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

Oceans and seas are important

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

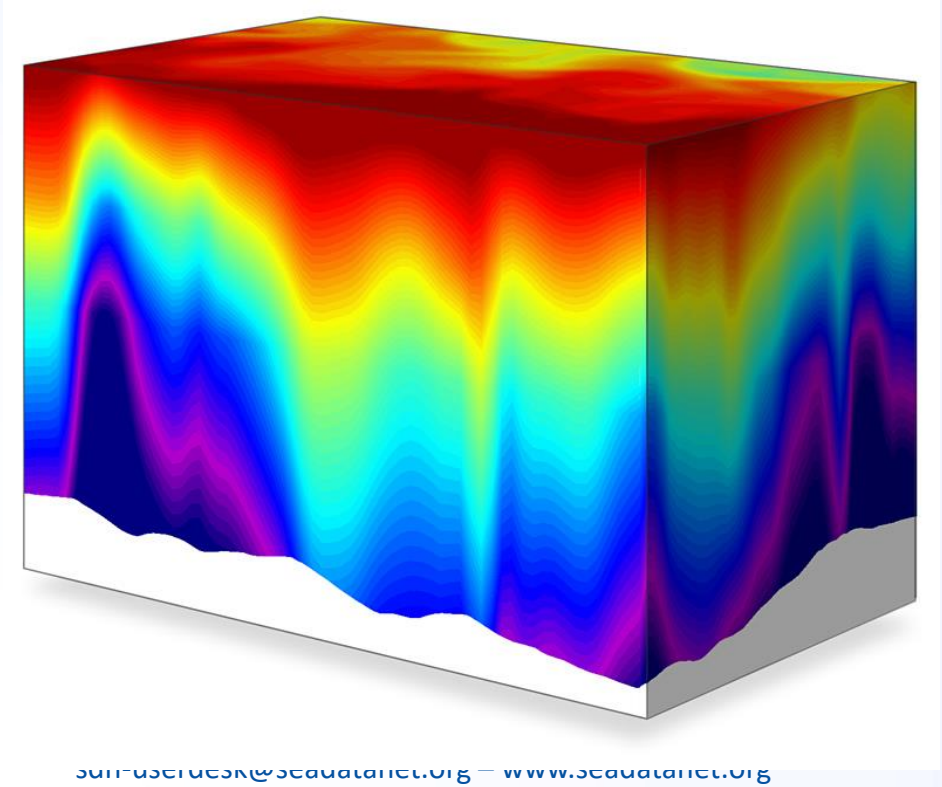
Marine data relevant for many uses:

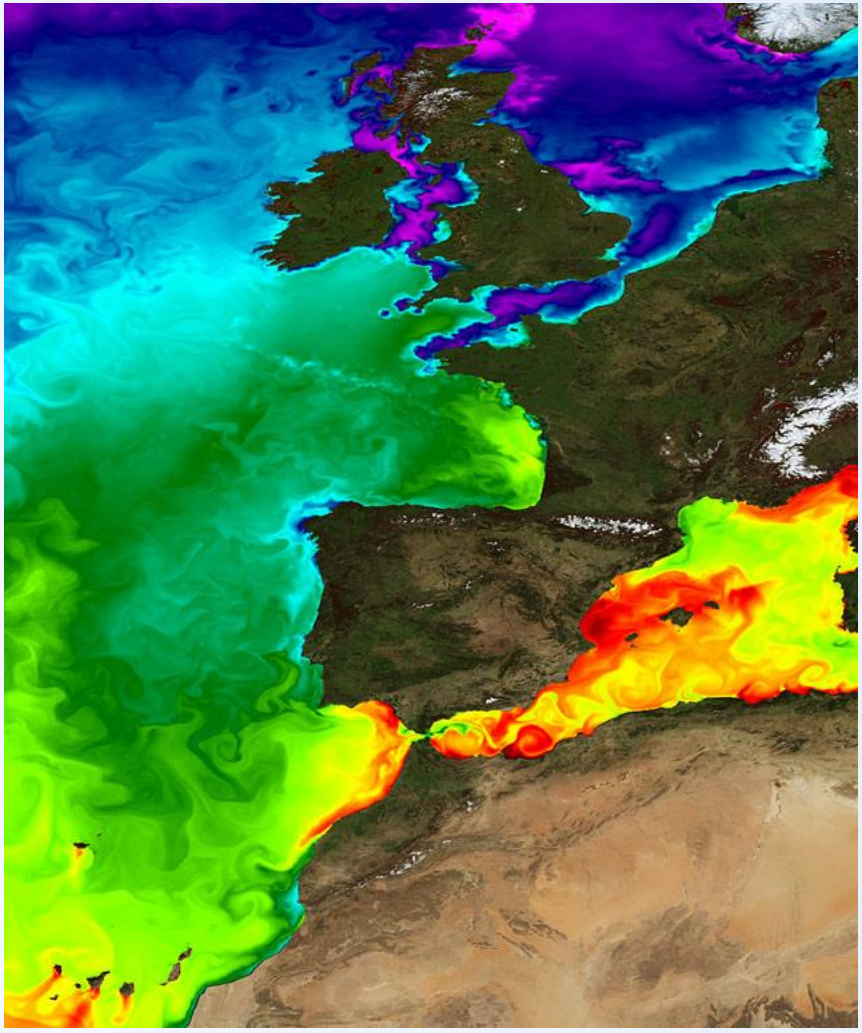
- Scientific Research to gain knowledge and insight
- Monitoring and assessment (water quality, climate status, stock assessment)
- Coastal Zone Management
- Modelling (including hindcast, now-cast, forecast)
- Dimensioning and supporting operations and activities at sea (shipping, offshore industry, 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

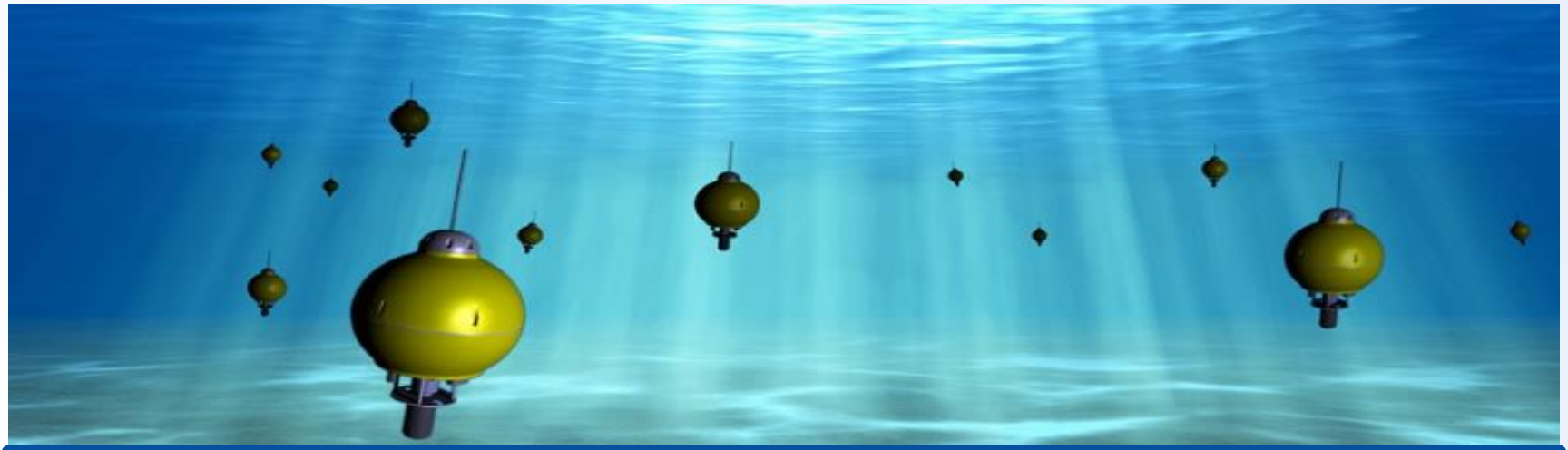




Acquisition of ocean and marine data

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?

