



*Your gateway to marine data in Europe*

# Adopting and adapting SeaDataNet services for EMODnet Chemistry

EUDAT Conference "Putting the EOSC vision into practice"

Porto (PT), 22-25 January 2018

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# EMODnet



## What is EMODnet?



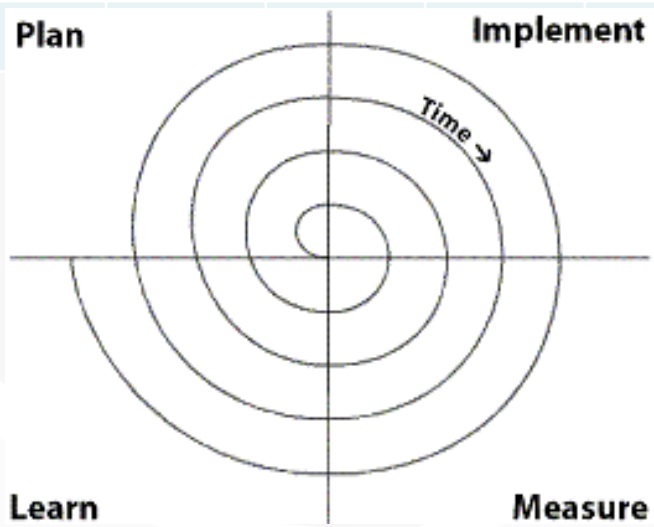
MARITIME AFFAIRS

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
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*Phase 1 – limited sea basins (ca 6 MEuro)*

*Phase 2 - low resolution (ca 16 MEuro)*

*Phase 3 - multi-resolution (> 100 – 200 MEuro)*

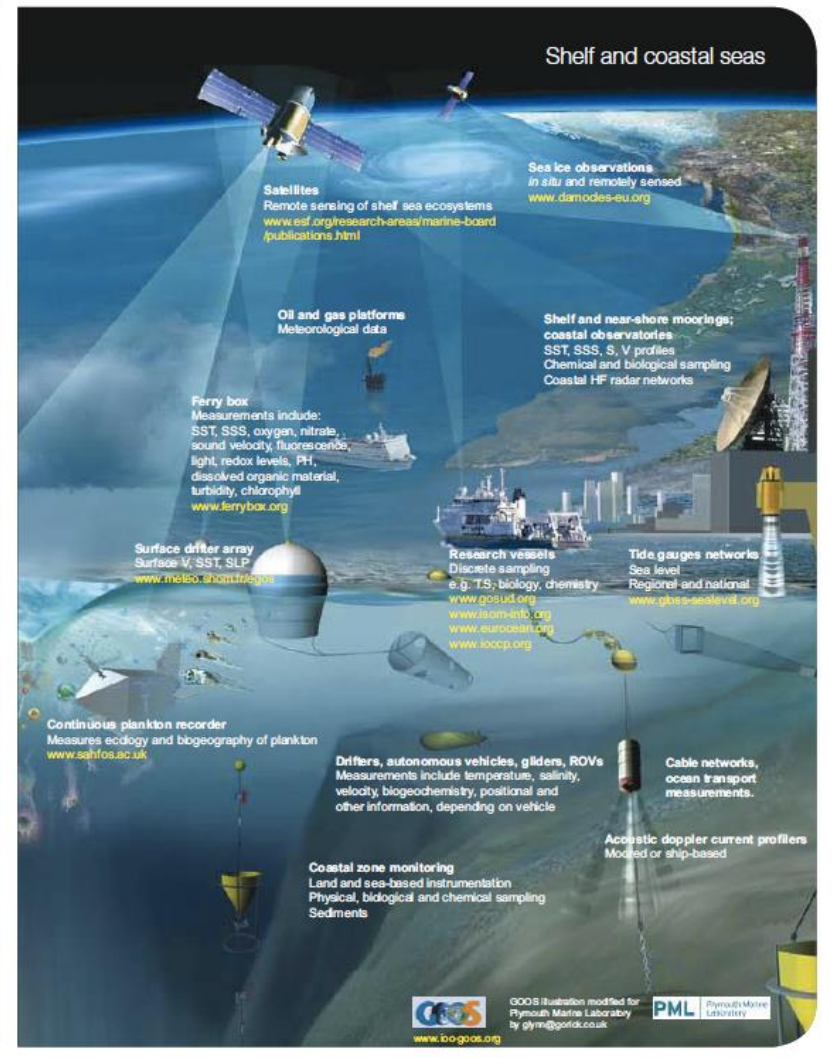
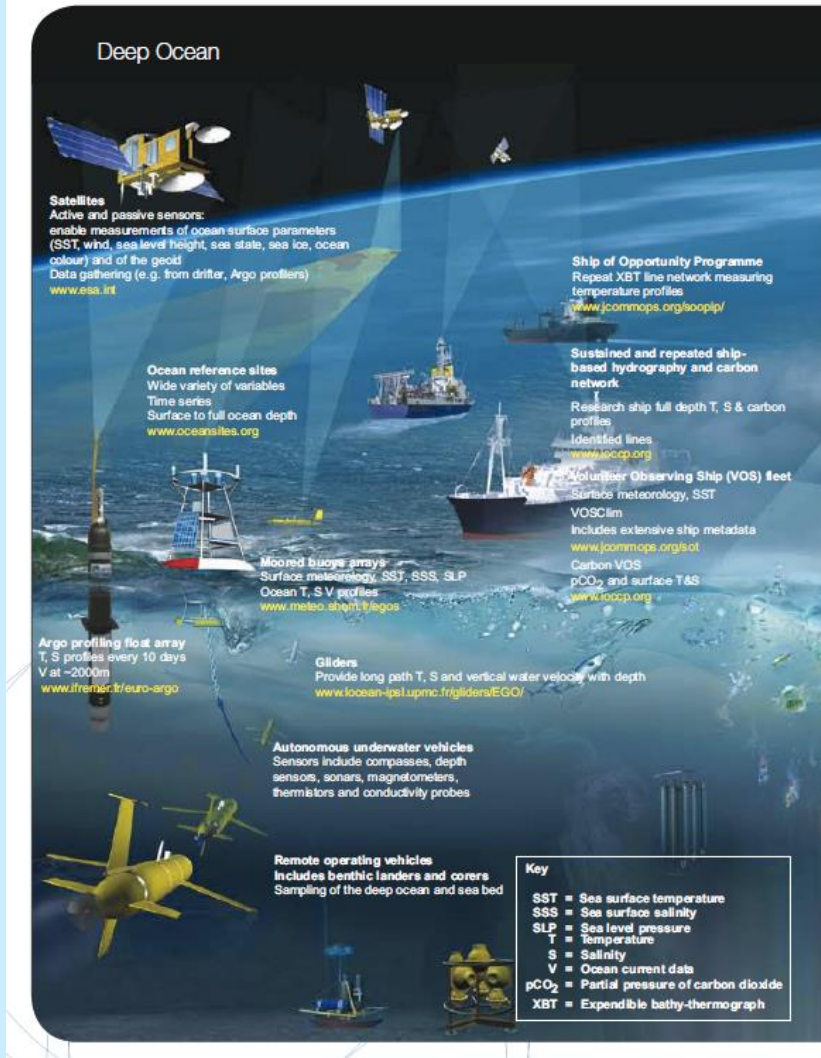


