EMODnet Chemistry: biogeochemical data management for long-term research and support to EU policies

IMDIS conference
11–13 October 2016, Gdansk Poland

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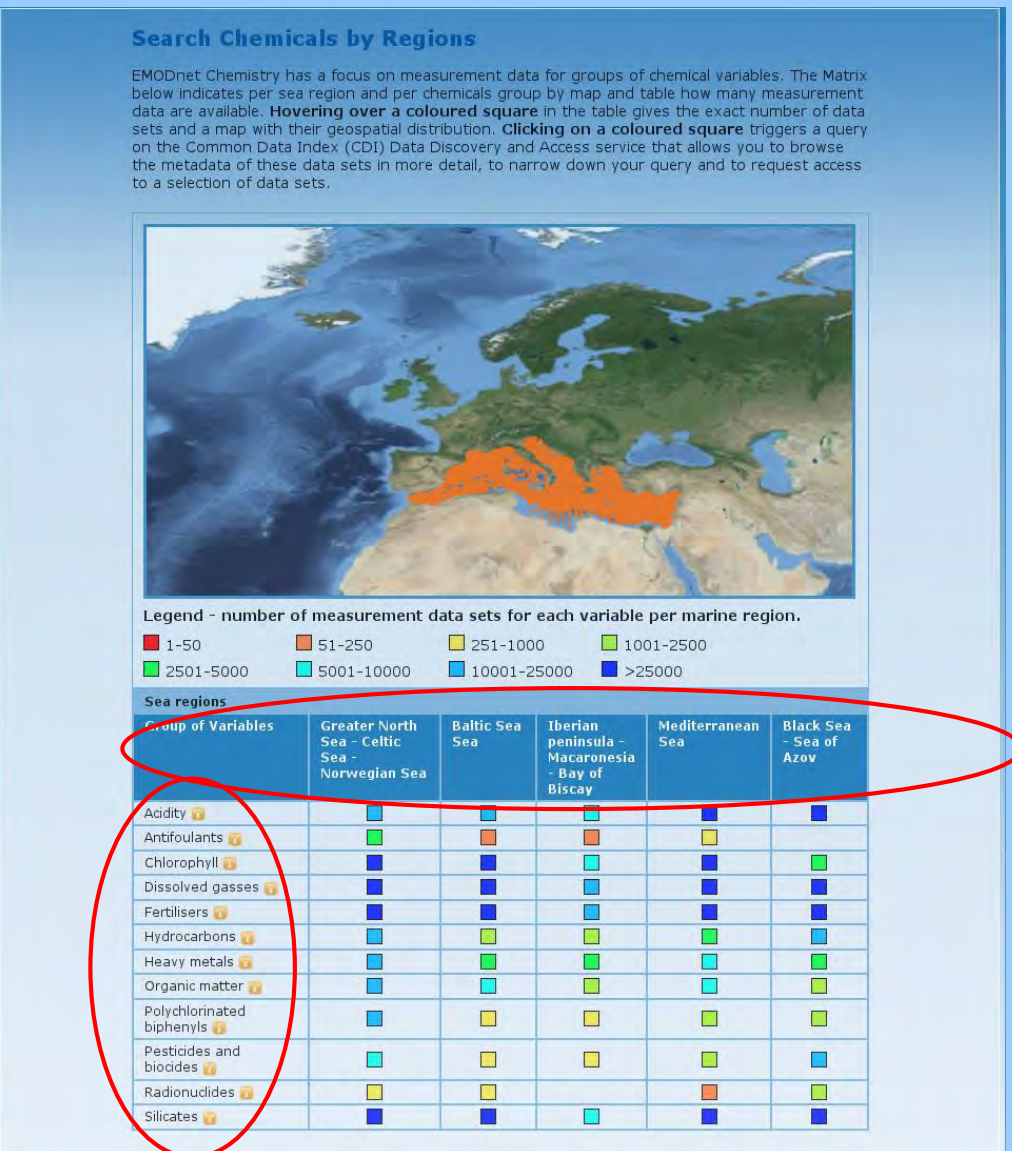
- EMODnet Chemistry: what, where and how
- Workflow: Quality and aggregation loop
- Interactions with MSFD
- Architecture and workflow from data to products
- Products

EMODnet Chemistry: What and Where

Environmental data management **to build a a continuous, pubblic-accessible, interoperable and long-term-use data flow** from **fragmented sources**



Search Chemicals by Regions

EMODnet Chemistry has a focus on measurement data for groups of chemical variables. The Matrix below indicates per sea region and per chemicals group by map and table how many measurement data are available. **Hovering over a coloured square** in the table gives the exact number of data sets and a map with their geospatial distribution. **Clicking on a coloured square** triggers a query on the Common Data Index (CDI) Data Discovery and Access service that allows you to browse the metadata of these data sets in more detail, to narrow down your query and to request access to a selection of data sets.