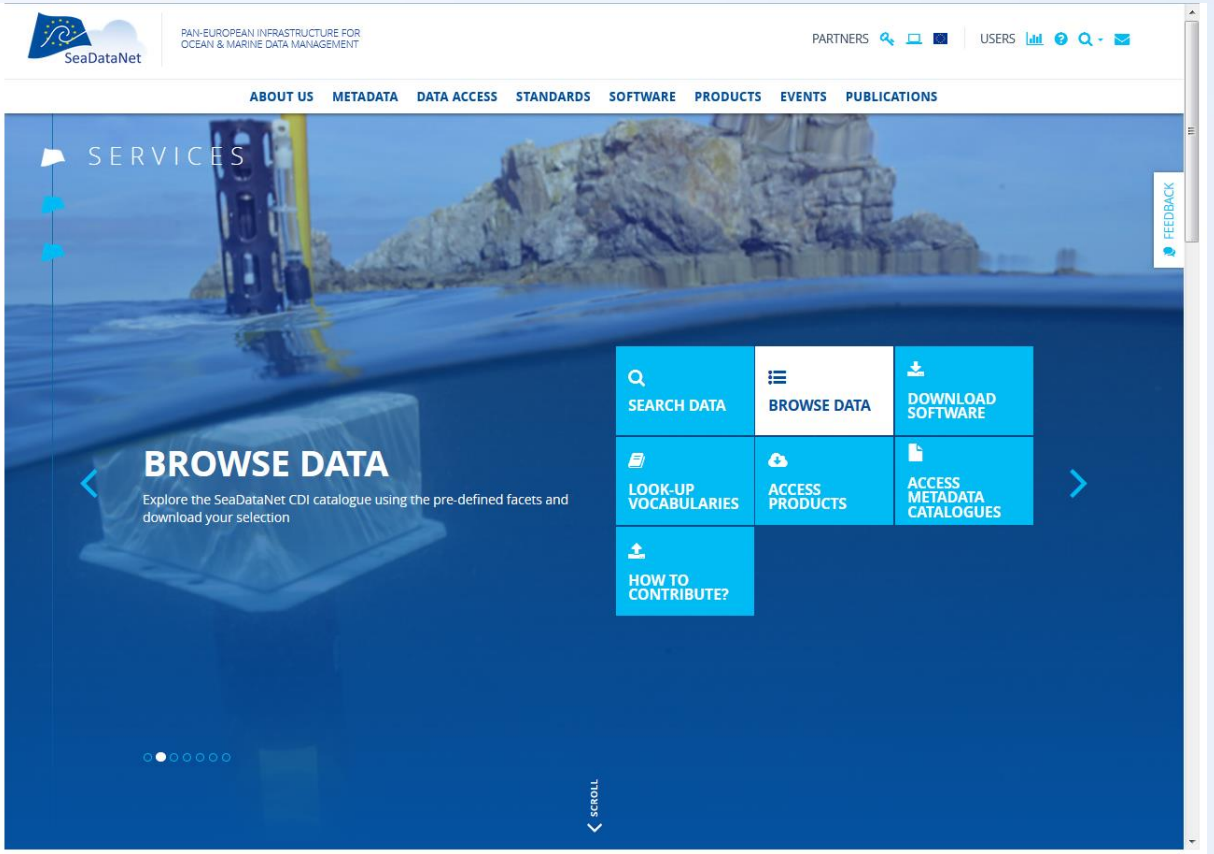
A pan-European infrastructure set up and operated for managing marine and ocean data in cooperation with the NODCs and data focal points of 34 countries bordering the European seas

90s	Metadata directories 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

Pan-European metadata directories

EDMERP
Projects

EDMO
Organisations

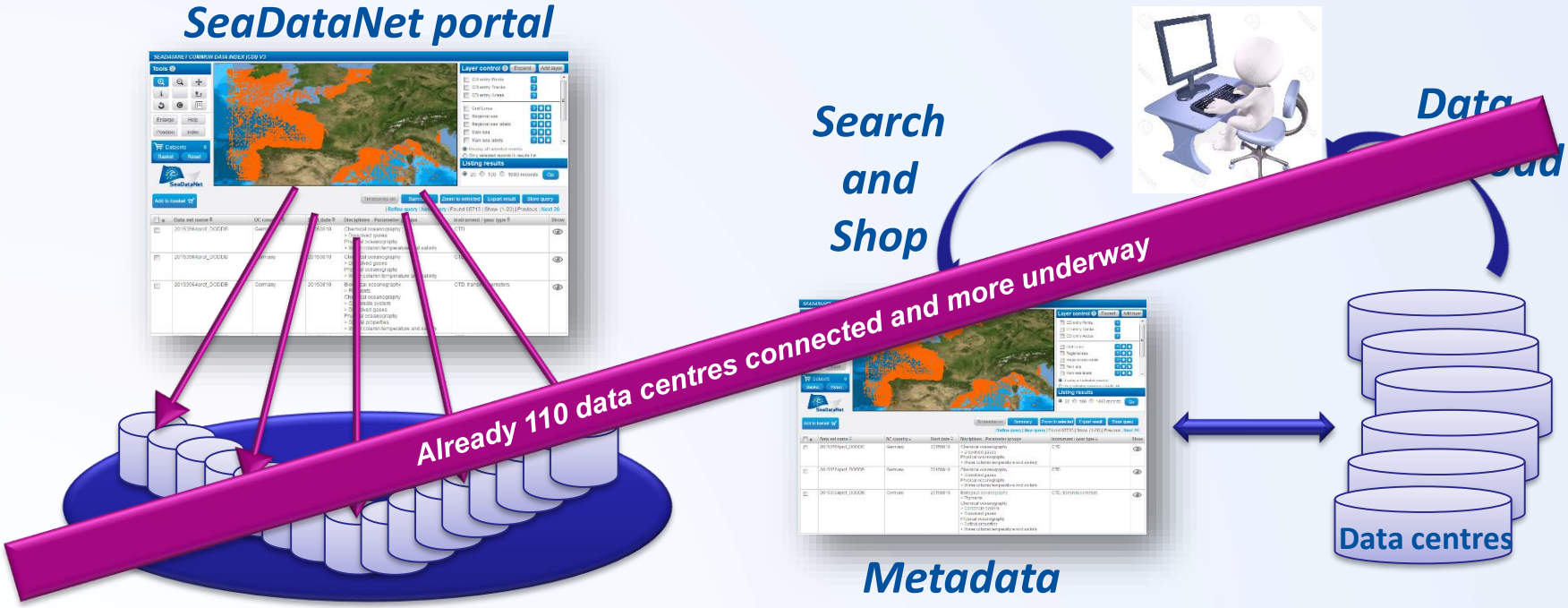
CSR
Research cruises

EDIOS
Observing programmes

CDI ***Data index***

EDMED
Data sets

CDI Data Discovery and Access service



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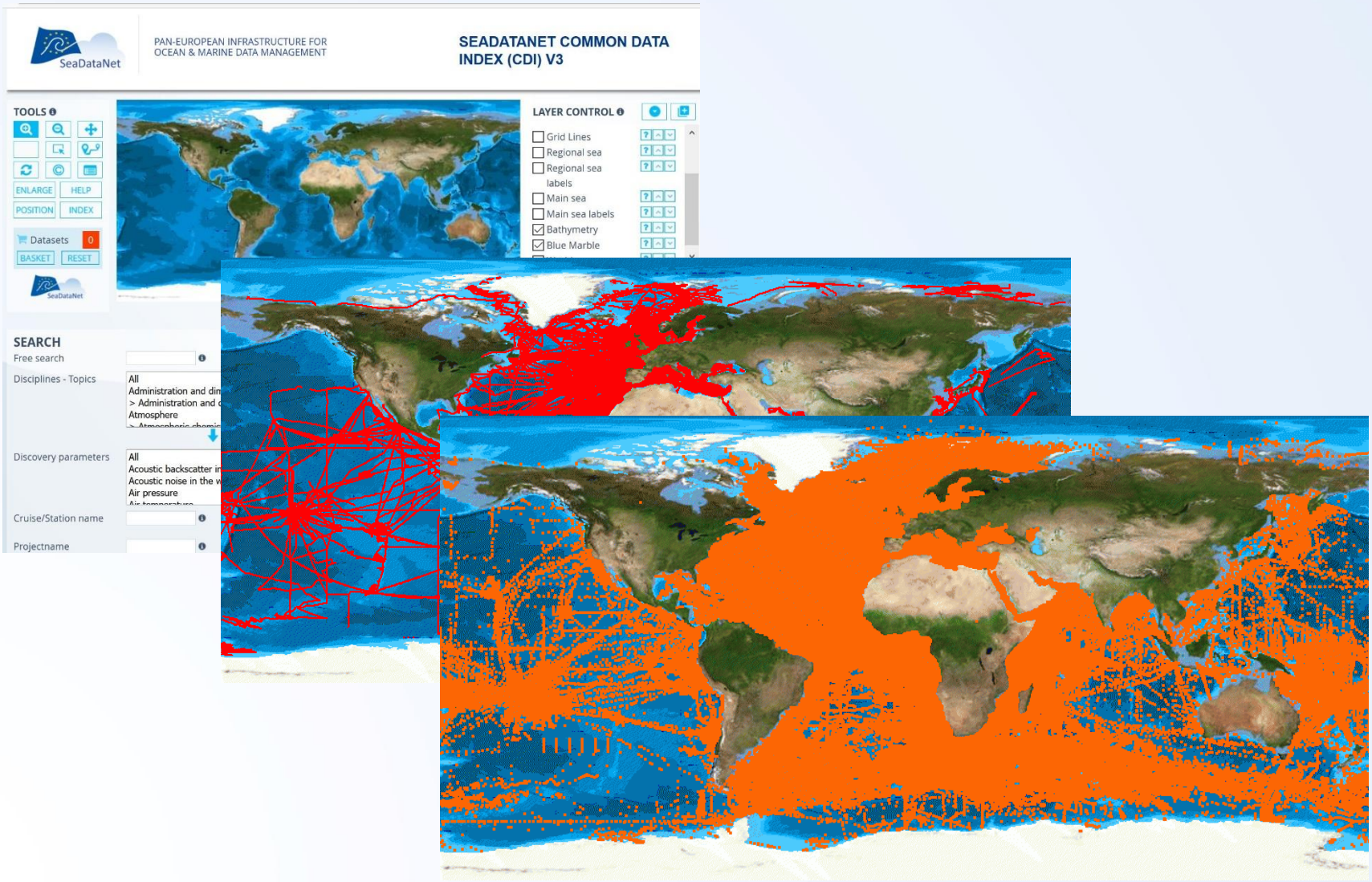
CDI Data Discovery and Access service