*PROTOTYPING:  
allows users to assess and  
improve product by trying it out*



Long-term initiative as part of Blue Growth strategy (Marine Knowledge 2020)

# Marine data acquisition



EU cost – benefit analysis: cost of marine observation in Europe is circa 400 Million Euro per year for space data and another 1 Billion Euro per year for in-situ data



# EMODnet



## How does it work?

- Developed by **7 thematic assembly** groups with thematic **data portals**
- Supported by a common **central portal**

<p><b>Bathymetry</b></p> <p>Data on bathymetry (water depth), coastlines, and geographical location of underwater features: wrecks.</p> <p><a href="#">Read more</a> <a href="#">Portal</a></p>	<p><b>Geology</b></p> <p>Data on seabed substrate, sea-floor geology, coastal behaviour, geological events, and minerals.</p> <p><a href="#">Read more</a> <a href="#">Portal</a></p>	<p><b>Seabed Habitats</b></p> <p>Data on modelled seabed habitats based on seabed substrate, energy, biological zone, and salinity.</p> <p><a href="#">Read more</a> <a href="#">Portal</a></p>
<p><b>Chemistry</b></p> <p>Data on the concentrations of pesticides, heavy metals, and antifoulants, in water, sediments and biota.</p> <p><a href="#">Read more</a> <a href="#">Portal</a></p>	<p><b>Biology</b></p> <p>Data on temporal and spatial distribution of species abundance and biomass from several taxa.</p> <p><a href="#">Read more</a> <a href="#">Portal</a></p>	<p><b>Physics</b></p> <p>Data on salinity, temperature, waves, currents, sea-level, light attenuation, and FerryBoxes.</p> <p><a href="#">Read more</a> <a href="#">Portal</a></p>
<p><b>Human Activities</b></p> <p>Data on the intensity and spatial extent of human activities at sea.</p> <p><a href="#">Read more</a> <a href="#">Portal</a></p>	<p> <b>EMODnet Central Portal</b> European Marine Observation and Data Network</p> <p><a href="http://www.emodnet.eu/">http://www.emodnet.eu/</a></p>	



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## What is EMODnet aim?

- ① **Network** of +110 organizations assembling marine data, metadata & data products from different sources within Europe in a uniform way to
  - ① **unlock** fragmented & hidden **marine data** by making data more easily accessible, re-usable and interoperable
  - ① produce data **products** of common interest



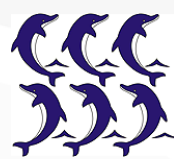
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# Link to EU Marine Strategy Framework Directive



🎯 Tight connection with EEA, RSC, JRC and ICES to provide relevant information for parameters identified as indicators of MSFD descriptors





# EMODnet

European Marine Observation and Data Network

# MSFD GES Descriptors and EMODnet

**Biology**



Data on temporal and spatial distribution of species abundance and biomass from several taxa.


[Read more](#) [Portal](#)

**Seabed Habitats**



Data on modelled seabed habitats based on seabed substrate, energy, biological zone, and salinity.

**Chemistry**



Data on the concentration of nutrients, organic matter, pesticides, heavy metals, radionuclides and antifoulants in water, sediment and biota.

[Read more](#) [Portal](#)

**Human Activities**



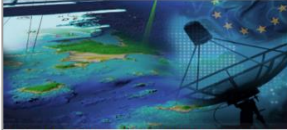
Data on the intensity and spatial extent of human activities at sea.

**Seabed Habitats**



Data on modelled seabed habitats based on seabed substrate, energy, biological zone, and salinity.

**Coastal Mapping**



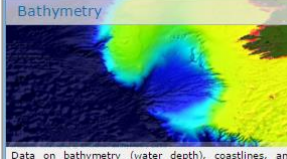
Building a Joint European Coastal Mapping Programme.