Sea regions

Group of Variables	Greater North Sea - Celtic Sea - Norwegian Sea	Baltic Sea Sea	Iberian peninsula - Macaronesia - Bay of Biscay	Mediterranean Sea	Black Sea - Sea of Azov
Acidity					
Antifoulants					
Chlorophyll					
Dissolved gasses					
Fertilisers					
Hydrocarbons					
Heavy metals					
Organic matter					
Polychlorinated biphenyls					
Pesticides and biocides					
Radionuclides					
Silicates					

Challenge:
Collection of a list of **chemical compounds required by EU based on MSFD needs.**

In **3 Matrixes:**

- **Water Column**
- **Sediment**
- **Biota**

For **All the European Seas** managed as 5 Regions

EMODnet Chemistry: How

Based on SeaDataNet :

- **An efficient distributed Marine Data Management Infrastructure** for in situ and remote observation of the seas and oceans.
- **Actively involved** in **standards implementation following INSPIRE (2007) rules for interoperable (EU) geographic data, metadata and services; (in contact with Marine Pilot)**;

- A *de-facto standard* with with around **100 nodes** from **35 countries** (including some non-EU countries).
- **Connected to Marine Data Management Infrastructure from USA and Australia** thanks to the **ODIP project** activities**.**

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QA/QC

Source laboratory standards

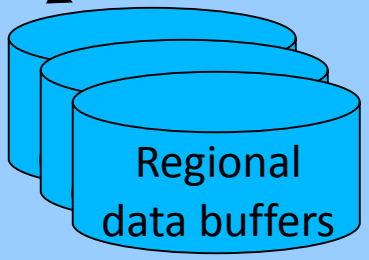
Questionnaire based on ISO/IEC 17025:2005

+

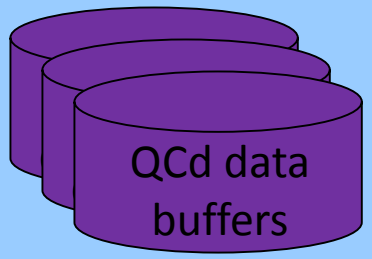
Data and Metadata

Data are **collected**, **checked, flagged and completed with relevant metadata** by **National Collators**

data extraction



Data aggregation
data QC with ODV
Correlation of params



Report errors or anomalies to the data originators

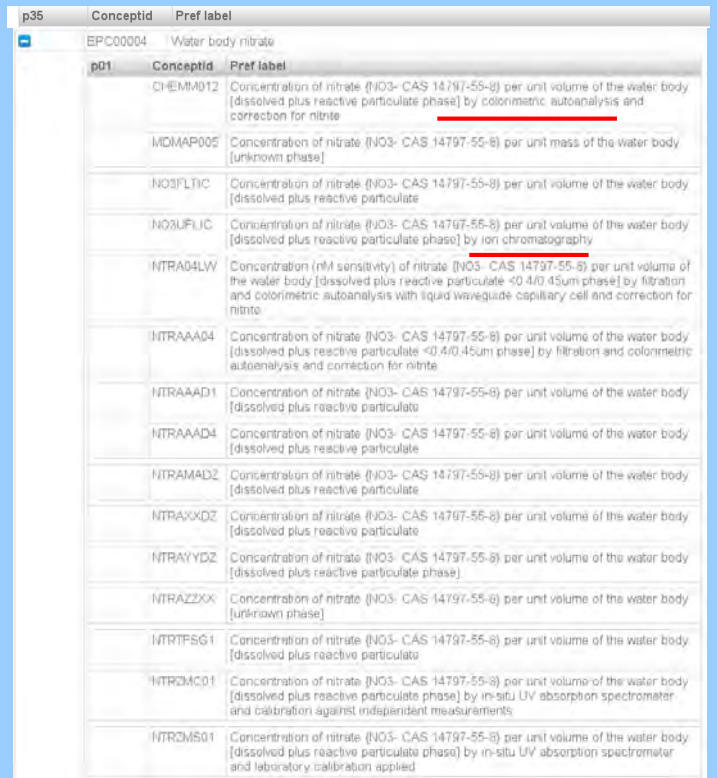
Update the official copy of data

Feedback loop for data quality upgrade

Data aggregations with P35 vocabulary (P01→P35)

Definition by a panel of **Chemistry** and **MSFD experts/stakeholders** of:

- **Scientifically meaningful aggregations (with units conversion) of parameters** to summarize the heterogeneity of source data (**P01 vocabulary**)
- Following **MSFD priority substances** (**contaminants**)
- **challenge** of **balance** between the **need of aggregation for visualization services** and **source measurements heterogeneity (methods, grain sizes, biota size/age)**



p35	Conceptid	Pref label
EPC00004		Water body nitrate

p01	Conceptid	Pref label
	CHEMM012	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate phase] by colorimetric autoanalysis and correction for nitrite
	MDMAP005	Concentration of nitrate {NO3- CAS 14797-55-8} per unit mass of the water body [unknown phase]
	NO3FLTIC	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate
	NO3UFLIC	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate phase] by ion chromatography
	NTRA04LW	Concentration (nM sensitivity) of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate <0.4/0.45um phase] by filtration and colorimetric autoanalysis with liquid waveguide capillary cell and correction for nitrite
	NTRAAA04	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate <0.4/0.45um phase] by filtration and colorimetric autoanalysis and correction for nitrite
	NTRAAAD1	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate
	NTRAAAD4	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate
	NTRAMAD2	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate
	NTRAXXDZ	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate
	NTRAYYDZ	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate phase]
	NTRAZZXX	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [unknown phase]
	NTRTFSG1	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate
	NTRZMC01	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate phase] by in-situ UV absorption spectrometer and calibration against independent measurements
	NTRZMS01	Concentration of nitrate {NO3- CAS 14797-55-8} per unit volume of the water body [dissolved plus reactive particulate phase] by in-situ UV absorption spectrometer and laboratory calibration applied

