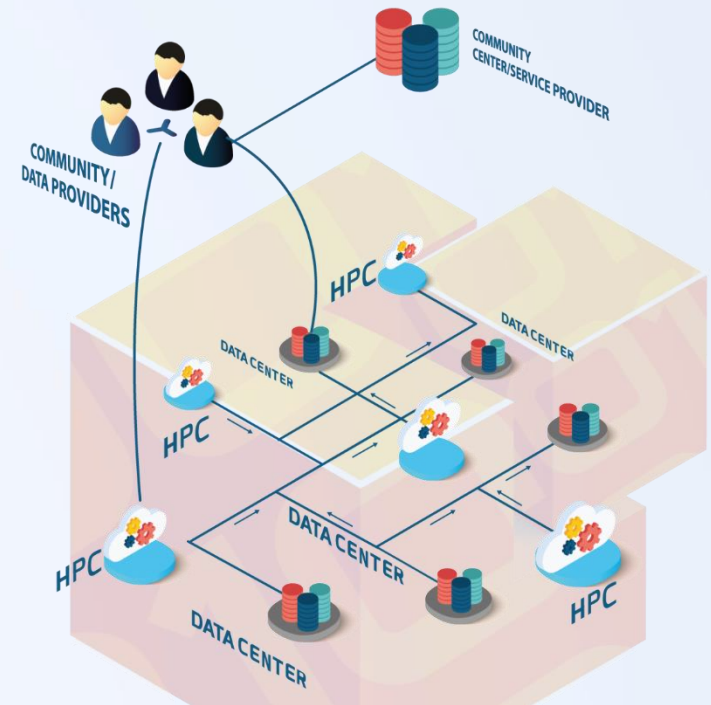
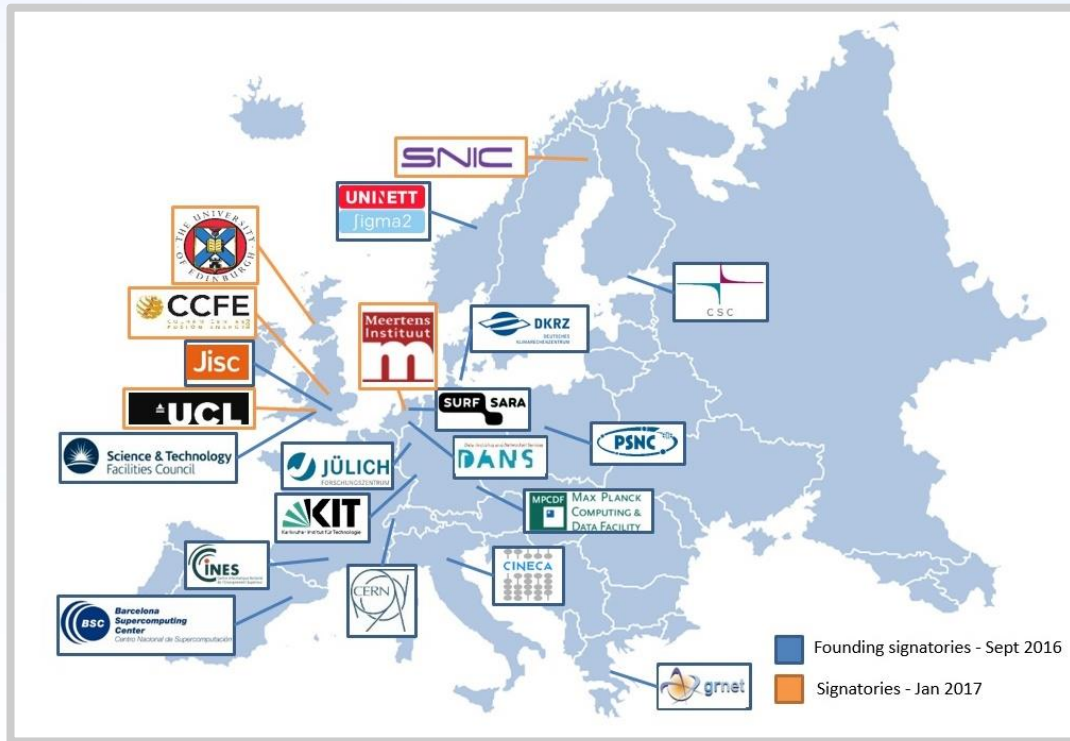




