New EU efforts to assess the state of the marine environment: the EMODnet Chemistry pilot project

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EMODnet
European Marine Observation and Data Network

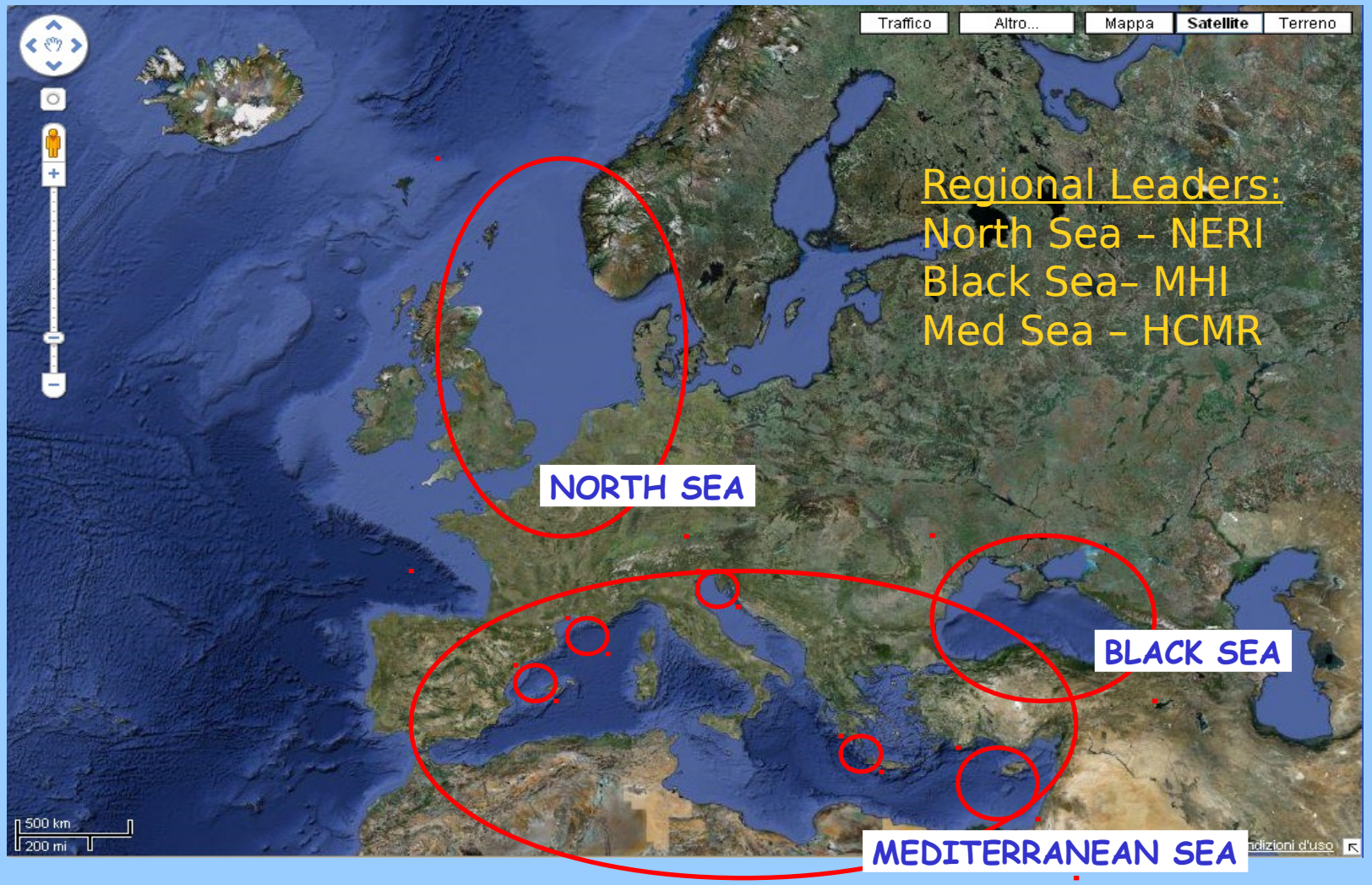
Overview about:

Chemistry Pilot:

- Where;
- What;
- How;
- Main Challenges;
- Products;
- Lessons Learned;

- New Phase;
- Ongoing activities.