**Geology**




Data on seabed substrate, sea-floor geology, coastal behaviour, geological events, and minerals.

**Bathymetry**



Data on bathymetry (water depth), coastlines, and geographical location of underwater features: wrecks.

**Physics**



Data on salinity, temperature, waves, currents, sea-level, light attenuation, and FerryBoxes.

1. Biodiversity
2. Non-indigenous species
3. Commercially exploited fish and shellfish
4. Food web integrity
5. Eutrophication
6. Sea-floor integrity
7. Hydrographical conditions →
8. Contamination
9. Contaminants in seafood for human consumption
10. Marine litter
11. Energy, including underwater noise



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# EMODnet Chemistry 3

→ 6/3/2017 - 5/3/2019

Aims to collect, aggregate, **standardize**, check the **quality** of data  
developing new services to **share** information and products

## Collects data on:

In 3 matrices:

- water column;
- biota;
- sediment.

	Group	Examples
<b>Eutrophication</b>	nutrients, dissolved gasses ...	N, P, Si, Oxy, Chl-a
<b>Ocean acidification</b>	acidity	pH, pCO <sub>2</sub>
<b>Contaminants</b>	hydrocarbons, heavy metals, pesticides, ...	anthracene, fluoroanthene, Me, Cd, Pb, TBT, DDTs
<b>Marine Litter</b>	beach litter, seabed litter, microlitter	

**Data products** generation are organized at **Regional level**





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## EMODnet Chemistry 3



With historical and **recent data**

2000-2016  
169.647 stations

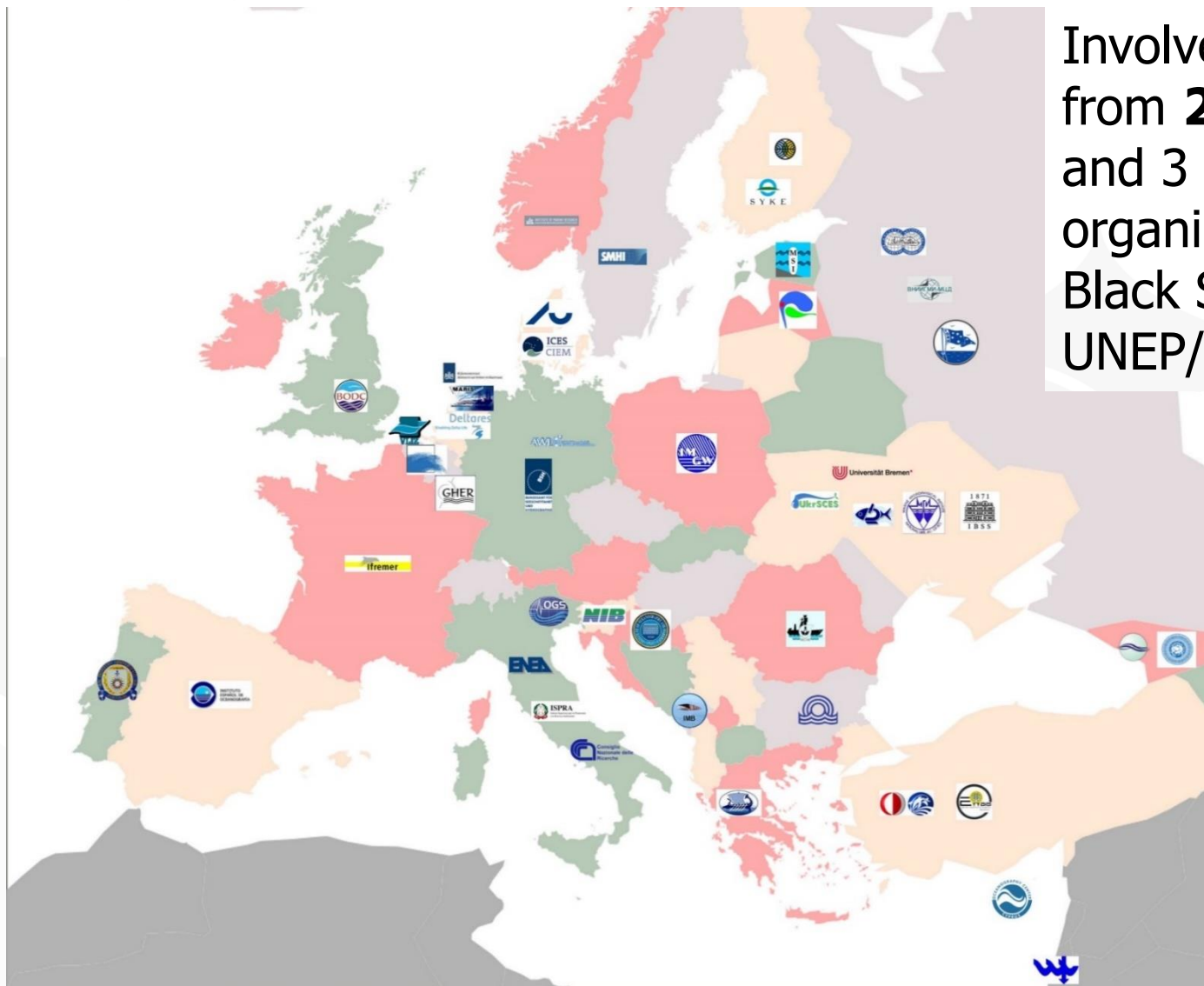




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## EMODnet Chemistry 3 network

Involves **45 institutes** from **27 countries** and 3 international organisations (ICES, Black Sea Commission, UNEP/MAP)



SeaDataNet  
network of  
NODCs



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# Adopting and adapting SeaDataNet

- **SDN Standards** for metadata and data:
  - metadata → CDI - Common Data Index (xml ISO 19115),
  - standard vocabs (P021,P011,P061...) for common terms,
  - for background data exchange → ODV data format,
- **SDN Infrastructure:**
  - CDI mechanism to access data with data policy management,
  - SDN Security Services for users registrations,
  - SDN Products viewing services for discovery, visualization and downloading of products.