# SeaDataCloud a new opportunity

- Standards and information technology are always evolving, there is a move towards cloud storage and cloud computing, and the SeaDataNet infrastructure must stay up-to-date to maintain and further expand its services to its leads customers and major stakeholders
- SeaDataCloud project, started Nov 2016 with 4 year run and 10 Meuro funding
- A strategic and operational cooperation between the SeaDataNet consortium of marine and ocean data centres and the EUDAT consortium of e-infrastructure service providers

# Cooperation with EUDAT

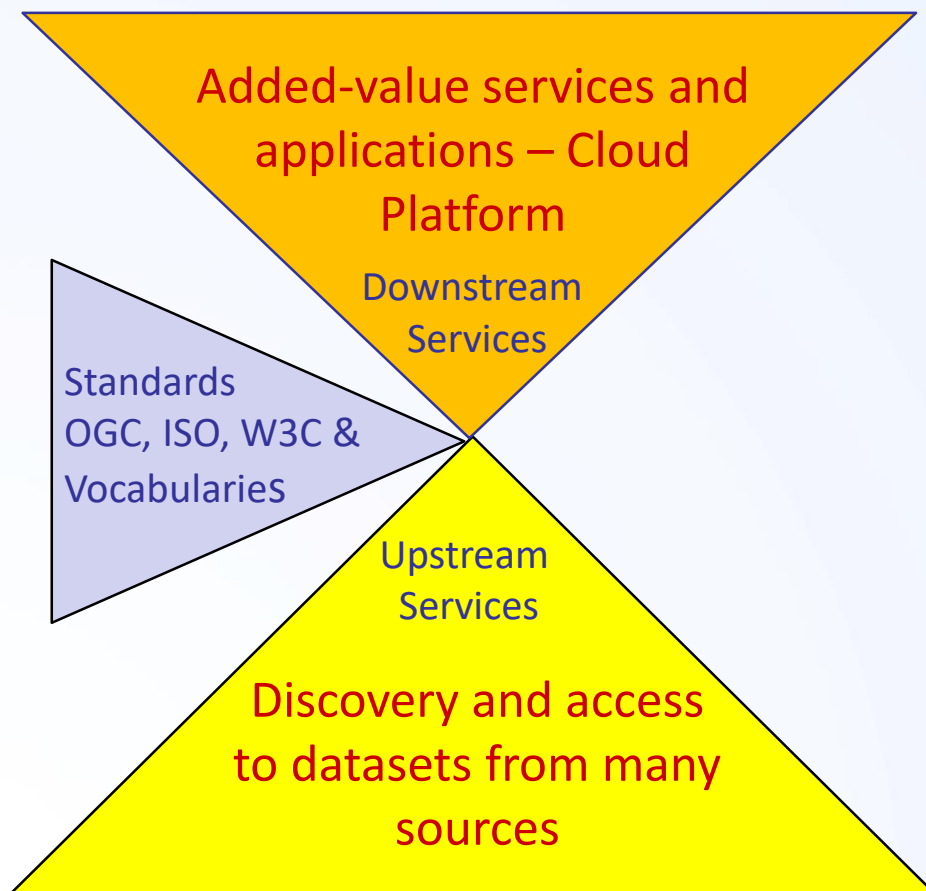


EUDAT is European consortium of academic computing centres

# What is it about?

- SDC is about **updating and further developing standards**
- SDC is about improving and innovating services & products
- SDC is about adopting and elaborating new technologies
- SDC is about giving more attention to users and putting the user experience in a central position
- SDC is also about developing a **Virtual Research Environment (VRE)** bringing data and applications together in the cloud and serving users