The Chemistry Pilot: where 3 areas of interest



The Chemistry Pilot : what

- a choice of **parameters** based on **MSFD requirements;**
- from **8 groups of compounds;**
- in **3 matrices: water column, biota, sediment**.

→**17 selected parameters** for product generation:

Chemical group	Parameter
Pesticides	Dichlorodiphenyltrichloroethane (DDT)
Pesticides	Hexachlorobenzene (HCB)
Antifoulants	Tributyltin (TBT)
Antifoulants	Triphenyltin (TPT)
Pharmaceuticals	Oxytetracycline ($C_{22}H_{24}N_2O_9$)
Heavy metals	Mercury (Hg)
Heavy metals	Cadmium (Cd)
Heavy metals	Lead (Pb)

Chemical group	Parameter
Hydrocarbons	Anthracene ($C_{14}H_{10}$)
Hydrocarbons	Fluoranthene ($C_{16}H_{10}$)
Radionuclides	Tritium
Radionuclides	Cesium 137
Radionuclides	Plutonium 239
Fertilisers/Nitrogen	Nitrate (NO_3)
Fertilisers/Nitrogen	Phosphate (PO_4)
Organic matter	Organic Carbon (C)
Organic matter	Organic Nitrogen (N)

The Chemistry Pilot : How

Based on SeaDataNet :

- **An efficient distributed Marine Data Management Infrastructure** for large and diverse sets of data deriving from in situ and remote observation of the seas and oceans.
- **Actively involved** in **standards implementation following INSPIRE**;
- An european *de-facto standard* with: **44 partners** and **14 subcontractors** from **35 countries european and not**.
- **Connected to Marine Data Management Infrastructure from USA and Australia** thanks to the **ODIP** activities**.**

The Chemistry Pilot : How

Principle of "ADOPTED AND ADAPTED"

- **SDN Standards for metadata ,data and products :**
- for **metadata** (xml ISO 19115→ ISO 19139) **CDI;**
- for **common terms Standard Vocabs** (P021,P011,P061 → P02,P01,P06);
- for background **data** exchange ASCII format **ODV**,

SDN Infrastructure:

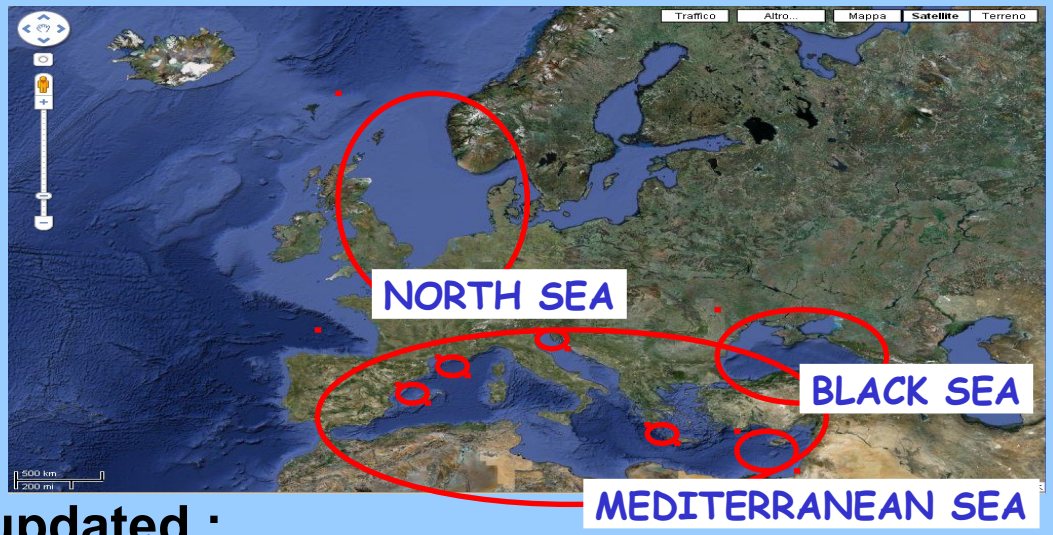
- Service to **access data** with **data policy management → CDI mechanism**,
- Service for **users registrations → SDN Security Services**,
- Service for **discovery**, **visualization** and **downloading** of products→ **SDN Products viewing services**