SeaDataNet as driver and contributing to many portals

Total collection

Data discovery
And access

SeaDataNet

> 110 data centres

NODCs; HOs; GEOs; BIOs; ICES;

> 650 European data originators

GEOSS portal

IODE ODP portal

Aggregated collection

Regional subsets

Black Sea portal

Caspian portal

Geo-Seas portal

Thematic subsets

Thematic subsets

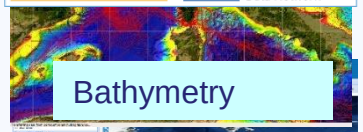
Thematic subsets

Thematic subsets

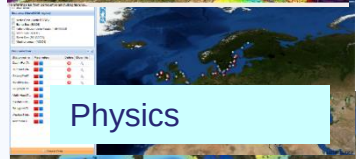
Thematic subsets

Thematic subsets

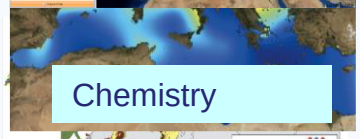
EMODnet
European Marine Observation and Data Network



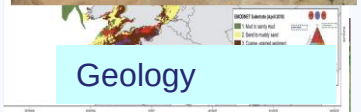
Bathymetry



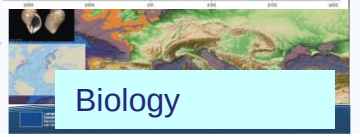
Physics



Chemistry



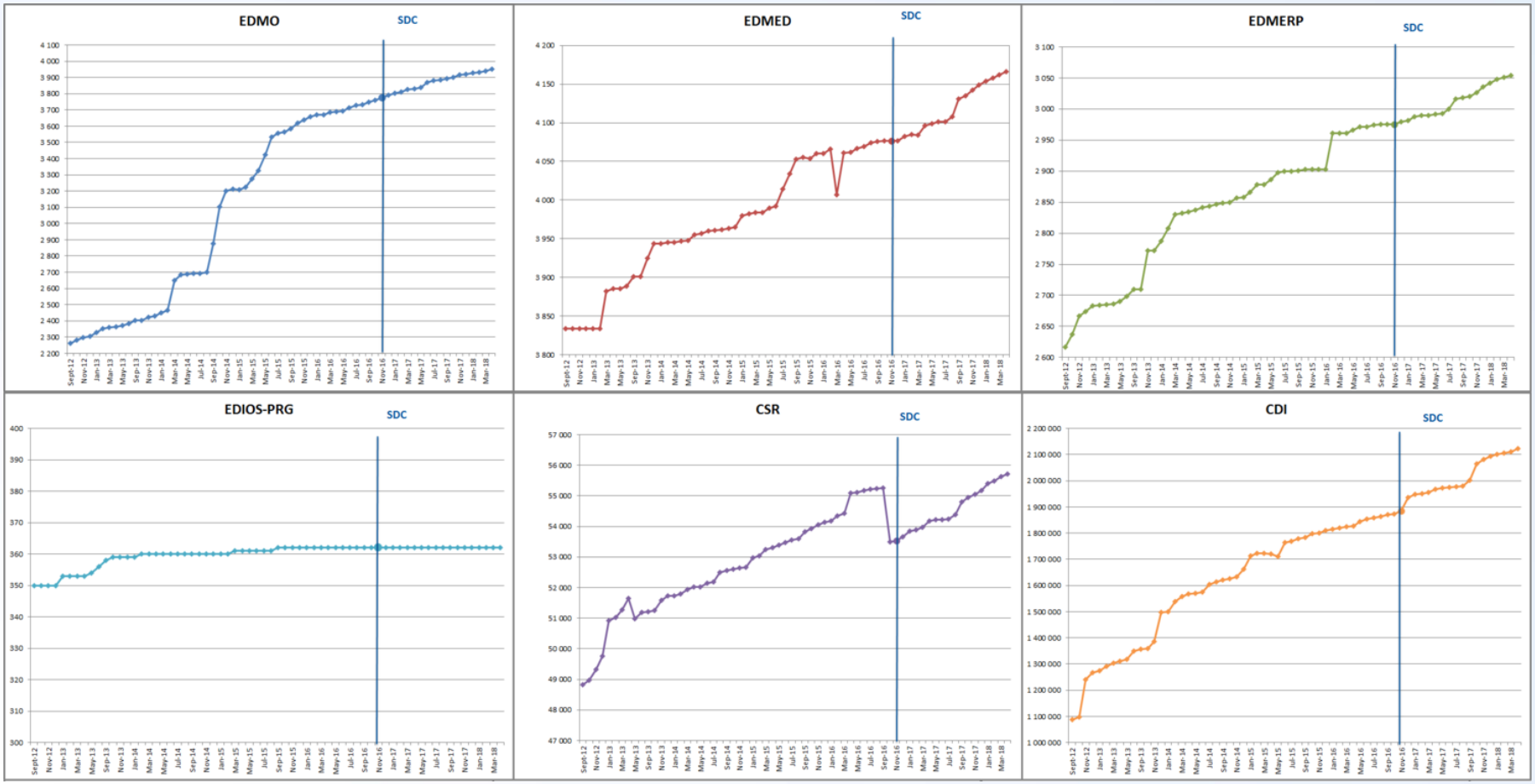
Geology



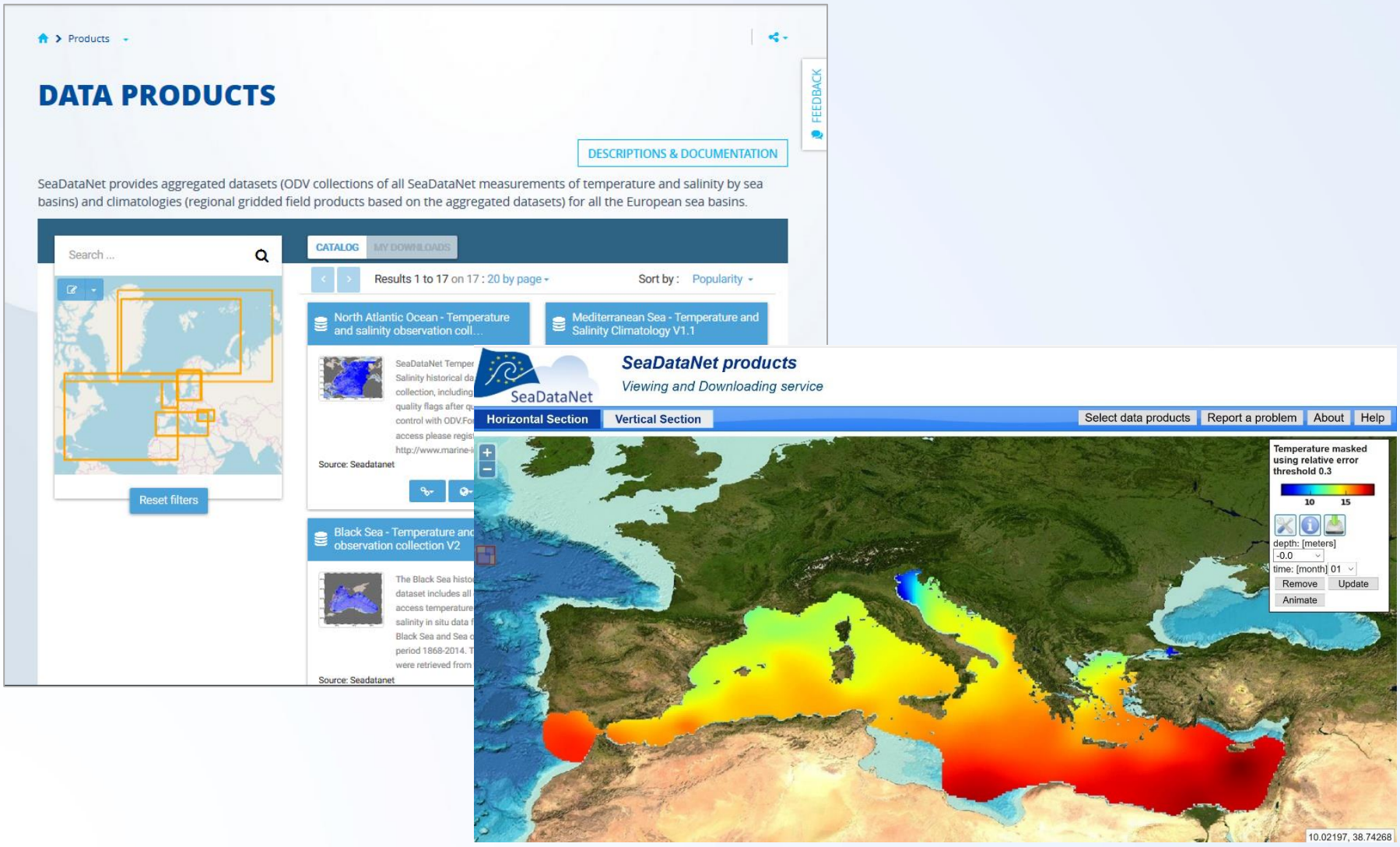
Biology

CDI Data Discovery and Access service

SeaDataNet directories increase



Data Products and viewers



SeaDataNet cooperation

- **Marine Strategy Framework Directive (MSFD):** providing infrastructure, standards and data collections for several indicators