p35	Conceptid	Pref label
EPC00118		Nickel per unit dry weight of sediment

p01	Conceptid	Pref label
	MNISP012	Concentration of nickel {Ni CAS 7440-02-0} per unit dry weight of sediment
	NICNICXT	Concentration of nickel {Ni CAS 7440-02-0} per unit dry weight of sediment by inductively-coupled plasma mass spectrometry
	NICNPEXT	Concentration of nickel {Ni CAS 7440-02-0} per unit dry weight of sediment by acid digestion and inductively-coupled plasma atomic emission spectroscopy
	NICNXTXT	Concentration of nickel {Ni CAS 7440-02-0} per unit dry weight of sediment by compression into pellets and X-ray fluorescence
	NISEDBD1	Concentration of nickel {Ni CAS 7440-02-0} per unit dry weight of sediment <2000um

p35	Conceptid	Pref label
EPC00119		Zinc per unit dry weight of sediment

p01	Conceptid	Pref label
	MZNSP012	Concentration of zinc {Zn CAS 7440-66-6} per unit dry weight of sediment
	ZNCNICXT	Concentration of zinc {Zn CAS 7440-66-6} per unit dry weight of sediment by inductively-coupled plasma mass spectrometry
	ZNCNPEXT	Concentration of zinc {Zn CAS 7440-66-6} per unit dry weight of sediment by acid digestion and inductively-coupled plasma atomic emission spectroscopy
	ZNCNXTXT	Concentration of zinc {Zn CAS 7440-66-6} per unit dry weight of sediment by compression into pellets and X-ray fluorescence
	ZNSEDBD1	Concentration of zinc {Zn CAS 7440-66-6} per unit dry weight of sediment <2000um

EMODnet Chemistry → MSFD Directive (2008):

MSFD (2008): for monitoring seas and oceans at National → Regional → EU level with reporting (WISE Marine) of environmental status based on:

Descriptors → Criteria → Indicators.

The objective is definition and achievement of Good Environmental Status.

Descriptor	Criterion	Indicator
D5 Eutrophication	5.1 Nutrient levels	5.1.1 Nutrient concentration in the water column
	5.2 Direct effects of nutrient enrichment	5.2.1 Chlorophyll concentration in the water column
	5.3 Indirect effects of nutrient enrichment	5.3.2 Dissolved oxygen
D8 Contaminants	8.1 Concentration of contaminants	8.1.1 Concentration of contaminants in the relevant matrix (biota, sediment, water)
D9 Contaminants in seafood	9.1 Levels, number and frequency of contaminants	9.1.1 Actual levels of contaminants

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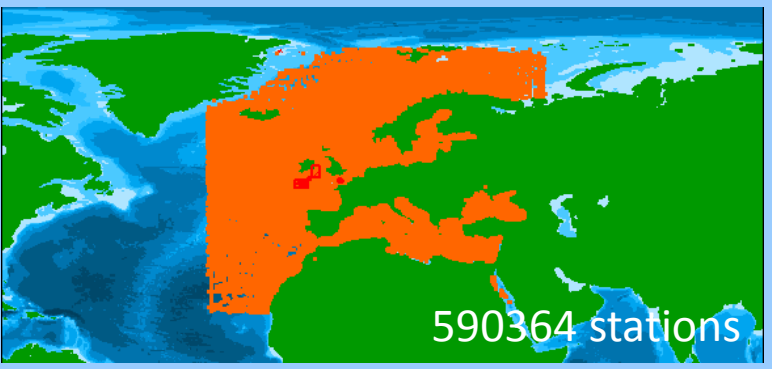
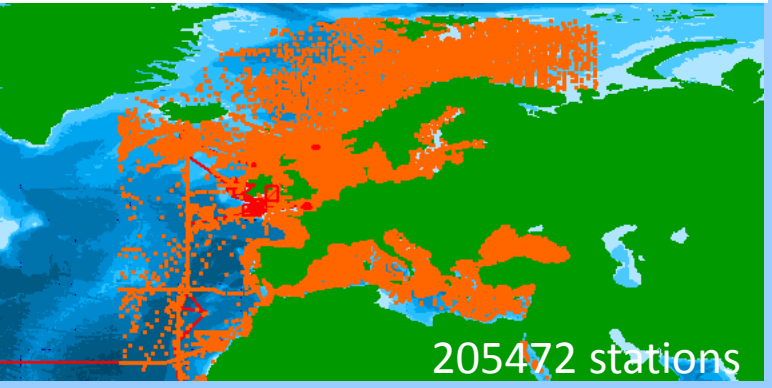
5.1.1 Nutrient concentration in the water column
5.2.1 Dissolved oxygen