SDN Softwares:

- **MIKADO** → metadata mapping and xml generator
- **NEMO** → data formatting tool
- **DIVA** software → **gridded data products** and error maps as NetCDF files,
- **ODV** software → **for "time series" products** generation and **QC**

The Chemistry Pilot

Data collection and metadata compilation :



All partners collected and updated :

- **Data** → ODV file →activity managed by Regional Leaders at level of the 3 Regional data pools → (de-centralized)
- **Metadata** → CDI entries → Maris (centralized)

All partners gave access to:

- **Metadata** → unrestricted;
- and **data** according to the **data policy** as **agreed with the data ORIGINATOR.**

The Pilot Project: challenge to face along the path from **DATA to PRODUCTS**

Data complexity:

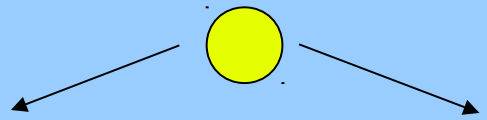
- from 8 groups of compounds;
- 3 matrices (sediment, water column and biota);
- 17 selected parameters for products generation;

Heterogeneity:

- **Data availability** in the different areas of interest;
- Of the **sampling/data distribution** (eg: coastal points time series Vs homogenous sampling at basins level);
- Of **measurement methods** (eg: instrument, target species, target basis, grain sizes).

The Chemistry Pilot Data Products and QC/QA:

- The analysis of **available data**;
- The **Expert workshop** with contribution of the **Marine Conventions**;
- Highlighted **2 main substets from the available data** :



Homogeneous ditribution
In time and space (basins)

Not homogeneous ditribution
In time and space (basins)

Expert workshop, summary **of decisions to highlight data features** with Products generation:

-**Standard Diva Interpolated maps** produced for parameters **with homogeneous data coverage**, measured on **basin scale**;

-**Time series plots** showing stations distribution linked to **plots of measured data**. This for not homogeneous data as:

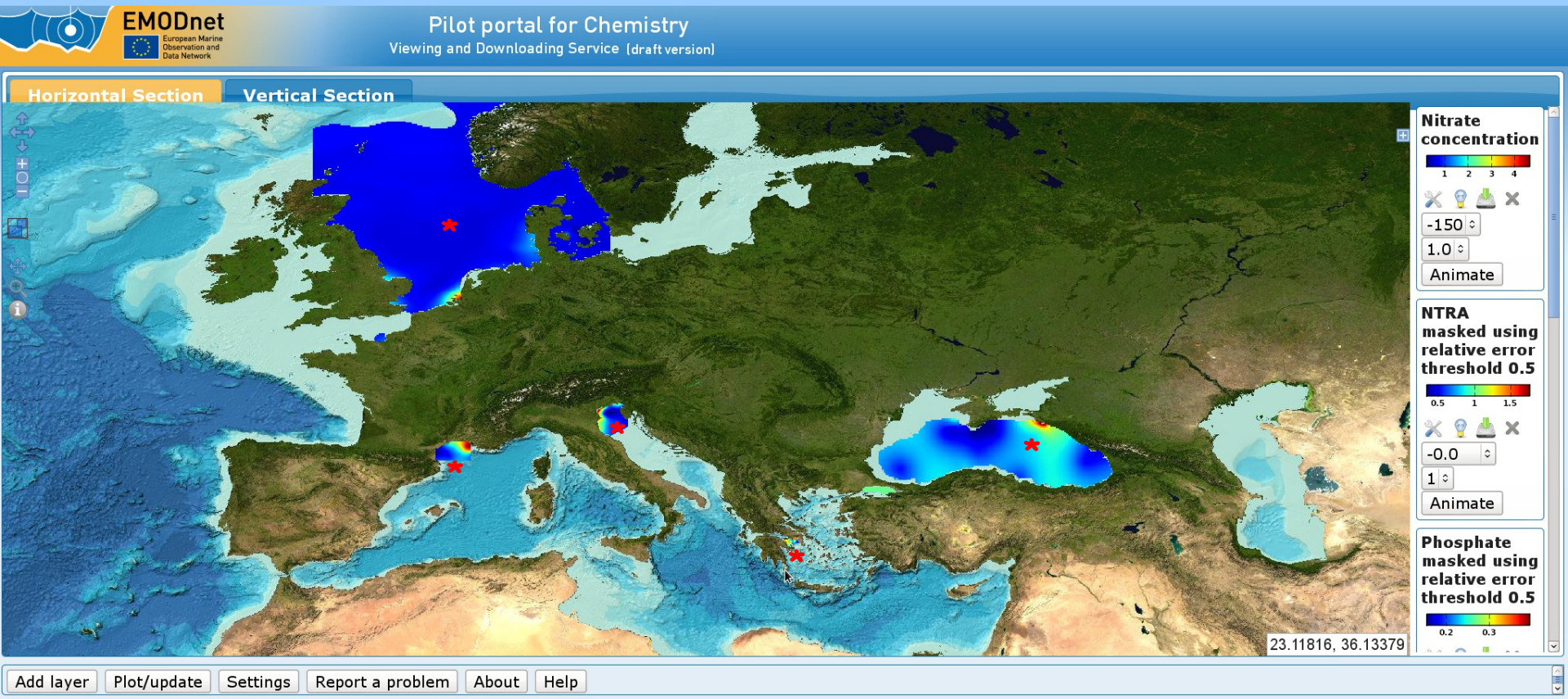
- **coastal points** repeated in time,
- datasets with **fragmented coverage**.