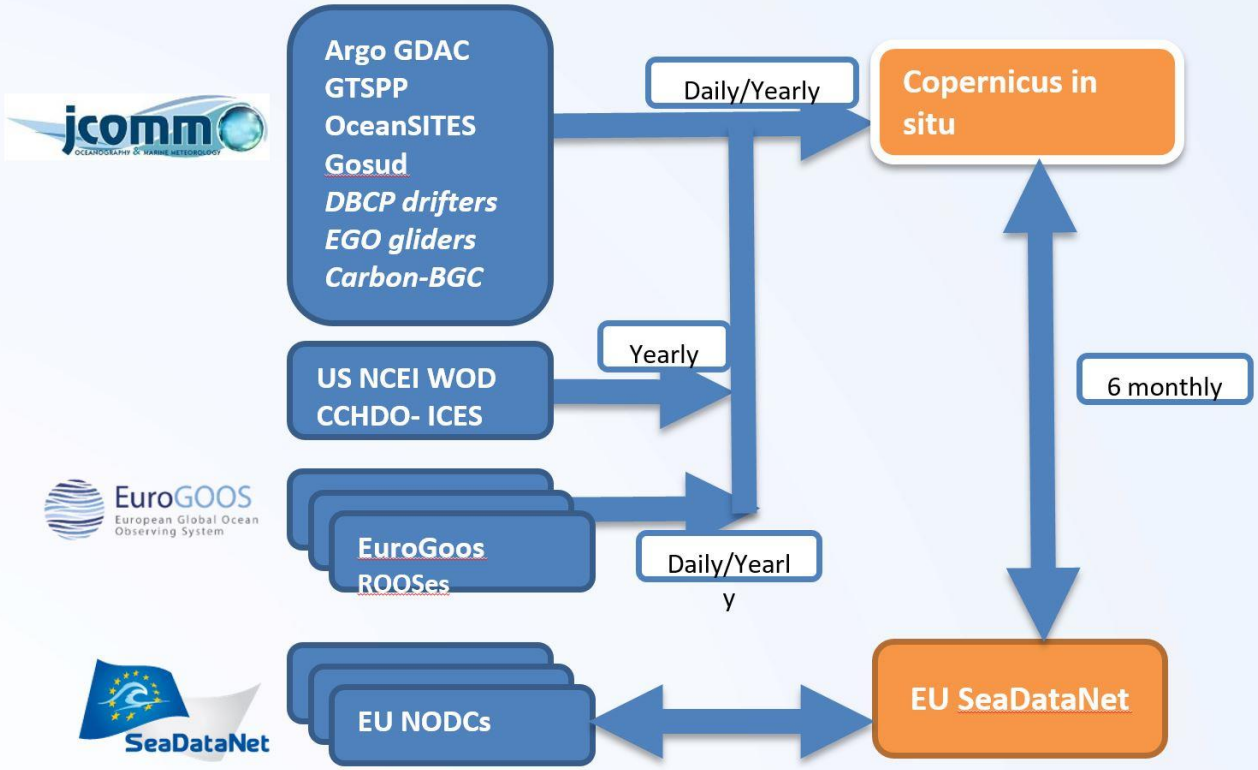
- **Large ocean monitoring systems (EuroGOOS, AtlantOS, Euro-ARGO, JERICO-Next, ..):** providing standards and validation + long-term archiving services

- **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:

Cooperation SeaDataNet – Copernicus

Copernicus Marine Environmental Monitoring Services (CMEMS)



SeaDataNet providing long-term archives and standards

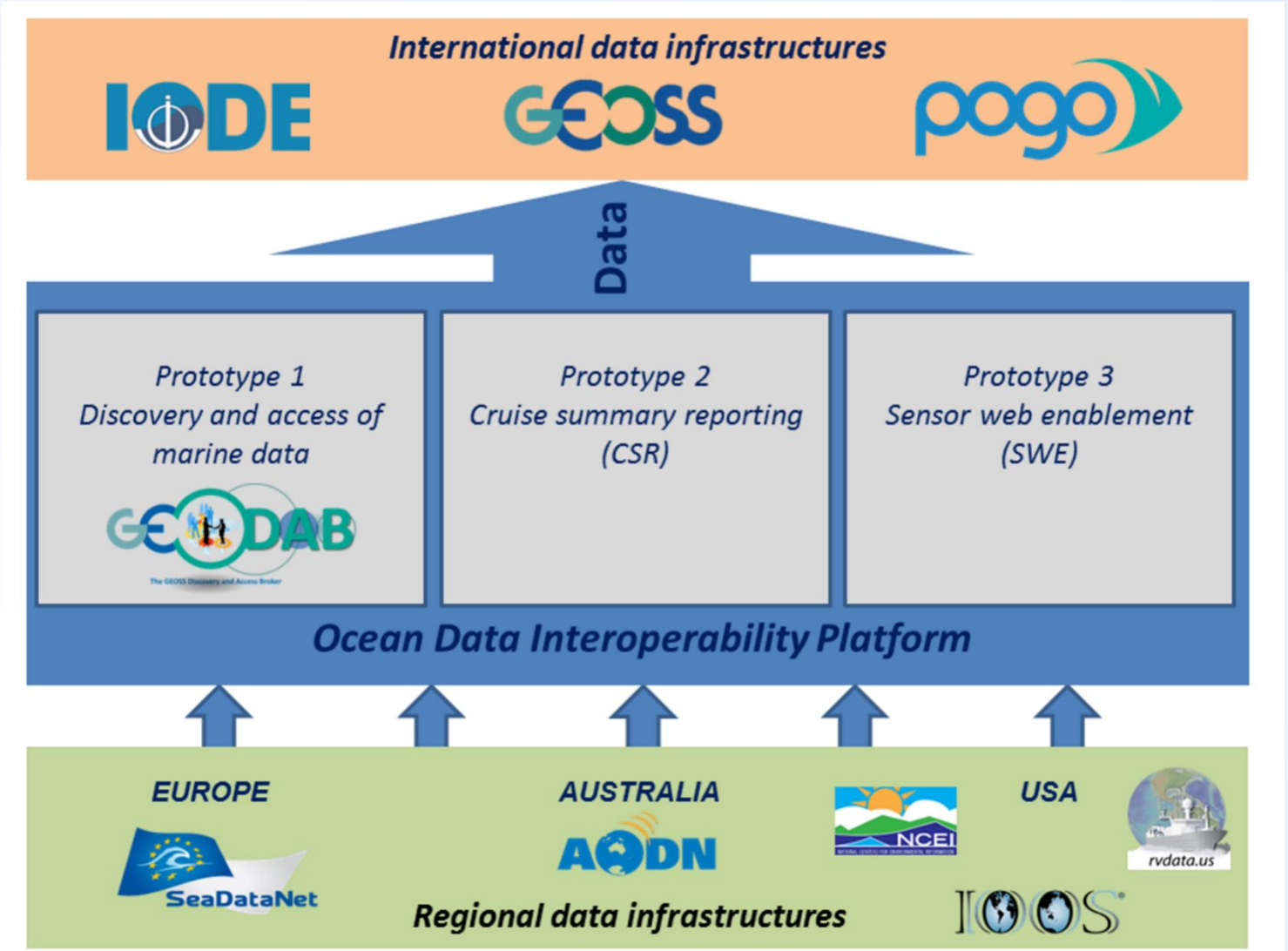
Ocean Data Interoperability Platform (ODIP - ODIP II)

- 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.