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# Adopting and adapting SeaDataNet

## SDN Software:

- MIKADO → metadata mapping and xml generator,
- NEMO → data formatting tool,
- DIVA software → to produce gridded data products and error maps as NetCDF files,
- ODV software → for row data management and QC check





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# Adopting and adapting SeaDataNet

- ⦿ Extension of **SDN Common Vocabularies**:
  - ⦿ additional P01 terms (for background data description)
  - ⦿ additional P02 terms (for data discovery)
  - ⦿ **new P35** for parameter aggregation and homogenisation
  - ⦿ **new P36** for EMODNET Chemistry themes
- ⦿ **ODV** software extended for data sub-setting, parameter aggregation with P35, quality control
- ⦿ **CDI** Data Access interface (with matrix selection, ...)
- ⦿ **Ocean Browser** (viewing maps and time series)
- ⦿ **Sextant** (including link to DOIs landing pages)



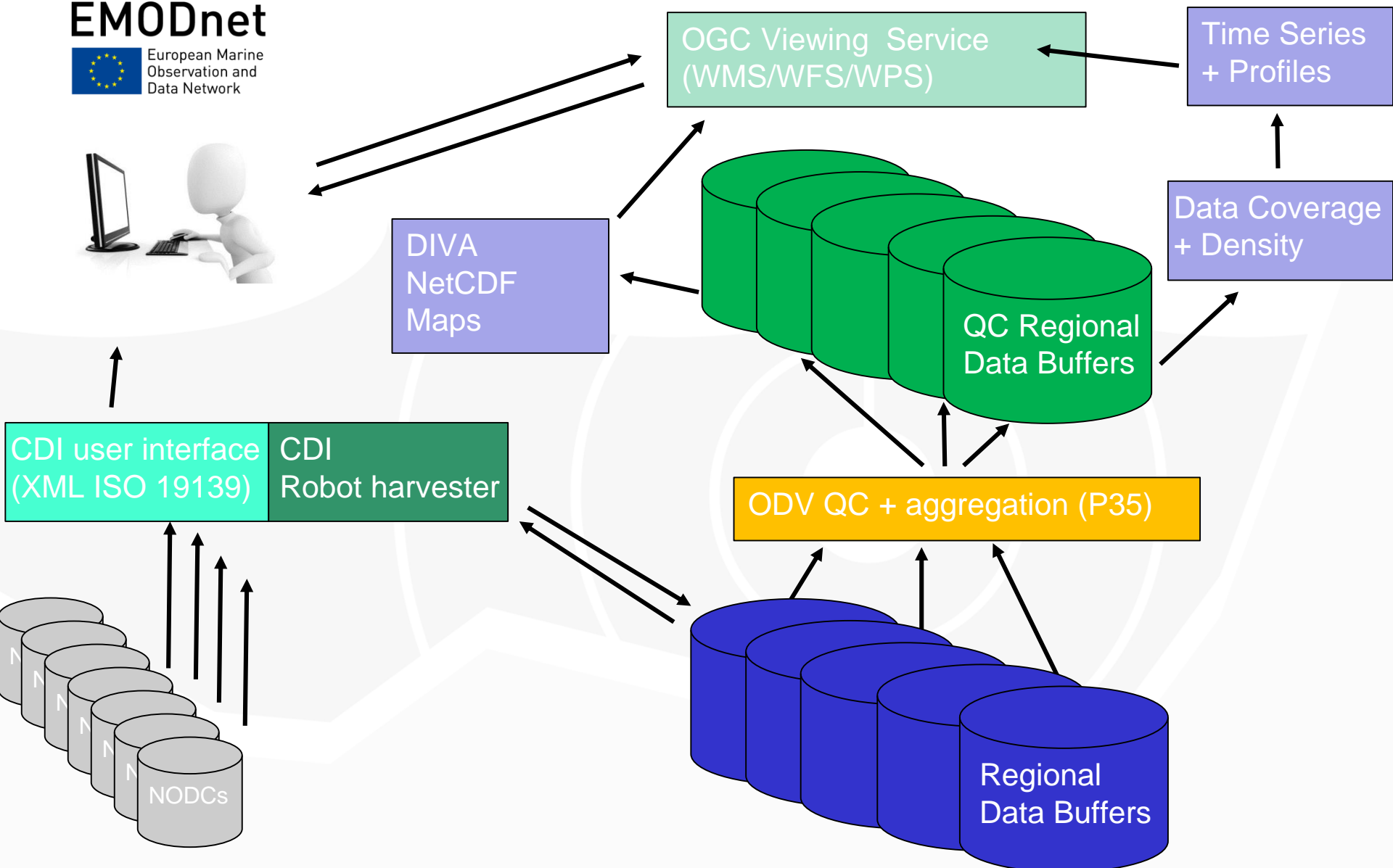
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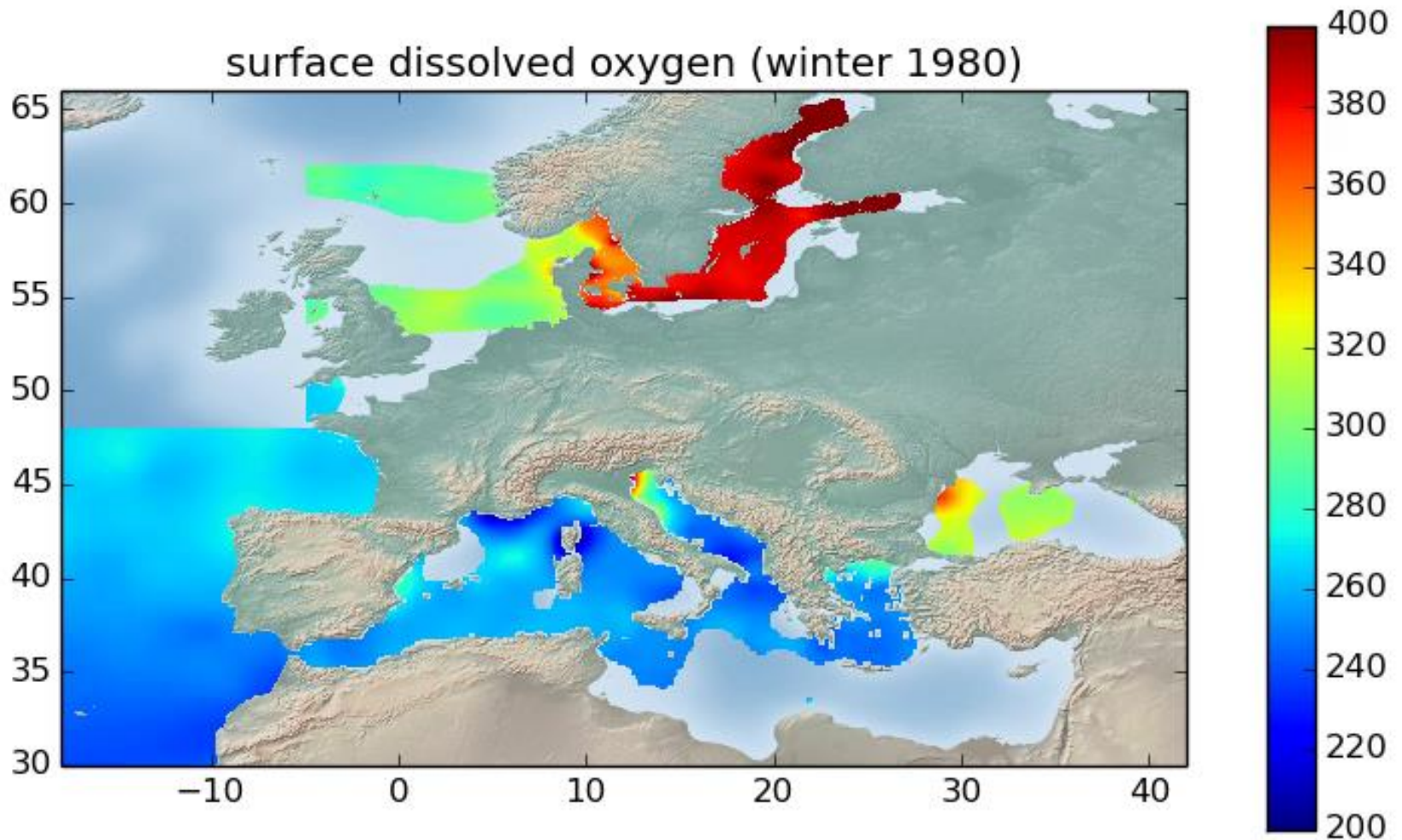