Data products

DIVA interpolated maps:

- Focus on **nutrients in the water column** based on **data availability**;
- Focus on **annual and seasonal scale** based on **data availability**;
- Interpolated maps generated by **Diva** software;
- Metadata file generated by **DivadoXML** script;

DIVA interpolated maps



Ocean Browser (Gher group)

* Interpolated fields loaded as WMS layers

Data products

Time Series plots:

-Focus on the parameters with **fragmented coverage** (spatial/temporal);

-suggested use of **ODV** software for plots generation;

-ratio of **1plot:1station:1parameter:1depth**;

-metadata collected in a **INDEX file** (*http://www.data-assimilation.net/mediawiki/index.php/OceanBrowser#Observation_index_files)*

Recommendations:

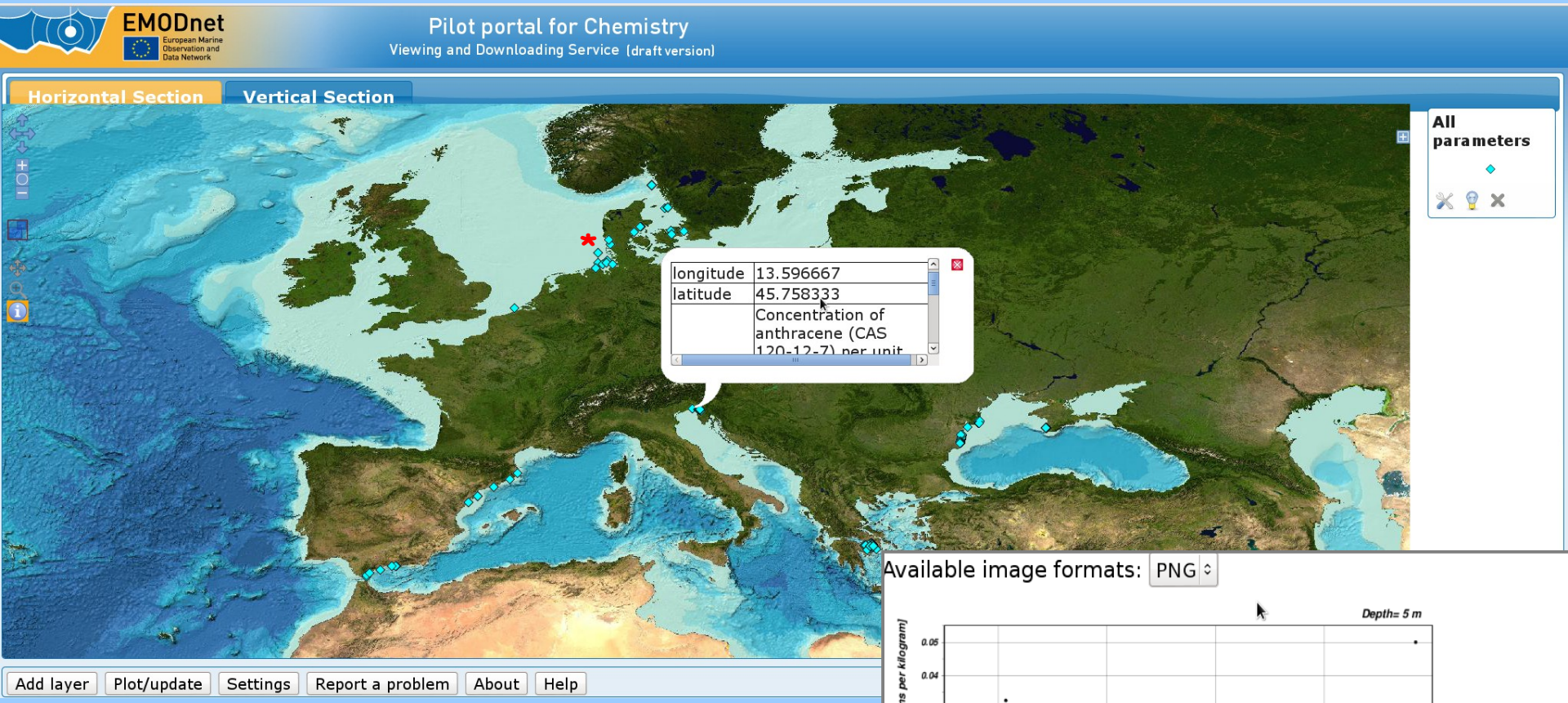
-to **avoid plots** for stations with **less than 3 points**;