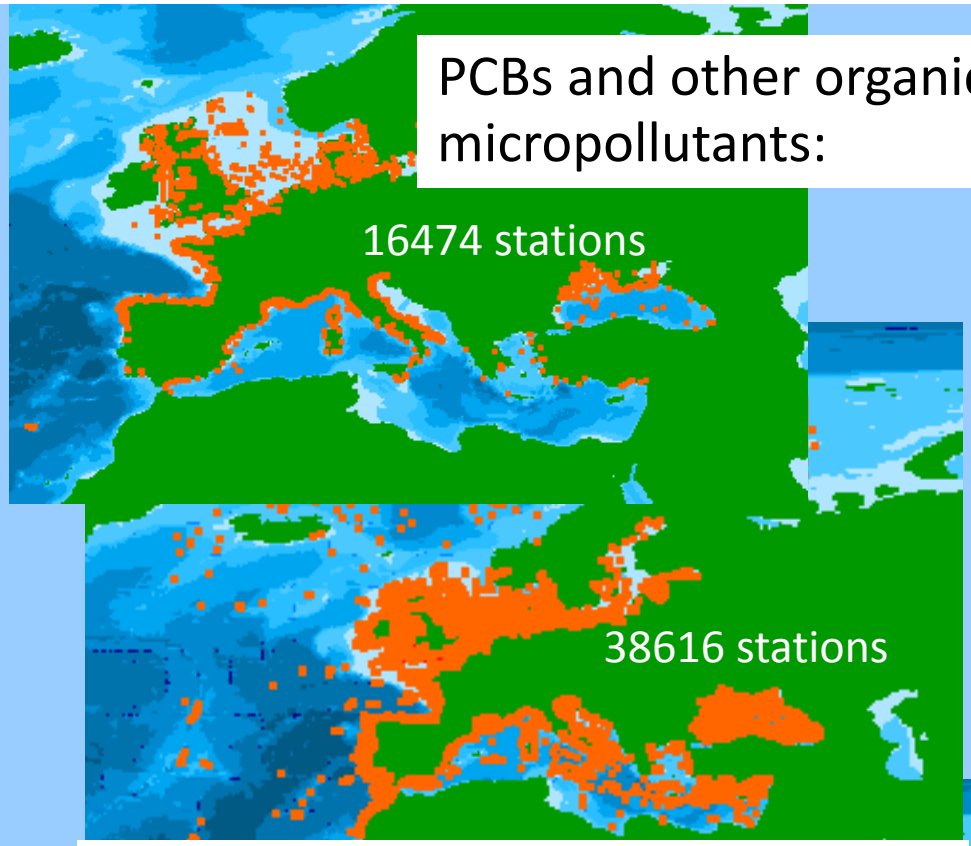


5.2.1 Chlorophyll concentration in the water column

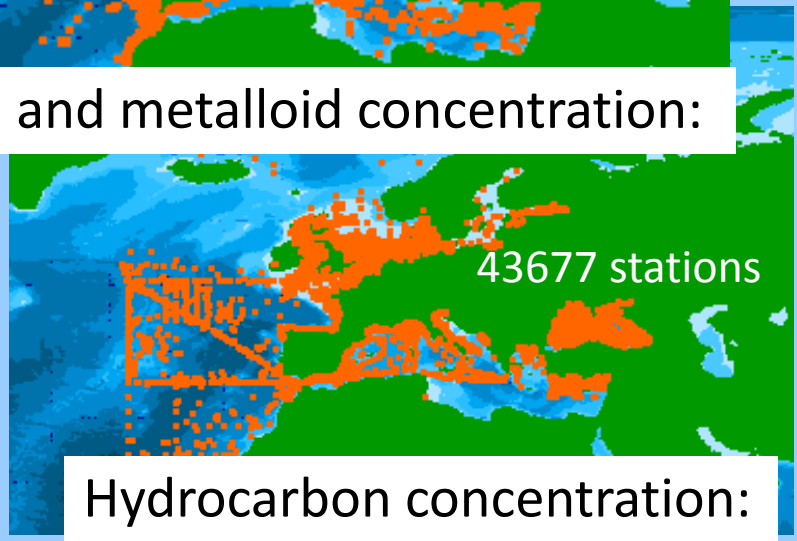


8.1.1 Concentration of contaminants in the relevant matrix (biota, sediment, water)

PCBs and other organic micropollutants:



Metal and metalloid concentration:



Hydrocarbon concentration:

From Data to Products – workflow

OGC Viewing Service
Ocean Browser(WMS/WFS)

DIVA NetCDF
Maps

Time Series
WPS

QC Regional
Data Buffer

CDI user
interface

CDI Robot
harvester

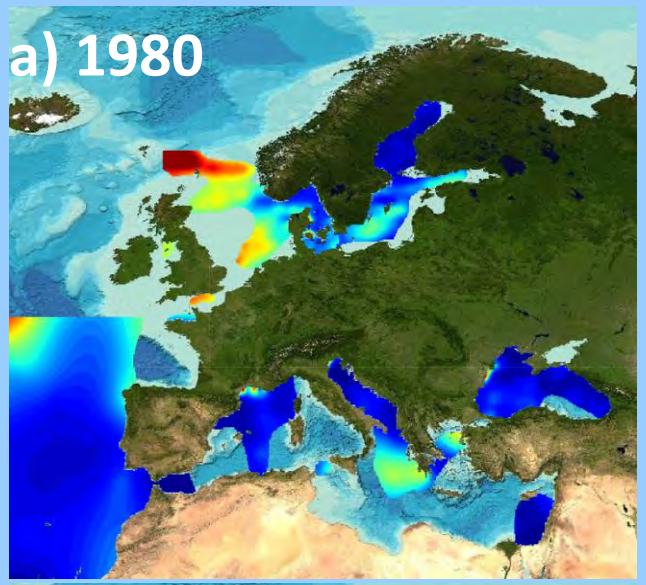
ODV QC + aggregation(P35)