# EMODnet Chemistry Architecture





# Product viewer service - DIVA maps



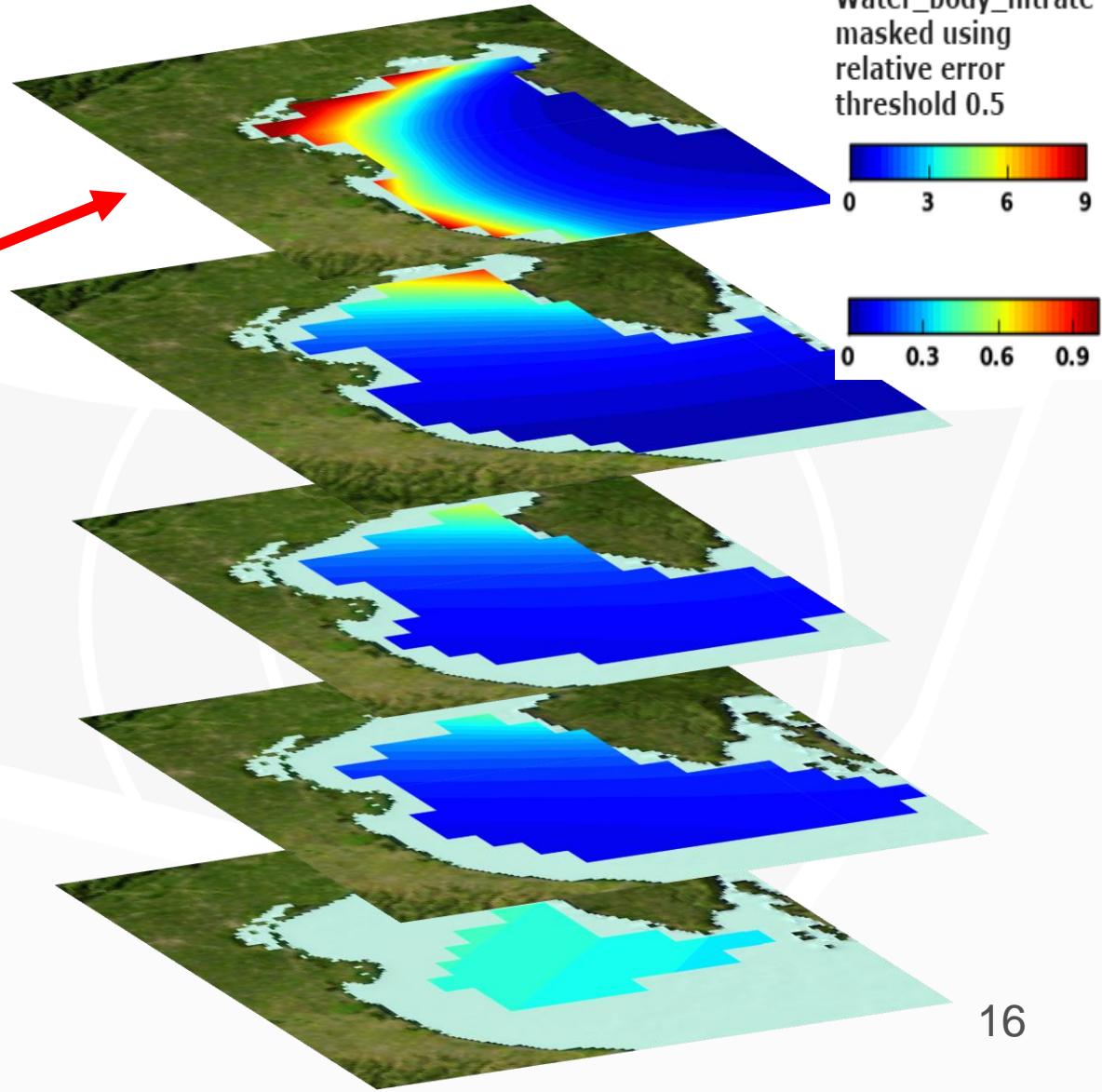
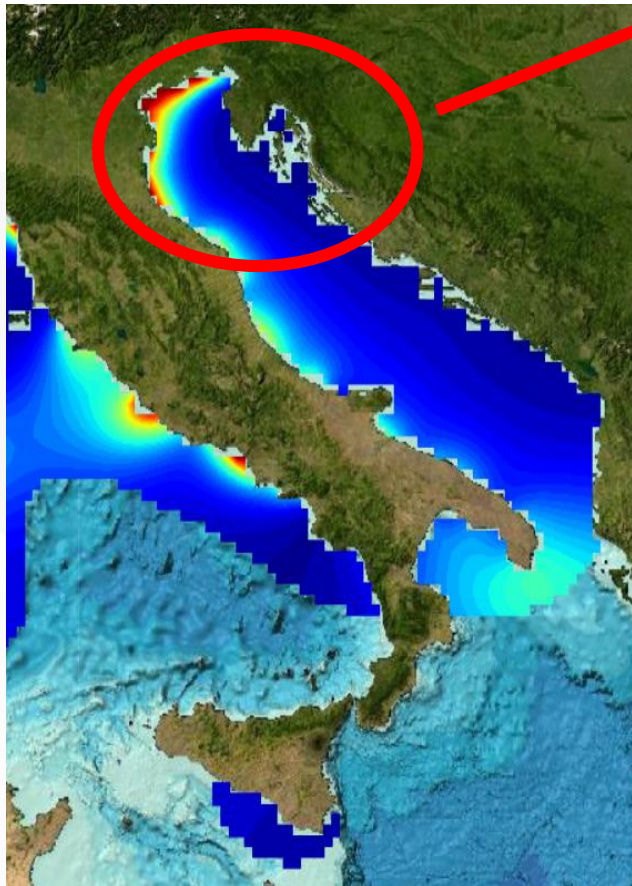


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# DIVA maps at several depths







# Time-series plots

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Go to: [website](#)

Portal for Chemistry

Viewing and Downloading service

Horizontal Section

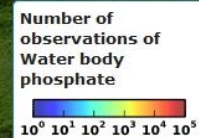
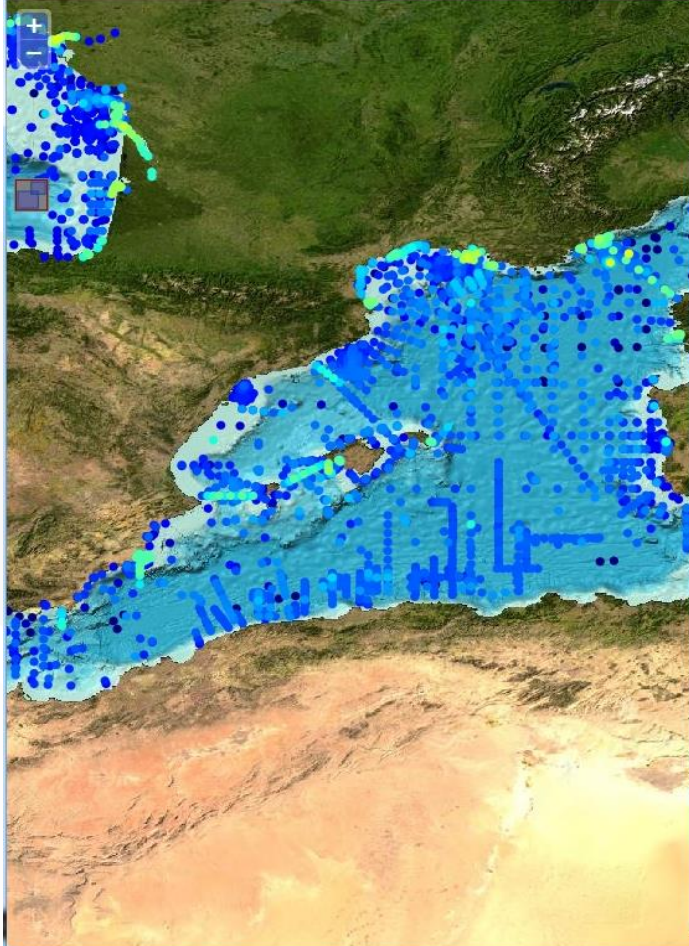
Vertical Section