# Towards a Blue Cloud as blue print for the European Open Science Cloud (EOSC)



- Cloud platform with common services for data pre-processing, analyses, visualizations, publishing, DOIs...
- Applying common standards and interoperability solutions for providing harmonised data and metadata
- Providing harmonised discovery and access to data output from multiple sources, European and international



# EMODnet Ingestion – wake up your data



The screenshot shows the EMODnet Data Ingestion Portal homepage. At the top is the EMODnet logo and the tagline "Wake up your data - set them free for Blue Society". A navigation bar contains links for ABOUT, DATA SUBMISSION, OPERATIONAL DATA, SUBMISSIONS, GUIDELINES, DATA WANTED, HELP, PROMOTION, and CENTRAL PORTAL. A search bar and a CONTACT link are also present. The main content area welcomes users to the portal and describes its purpose. Below this is a "READ MORE" button. A large banner with the text "EMODNET INGESTION" and "CHECK OUT" is followed by three columns of content. The first column, "Submit your data files", features a red arrow pointing to a "submit" button on a keyboard. The second column, "Ingest operational data", shows a blue background with data charts. The third column, "View submissions", shows a green background with the text "DATA ACCESS".

**EMODnet**  
Wake up your data - set them free for Blue Society

DATA INGESTION PORTAL

Search

CONTACT

ABOUT DATA SUBMISSION OPERATIONAL DATA SUBMISSIONS GUIDELINES DATA WANTED HELP PROMOTION CENTRAL PORTAL

Home

## Welcome to the EMODnet Data Ingestion portal

The European Marine Observation and Data Network (EMODnet) consists of more than 160 organisations that together work on assembling, harmonising and making marine data, products and metadata more available to public and private users. This Data Ingestion portal facilitates additional data managers to ingest their marine datasets for further processing, publishing as open data and contributing to applications for society.

[READ MORE](#)

## EMODNET INGESTION

CHECK OUT



### Submit your data files

The online Data Submission service facilitates you to submit marine datasets by completing a form and



### Ingest operational data

We are also interested in (Near) Real-Time ((N)RT) data streams from fixed and autonomous ocean



### View submissions

View, search and download datasets that have been submitted by data providers using the Data



SeaDataCloud

# Submission service for offline data sets

**EMODnet**

**DATA INGESTION PORTAL**  
*Wake up your data - set them free for Blue Society*  
**Data Submission Service**

[DASHBOARD](#) | [BACK TO LIST](#)WELCOME DICK M.A. SCHAAP (M) | [LOGOUT](#)

Dataset Identification

  
Process Info

  
Organizations

  
Dataset Identification

  
Data Types

  
Locations & Dates

  
Data Links & Finish

**DATASET GENERAL INFORMATION**

Title of dataset \* 

2011-GEMS, Zone 8 - Bristol Channel Atlantic Array, Metocean assessment

Narrative summary of dataset \* 

GEMS Survey Ltd. (GEMS) was awarded a contract by Channel Energy Limited to undertake metocean data collection in the Bristol Channel as part of the Atlantic Array wind farm development project. The scope of work includes the deployment of two acoustic wave and current (AWAC) units and one Directional Waverider Buoy. Ancillary work includes water and sediment sampling and water profiling. Following non-recovery of AWAC devices, TRIAXYS Directional Wave buoys were utilised for the rest of the survey. This series contains both reports and datasets associated with the Metocean Assessment.

**DATASET FORMATS**

Dataset format \* 

Text or Plaintext

# View submissions service 'as is'



**DATA INGESTION PORTAL**  
Wake up your data - set them free for Blue Society

[CONTACT](#)

[ABOUT](#)
[DATA SUBMISSION](#)
[GUIDELINES](#)
[SUBMISSIONS](#)
[DATA WANTED](#)
[HELP](#)
[OPERATIONAL DATA](#)
[PROMOTION](#)
[CENTRAL PORTAL](#)

Home / Submissions

## View submissions

This service allows users to search and download the datasets that have been submitted via the Submission service and that have been reviewed and completed in metadata by assigned data centers. These datasets are published "as-is" and will be further inspected and elaborated, where possible, for uptake in the national and European infrastructures supporting EMODnet.