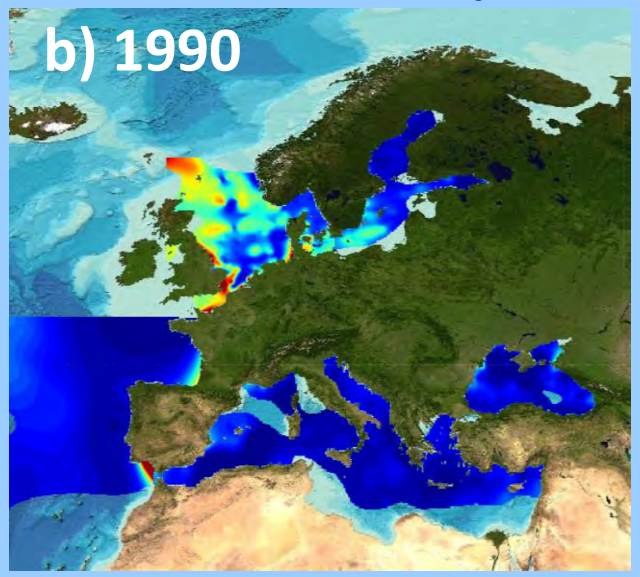
NODCs

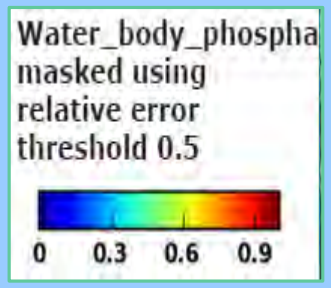
Regional
Data Buffer

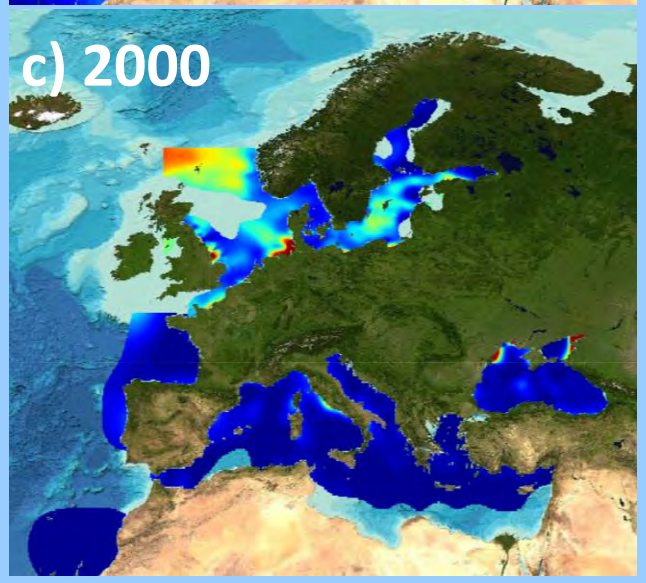
Cloud @CINECA

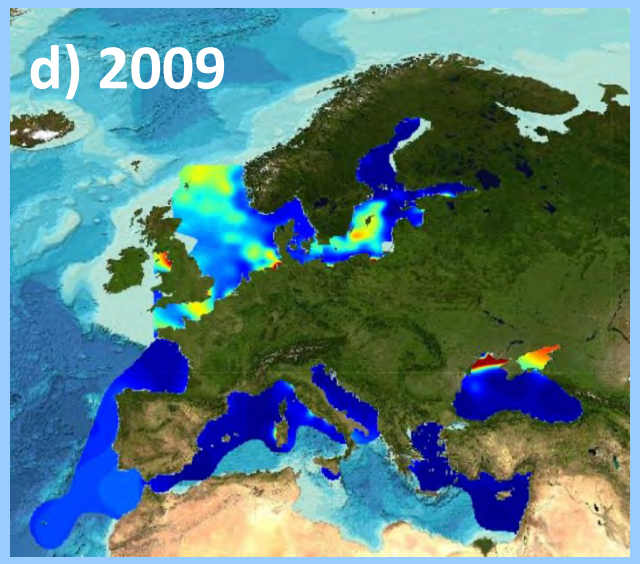
DIVA horizontal maps as OGC-WMS layers