Select data products

Report a problem

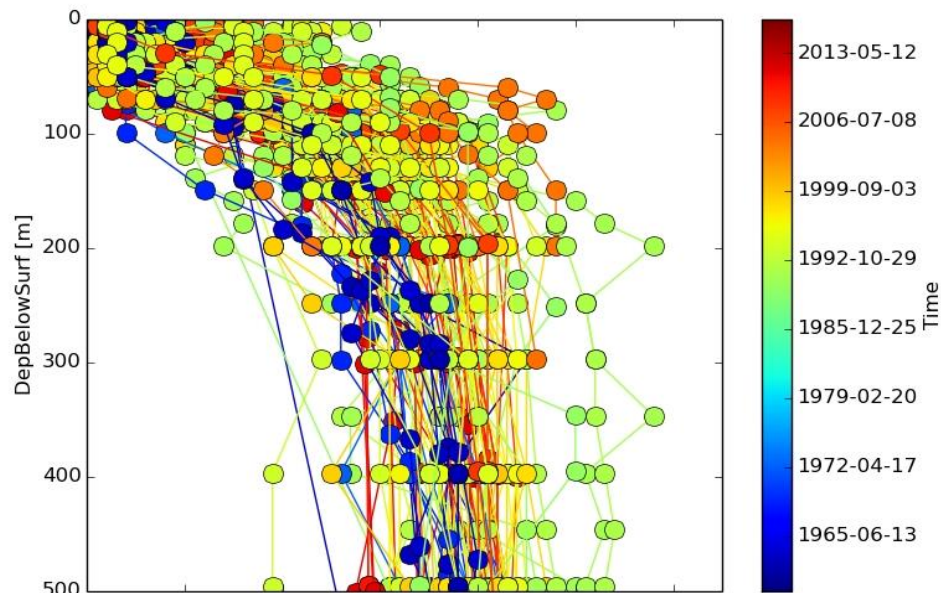
About

Help



observations of Water body phosphate

Plot type:





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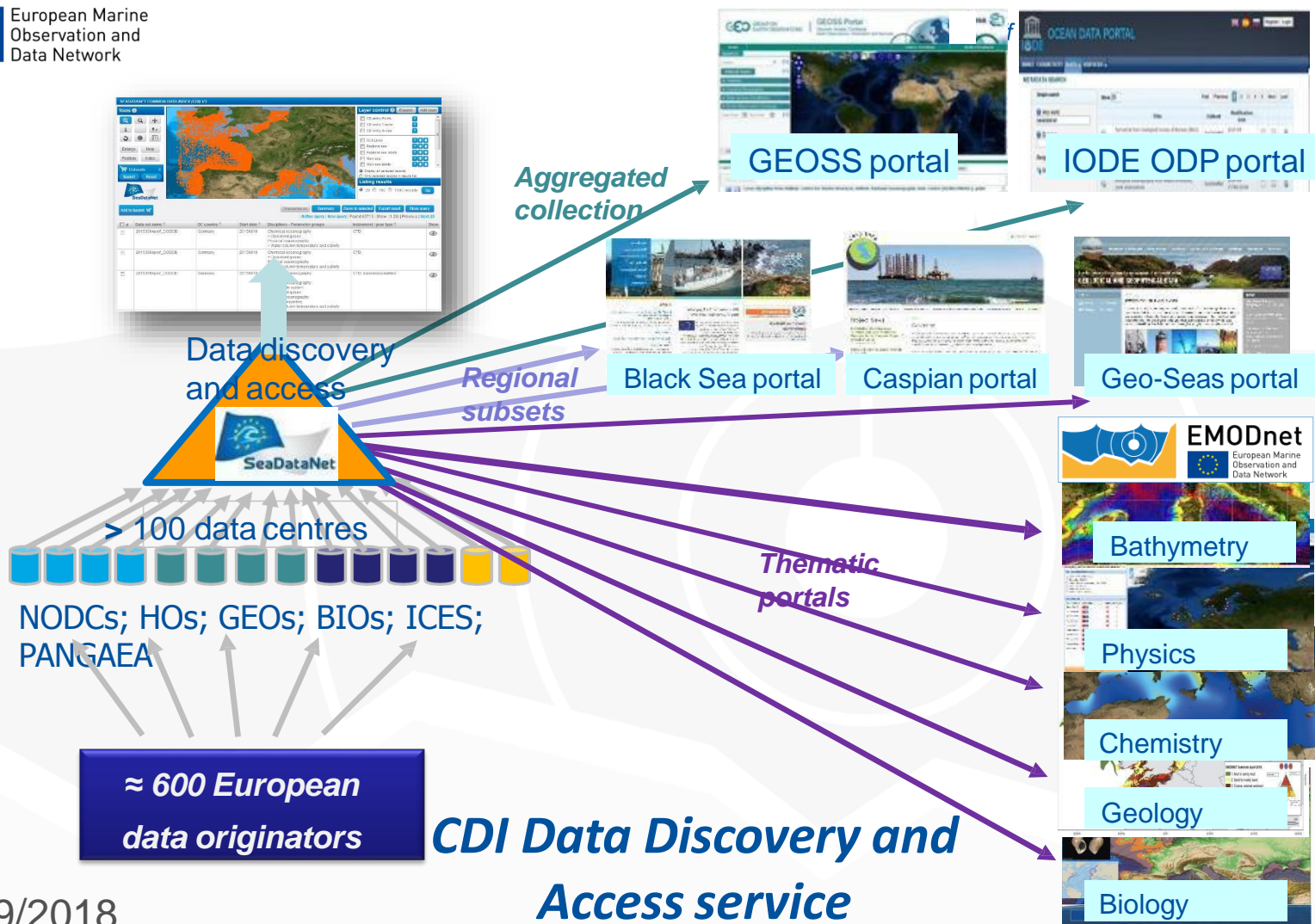