-to **avoid linkage lines** between single points (we are not showing trends but measures!);

-to provide TS plots in **vector format (**as SVG);

Time Series plots

Ocean Browser (Gher group)



* products loaded as WMS layers

Note that some browser cannot display images in SVG format.

Lessons Learned/Open issues from Pilot

- **QC for «exotic parameters»** (eg:contaminants...) **no spikes can be** detect for them because they are **events**. At **the moment not enough data** to calculate **regional ranges**.

- **Lack** of «**Under detection limit**» information (limit not specified!);

- Technical development/usersfriendliness:
  - **Finalization of products metadata catalogue**;
  - **Improvements of web interfaces search criteria**;
  - **Improvement of handling of Chemical Parameters metadata**;

- **Need of group of experts** for the **data-products periodic validation for each region + workshop**.

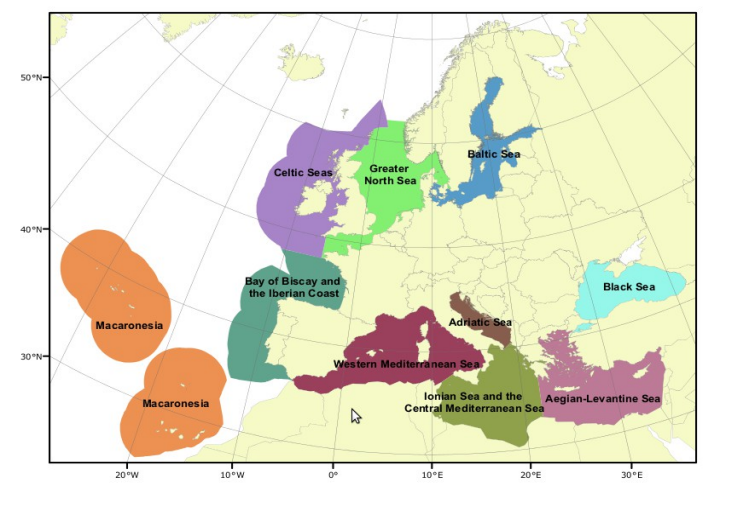
Chemistry Lot is ongoing
The New Phase (MARE/2012/10)

- **Enlarged partnership**: 32 partners + 14 sub-contractors = total of 46 participants (about twice!) coordinated by OGS;
- **Official Start** 16th August 2013;
- **Specific focus** on **MSFD needs;**
- **New products**: coastal visualization + a proposal for assessment tool;
- Specific focus on **Coastal Data**.