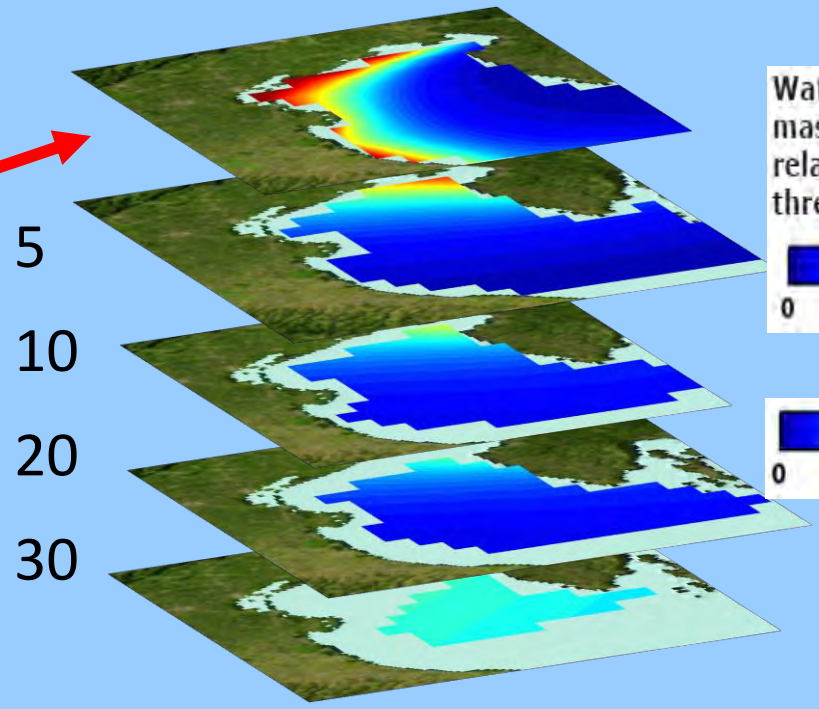


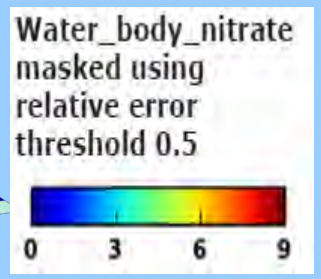


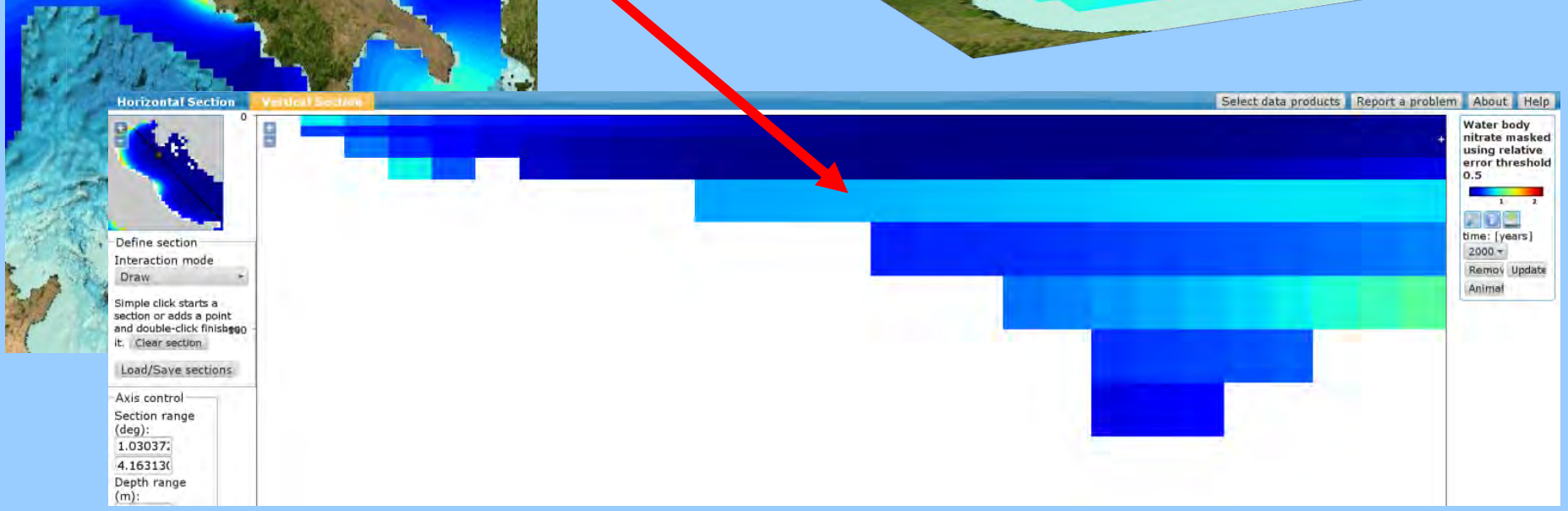
Spring surface distribution of phosphate (µmol/l) for the decades 1975-1984 (a), 1985-1994 (b), 1995-2004 (c), and 2004-2013 (d).