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# SeaDataNet as driver



SeaDataNet





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## Marine Litter

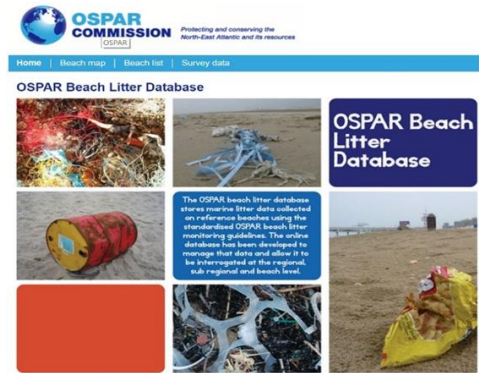
- EMODnet Chemistry **focus extended** on gathering data, generating data products on a European scale, and publishing data and data products on:
  - Beach** litter (nets, bottles etc.)
  - Seafloor** litter (i.e. litter collected by fish trawl surveys)
  - Micro** litter (microplastics)
- Not on litter in biota
- Approach discussed at MSFD Technical Group on Marine Litter (TG ML)



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# Proposed approach



- ⦿ Opt for developing two central EMODnet internet databases:
  - ⦿ one for **beach litter**, modelled after the OSPAR-MCS approach
  - ⦿ one for **seafloor litter**, modelled after the ICES-DATRAS approach
- ⦿ Arrange data exchange mechanisms and cooperation with the **relevant regional systems**, their responsible managers and related networks
- ⦿ Encourage **further population** of the existing systems by organisations in the relevant regions
- ⦿ Arrange central submission facility cover additional data providers
- ⦿ Develop **search and display services** (including maps) on the central EMODnet validated databases



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## Micro litter - proposed approach

For **micro litter** there are not yet coordinated efforts at regional or European scale. EMODnet Chemistry proposes to adopt the data management approach as generally applied for marine data in Europe, adopting and adapting the **SeaDataNet infrastructure and standards**:

- 📍 **CDIs** → include micro litter metadata information, for discovery and access
- 📍 **ODVs** → include data, extending ODV **mandatory** fields with **additional selected fields** necessary to describe marine micro litter (category, count,... and size, color,...)



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## Impact to SeaDataNet

- ⦿ **Extend ODV “bio-ODV like” data format** with a set of additional fields to describe marine micro litter
  - ⦿ additional mandatory: fields will be always present in ODV file and always filled
  - ⦿ additional optional: fields will be always present in ODV file but could be empty
- ⦿ Creation of **6 new vocabs** for **Type** of micro-litter particles (H01), **Shape** of micro-litter particles (H02), **Size class** of micro-litter particles (H03), **Colour class** of micro-litter particles (H04), Micro-litter **polymer types** (H05), Douglas Sea Scale



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## Cloud environment

- ⦿ EMODnet Chemistry provides **controlled and synchronized access** to regional standardized, aggregated and validated **marine chemical datasets** stored on the cloud provided by Cineca
- ⦿ All EMODnet Chemistry **viewing and downloading services** are stored on the cloud provided by Cineca



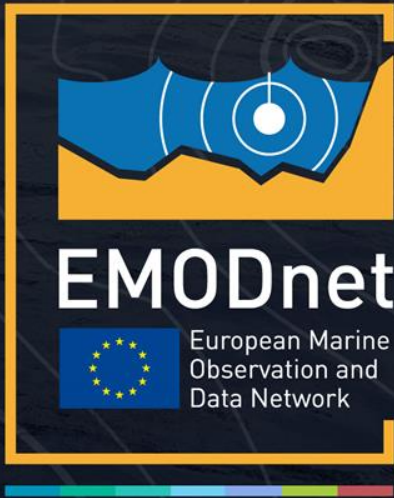
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## Compliance as added value

- ⦿ Adoption of SeaDataNet Discovery – Viewing – Downloading services for marine chemistry provides compliance with **INSPIRE** (EC Directive establishing an Infrastructure for Spatial Information in the European Community), on viewing services and data model
- ⦿ SeaDataNet CDI Data service supports **FAIR** (Findable, Accessible, Interoperable, Re-usable) guiding principles for scientific data management
- ⦿ Further extending evolving standards





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

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