The New Phase

The portal should cover **all European waters**

1	Adriatic Sea
2	Aegean Levantine Sea
3	Baltic Sea
4	Black Sea
5	Celtic Seas
6	Greater North Sea
7	Iberian Coast and Bay of Biscay
8	Ionian Sea and Central Mediterranean
9	Macaronesia
10	Norwegian Sea
11	Western Mediterranean Sea



Note: This map is derived from the EU Tender document but lacks the Norwegian sea

The parameters:

In 3 matrices:

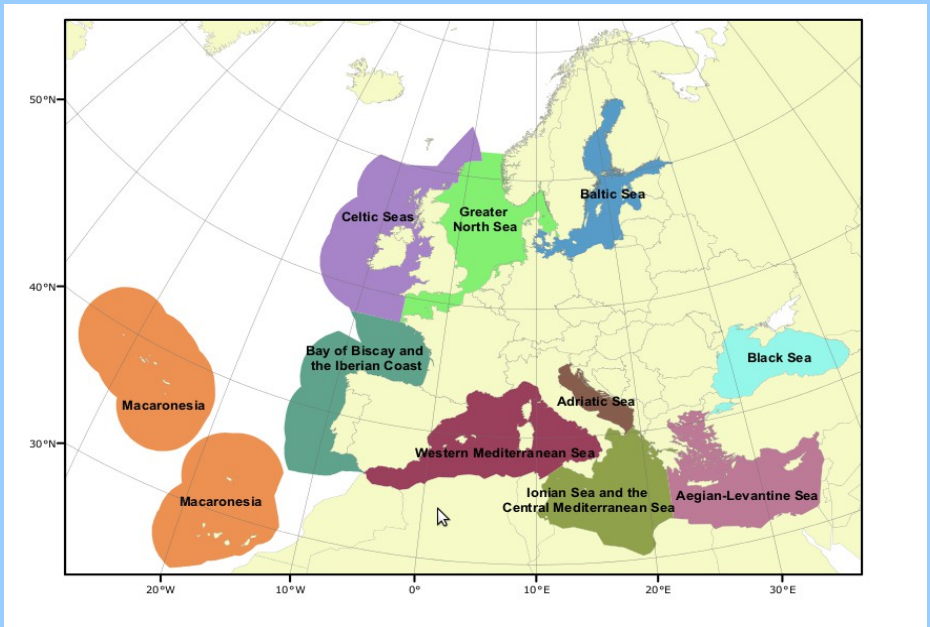
-water column;

-biota;

-sediment.

Group	Examples
pesticidides and biocides	DDT, HCB
antifoulants	TBT, TPT
Pharmaceuticals	oxytetracycline
heavy metals	mercury, cadmium, lead
Hydrocarbons	anthracene, fluoroanthene
Radionuclides	Cs^{137}, Pu^{239}
fertilisers	nitrogen (DIN, TN), phosphorus (DIP, TP)
organic matter(e.g. from sewers or mariculture)	total carbon (TOC)
Chlorophyll	
Silicates	
partial pressures of dissolved gases	oxygen, carbon dioxide
Plastics	polyethelyne, polypropylene
Acidity (from pH, pCO2, Total Inorganic Carbon, alkalinity)	pH

Regional level:



Data harvesting (WP1) and products generation (WP2) will be always organized at Regional level. This time 5 sea regions have been defined as:

- **Greater North** Sea (including **Norwegian** Sea and **Celtic** Sea)**;**
- **Atlantic** Sea (including **Atlantic Coast** and **Macaronesia**);
- **Baltic** Sea;
- **Black** Sea;
- **Mediterranean** Sea.

Ongoing activity to face the Pilot open issues:

- **QC for exotic parameters:**
  - **To keep an open dialogue with MSFD requirements/guidelines;**
  - **The data harvesting** will **provide new data to calculate regional ranges**;
  - To keep an **open dialogue with Marine Conventions experts**;
  - **Efforts to collect «detection limits» for an inventory** in the different areas.

QC workshop with the Regional experts → will be organized at month 12.

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Thanks for your attention !
Questions?