10-year running mean centred on the year indicated

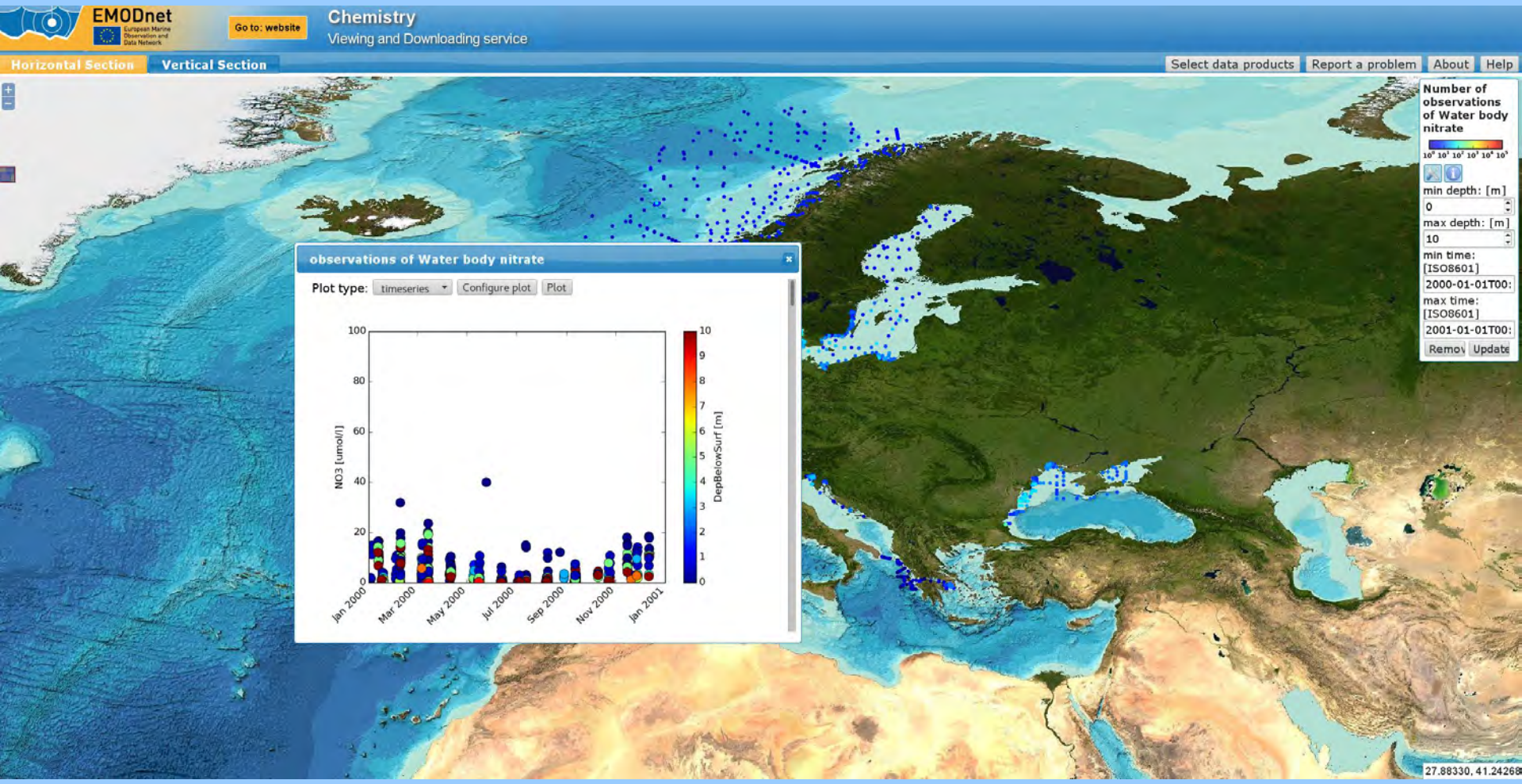
DIVA horizontal maps as OGC-WMS layers and vertical sections