ODIP – Prototype projects

SeaDataCloud



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SeaDataNet and EMODnet

- EU initiative for an overarching **European Marine Observation and Data Network (EMODNet)** driven by Marine Knowledge 2020 and Blue Growth

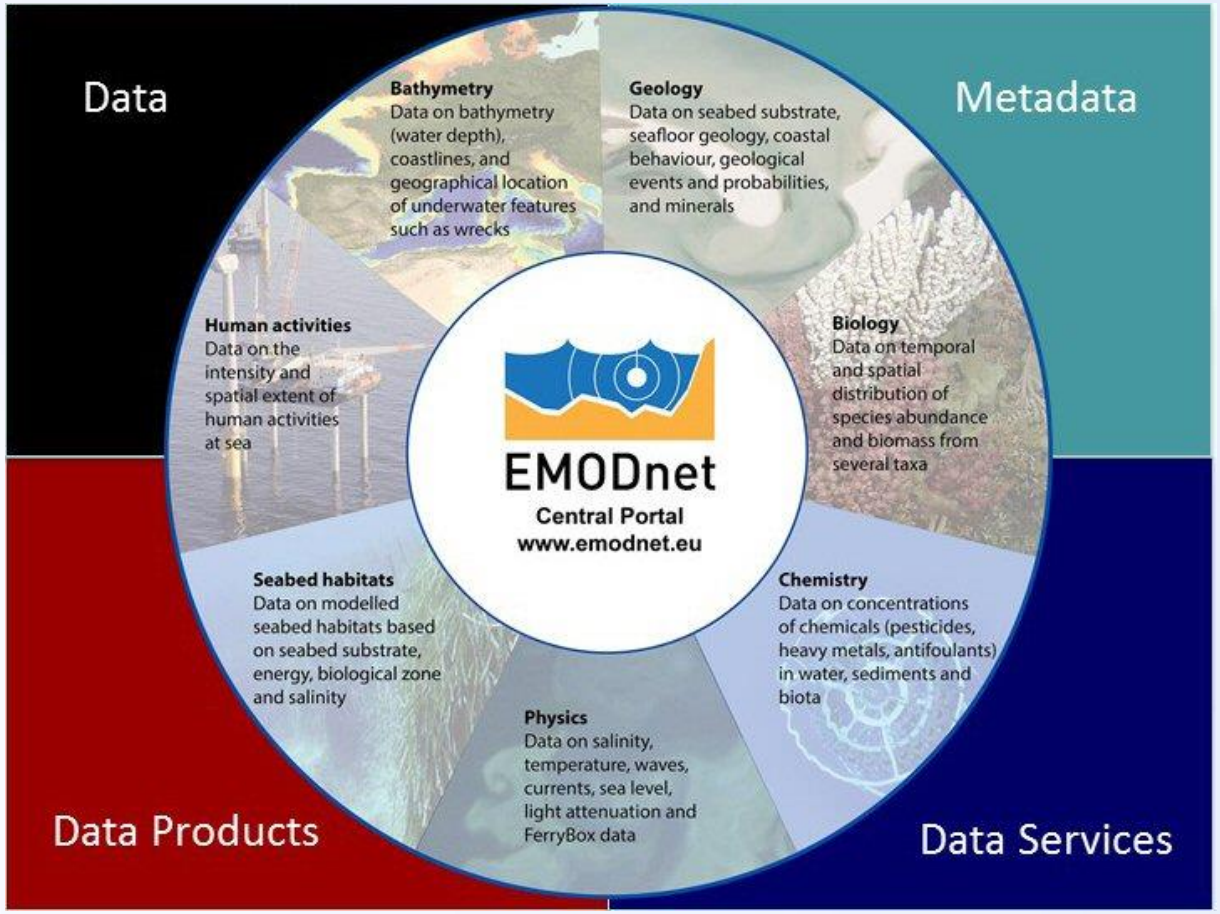
- SeaDataNet qualified as a leading infrastructure for the EMODnet data management component and is driving several thematic portals from the start in 2008

- *'Bottom-up meets top-down'*

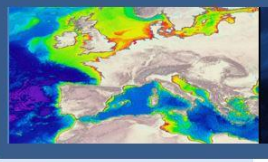
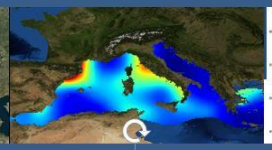
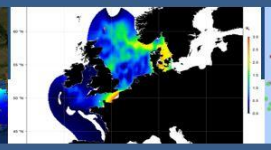
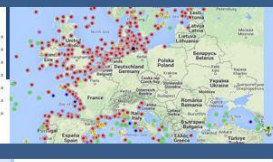
- This synergy has resulted in many more data centres adopting SeaDataNet standards and connecting to the CDI Data Discovery and Access service while it gave a flying start to EMODnet

European Marine Observation and Data Network

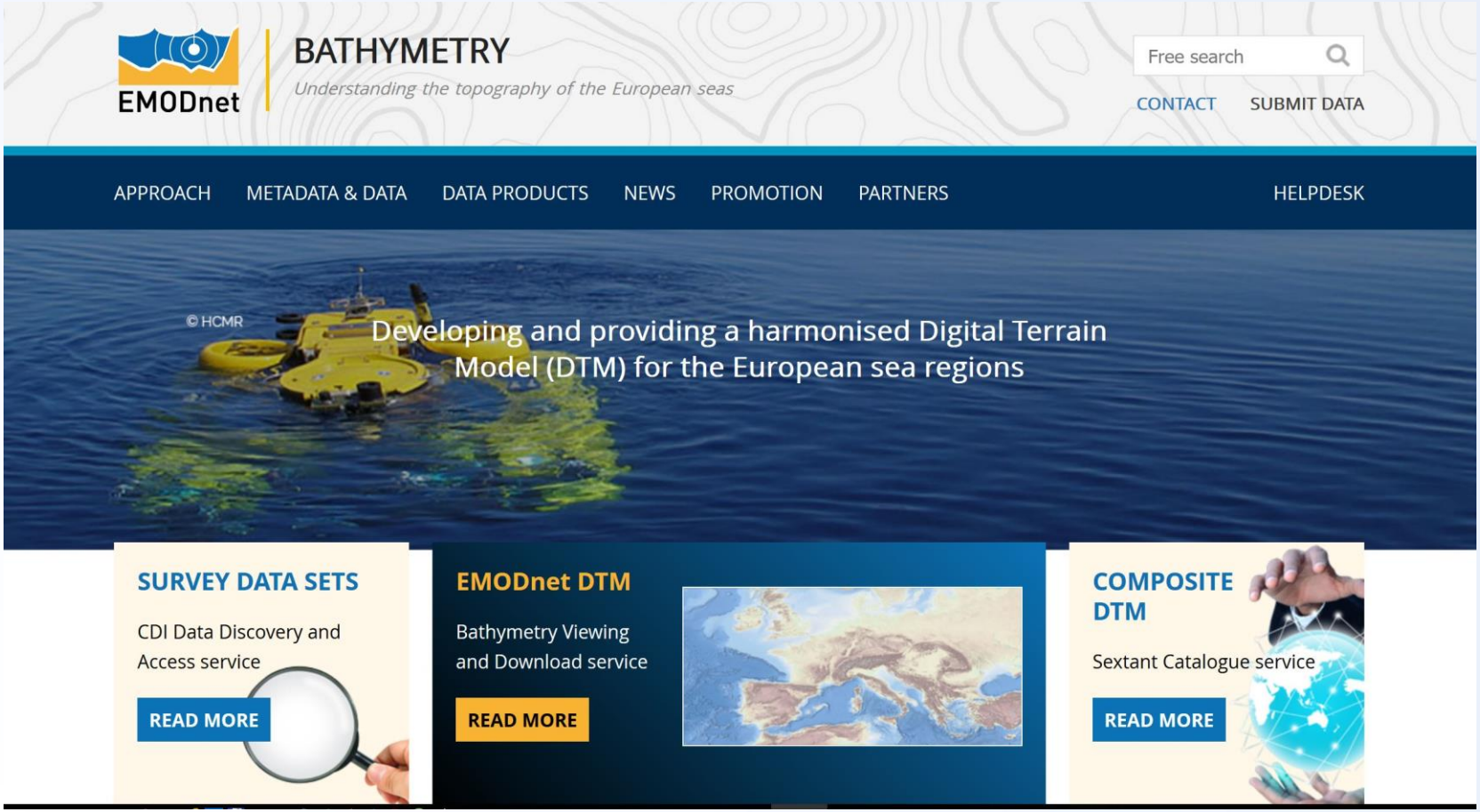
- Central portal
- Thematic portals for physics, biology, geology, bathymetry, chemistry, seabed habitas and human activities
- Checkpoints for analysing fitness for purpose



EMODnet thematic portals

Bathymetry	Geology	Seabed Habitats	Chemistry	Biology	Physics	Human activities
						
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	Seabed substrate Sediment accumulation rate Sea-floor geology Seabed lithology Stratigraphy Coastline migration Aggregate resources Geological events	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	Pesticides & Biocides Antifoulants Phamaceuticals Heavy Metals Hydrocarbons Radionuclides Fertilizers Acidity Dissolved Gasses Plastics Marine Litter Beach litter Seafloor litter Micro litter Chlorophyll Silicates Organic Matter	Biomass Abundance Gridded Abundance maps *species groups:* • phytoplankton • zooplankton • angiosperms • macro-algae • invertebrate bottom fauna • birds • mammals • reptiles • Fish	Waves Water temperature Water salinity/conductivity/density Currents Light attenuation/ fluorescence Sea level Atmospheric parameters Wind Underwater noise Rivers Ice	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



www.emodnet-bathymetry.eu

Bathymetry CDI data discovery and access service

EMODnet 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

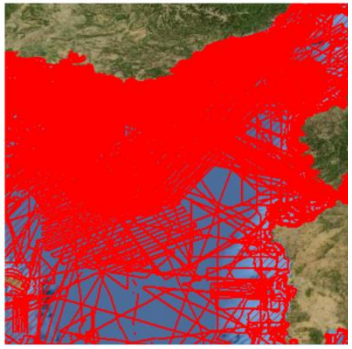
Layer control

- 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 Reco

#	Data set name
	S196900100-016
	S196900100-014

Details | Results | Found 27066 | Show 26501 | Previous | Next

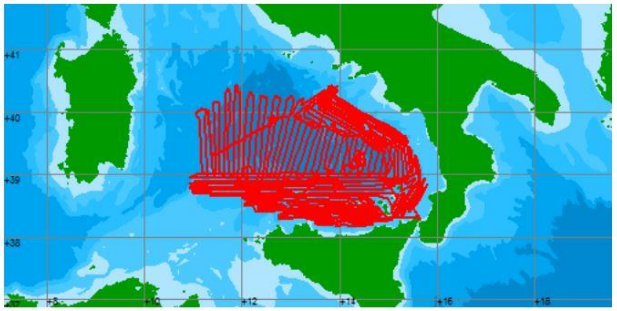
XML

WHAT?