**Search by**

**Free search**

**Date [yyyymmdd]**

**Geobox**

**Sea areas**

- Strait of Sicily (3)
- Black Sea (2)
- Skagerrak (2)
- Baltic Sea (1)
- North Atlantic Ocean (1)

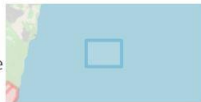
**Observation types**

**Results (10)**

**southstream observation**

Period: 2014-10-18 - 2015-10-15

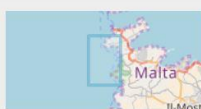
Observation type: Currents,Other physical oceanographic measurements,Water column temperature and salinity



**CTD Cumnija Bay**

Period: 1996-09-17 - 1996-09-22

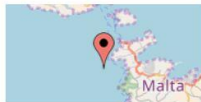
Observation type: Dissolved gases,Other inorganic chemical measurements,Water column temperature and salinity



**Currents Cumnija Bay**

Period: 1996-05-29 - 1996-09-30

Observation type: Currents



**Ferry box data**

Period: 2015-04-01 - 2015-10-31

Observation type: Water column temperature and salinity

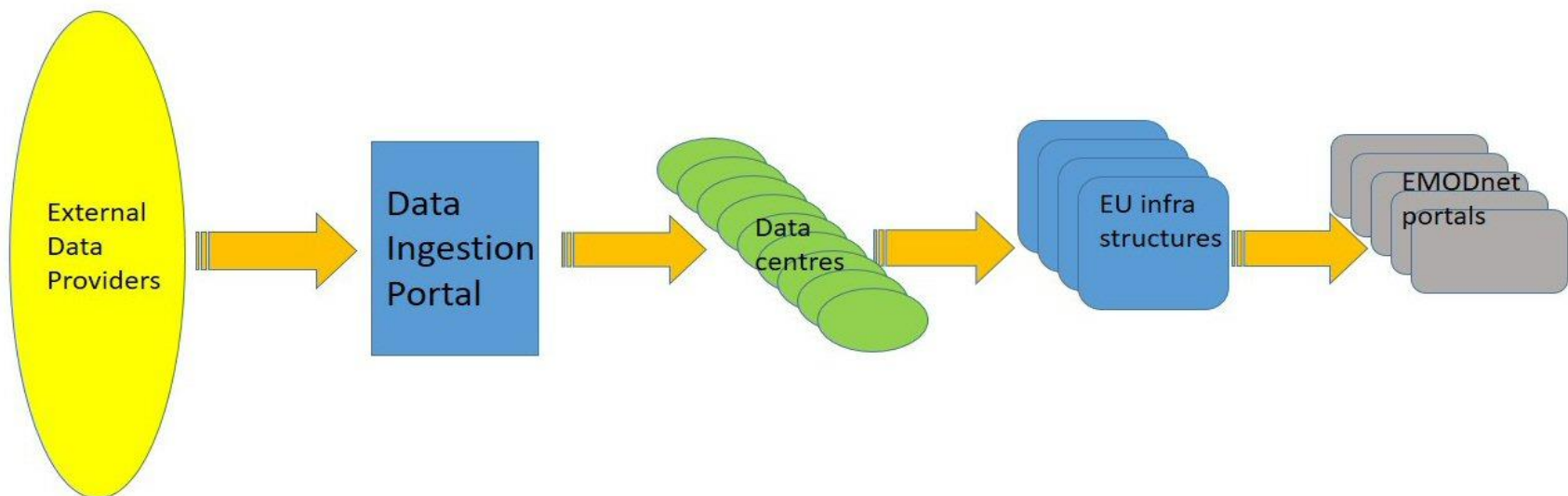


**oceanographic data from UTO platform**

Period: 2017-03-01 - 2017-07-01



# Uptake of ingested data sets by European infrastructure





## EMODnet Data Ingestion

# WAKE UP YOUR DATA

Set them free for Blue Society

The **Data Ingestion Portal** facilitates submitting marine datasets for further processing, Open Data publishing and contributing to applications for society.

[emodnet-ingestion.eu](https://emodnet-ingestion.eu)



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