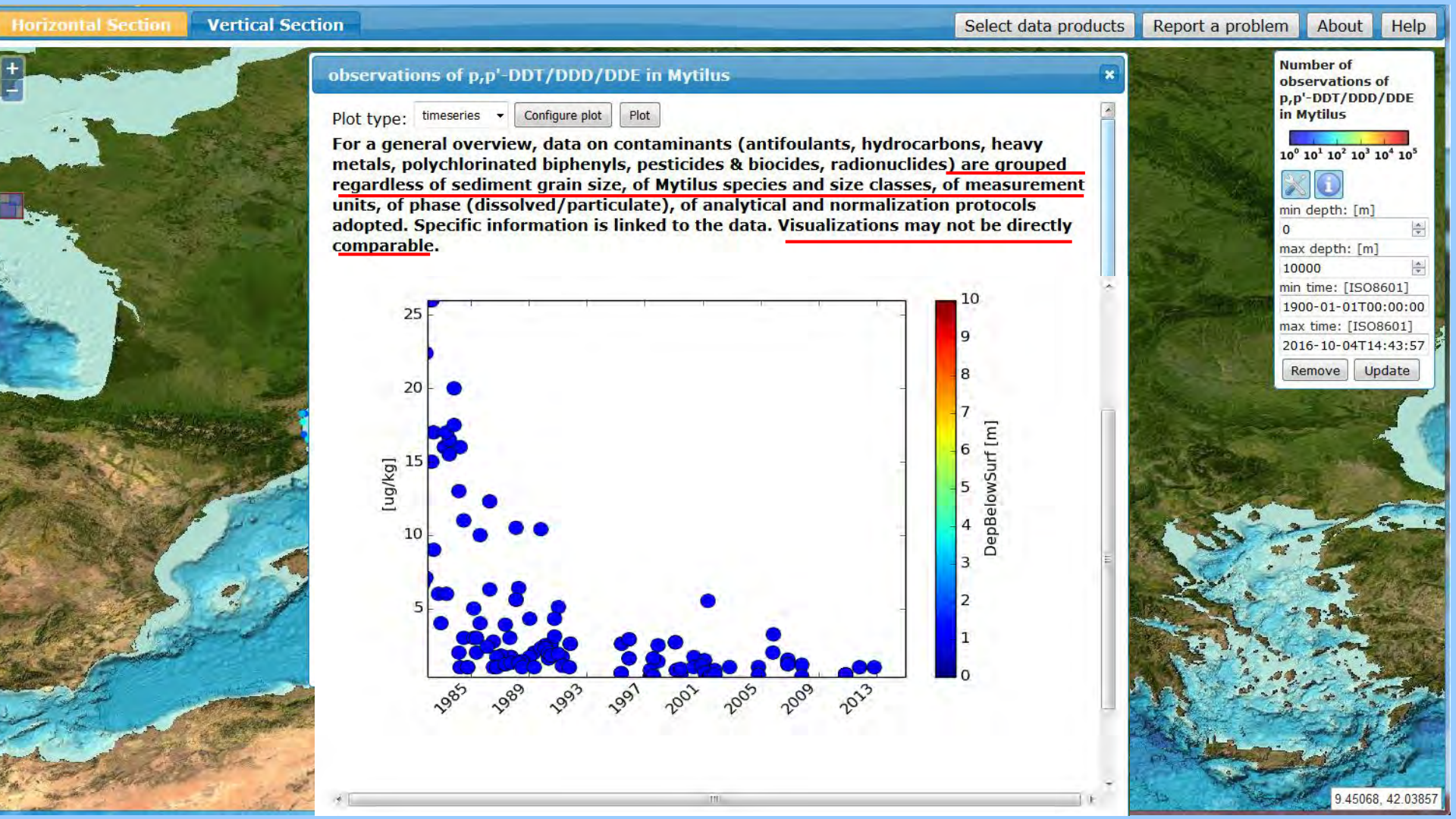




Stations density maps and plots as OGC-WPS/WFS



Stations density maps and plots as OGC-WPS/WFS



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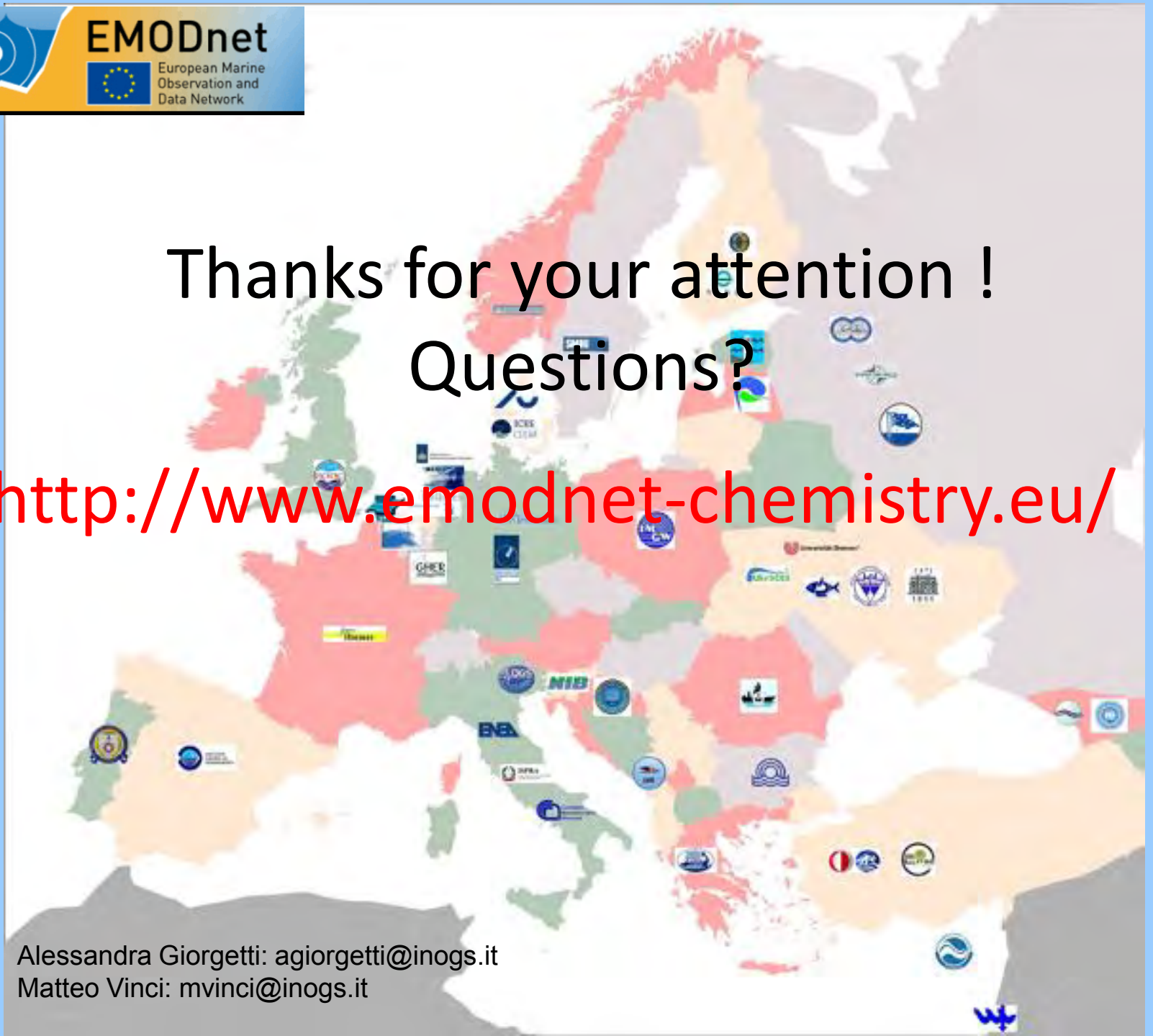
Thanks for your attention !
Questions?

http://www.emodnet-chemistry.eu/



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