Data set name	TIR96
Discipline	Marine geology Terrestrial
Parameter groups	Gravity, magnetics and bathymetry Terrestrial
Discovery parameters	Bathymetry and Elevation
GEMET-INSPIRE themes	Oceanographic geographical features
Abstract	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 framewok 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).
Data format	Climate and Forecast NetCDF **Version** 3.5
Data set creation date	20170831

WHERE?

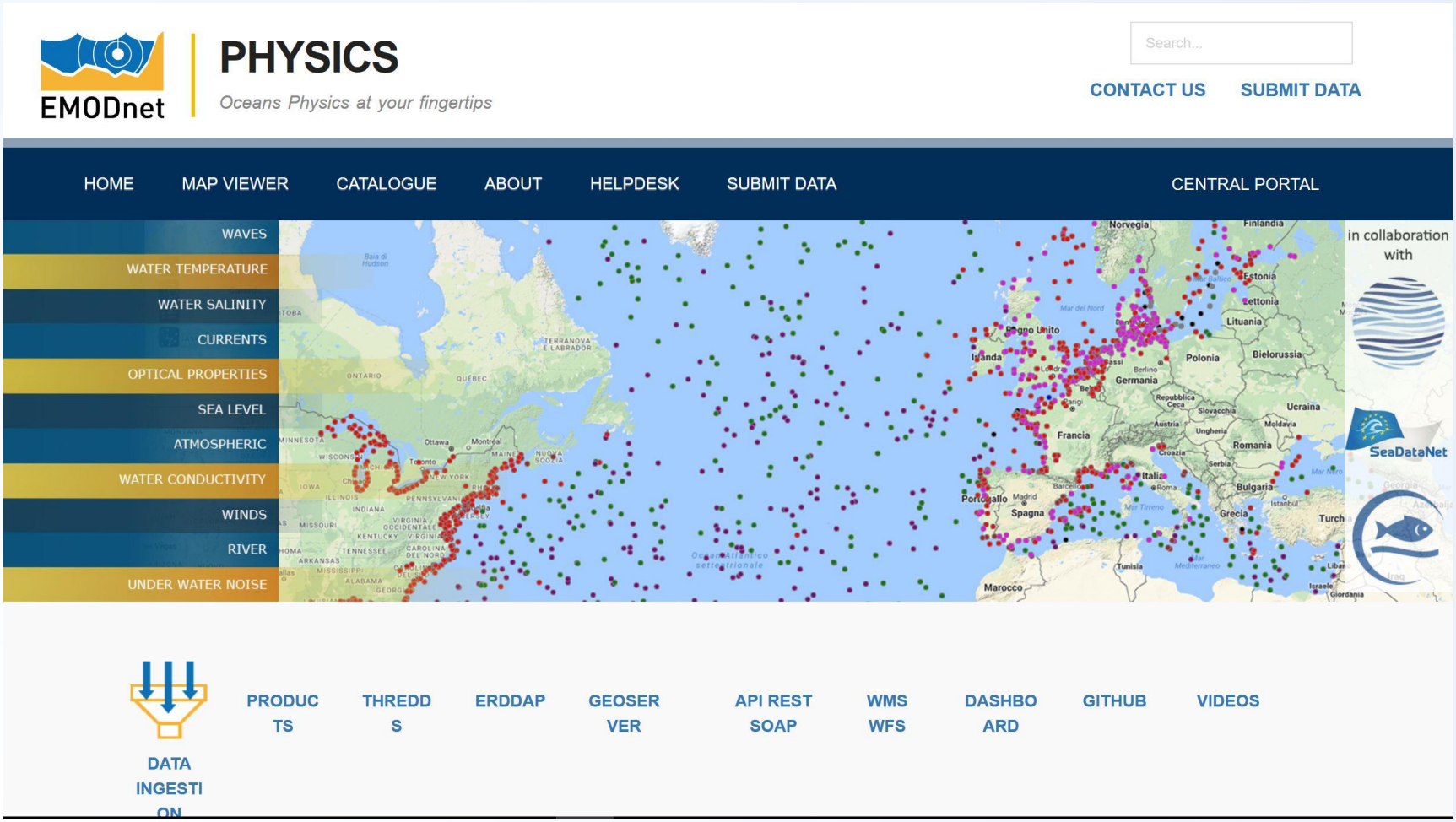
Map



GML id	mc01
GML objects	

Name	Description
Track T960016 for TIR96	Track T960016 for TIR96
Track T960017 for TIR96	Track T960017 for TIR96

EMODnet Physics



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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

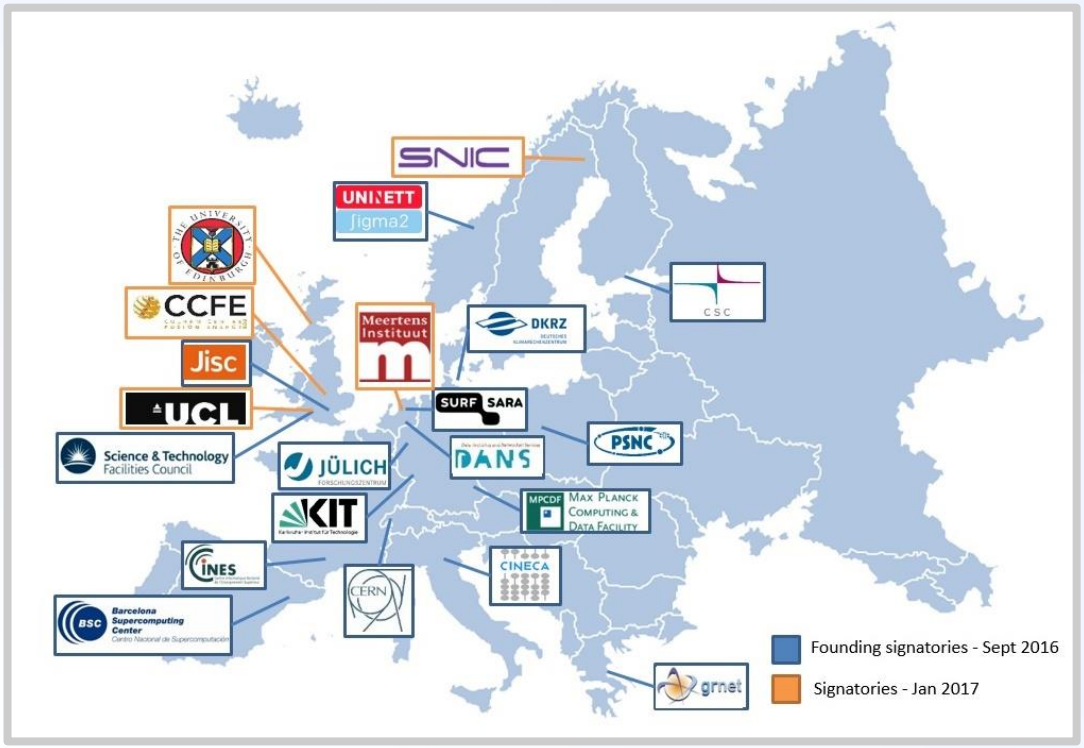
SeaDataCloud a new opportunity

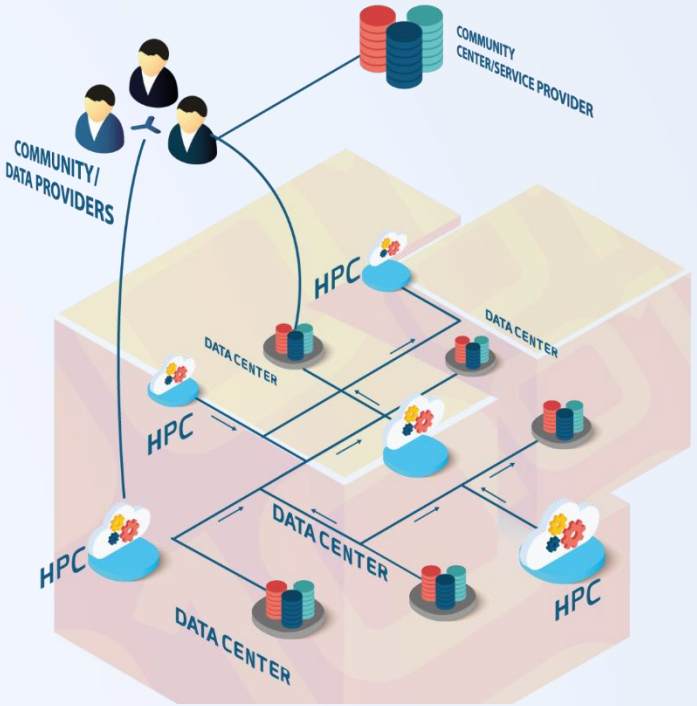
- Standards and information technology are always evolving, there is a move towards cloud storage and cloud computing, and the SeaDataNet infrastructure must stay up-to-date to maintain and further expand its services to its leads customers and major stakeholders

- 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





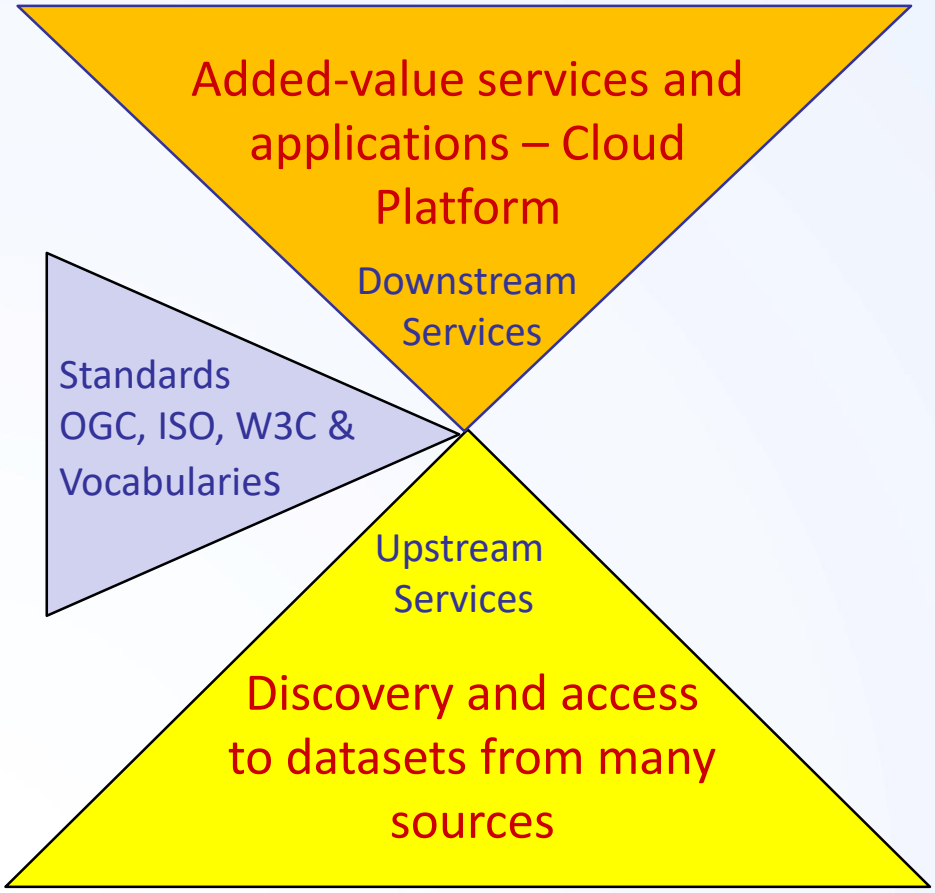
EUDAT is European consortium of academic computing centres

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

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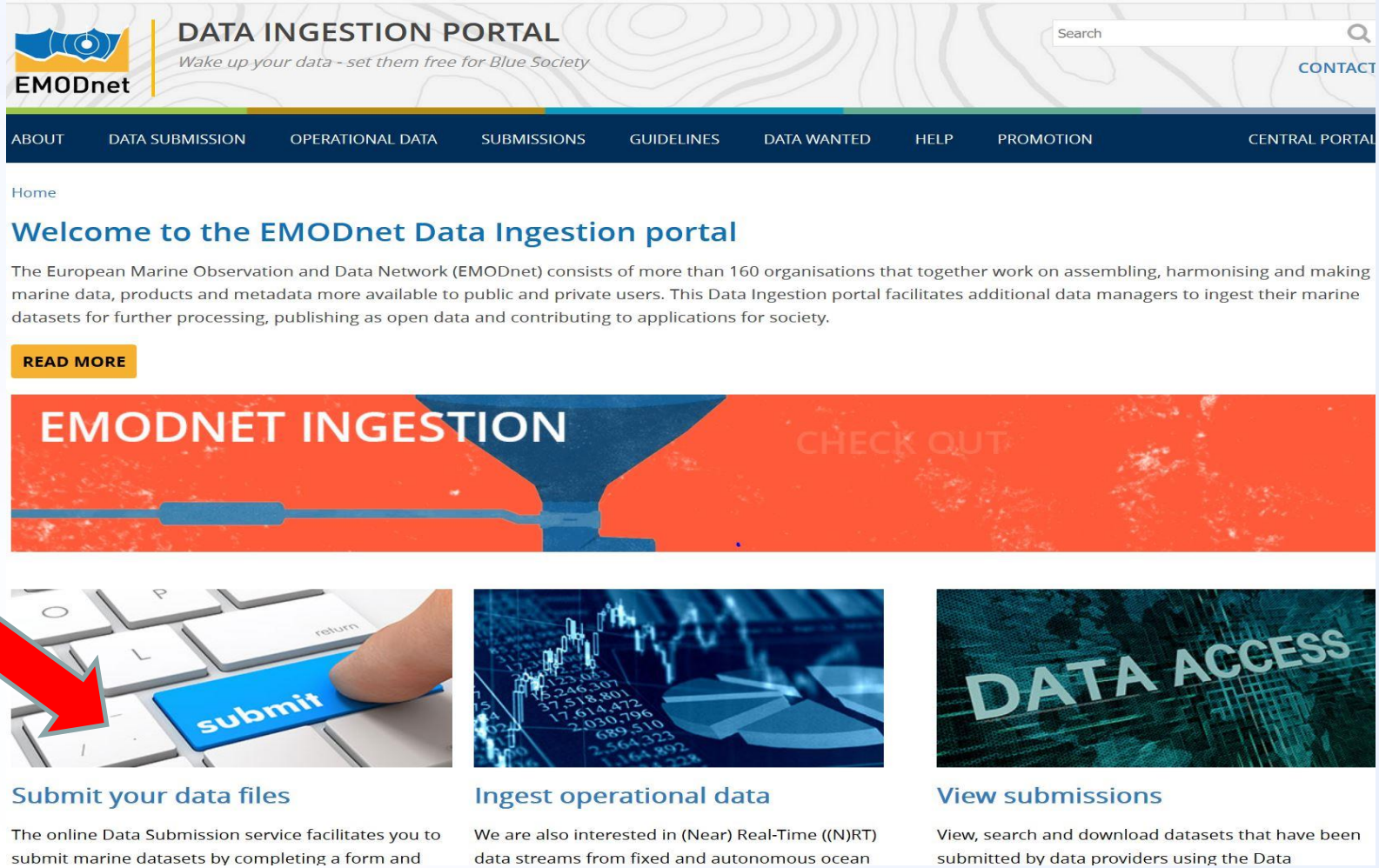
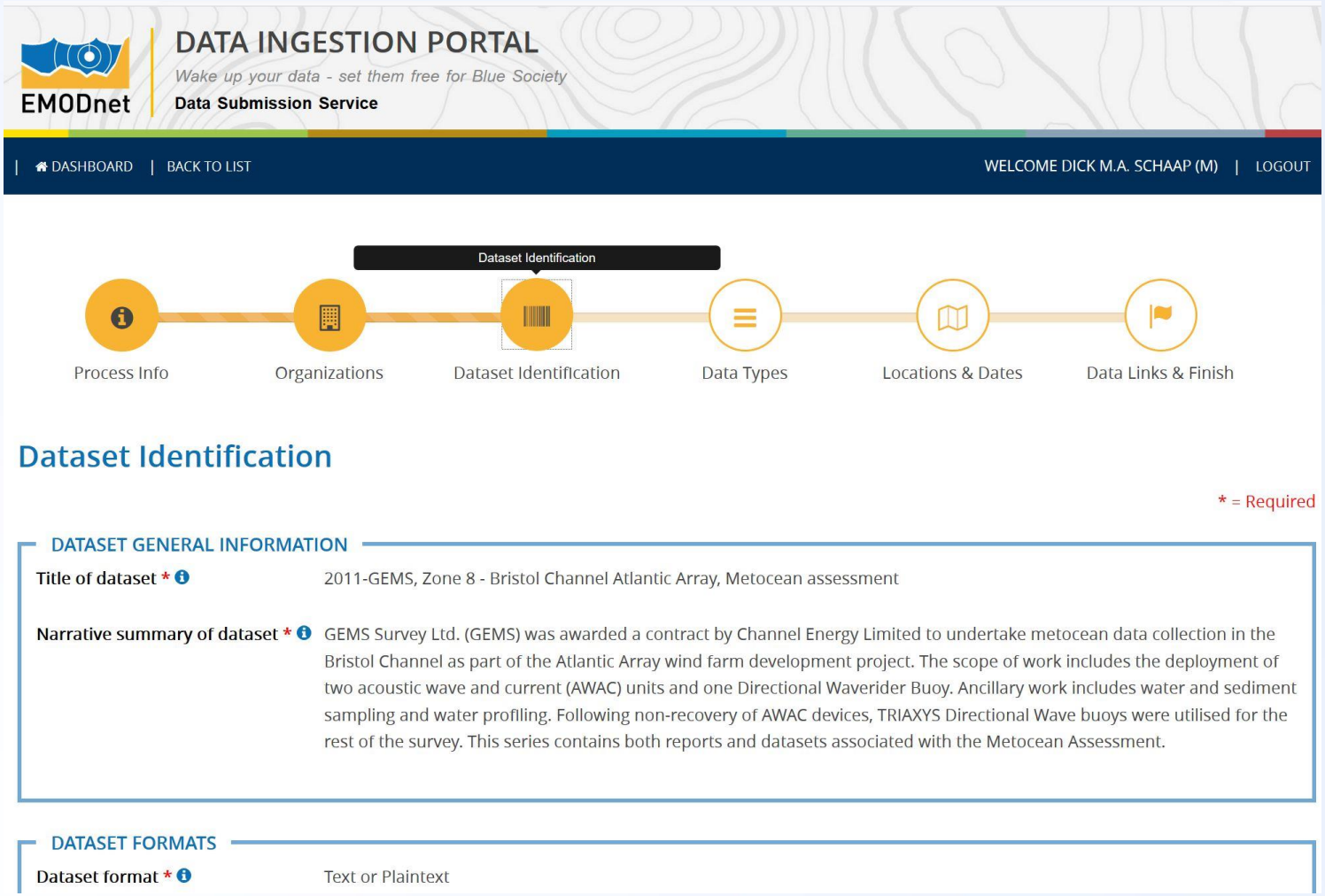
EMODnet Ingestion – wake up your data

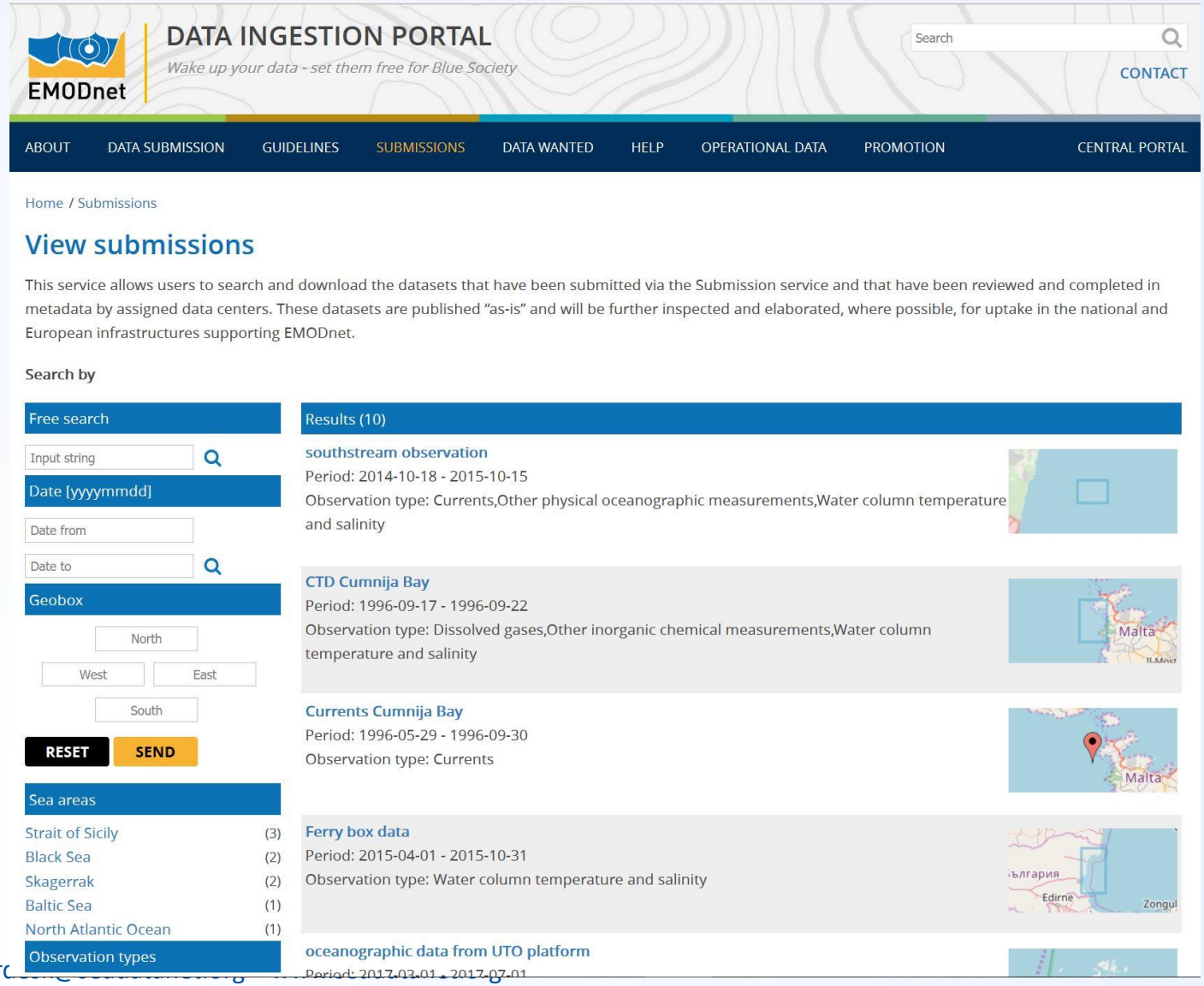


Submission service for offline data sets

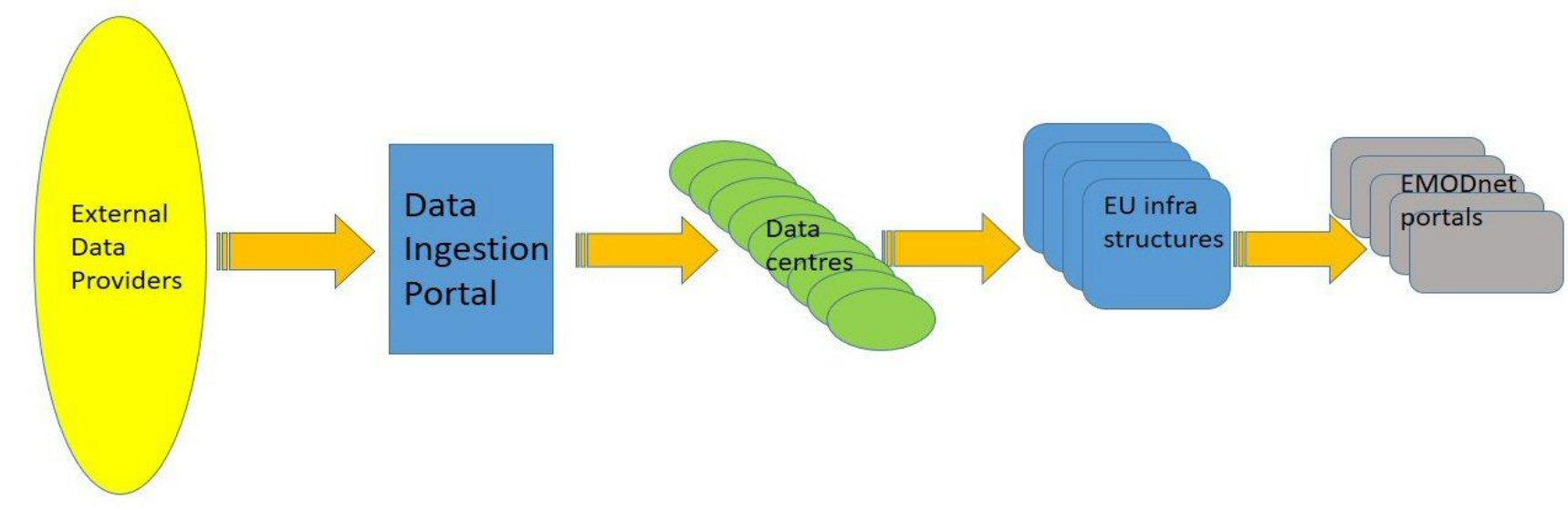
SeaDataCloud



View submissions service ‘as is’



Uptake of ingested data sets by European infrastructure



[Check out the video]