



# **EMODnet Lot 3 – Chemical data**

## **FIRST INTERIM REPORT**

**Version 1.0**

**4/6/2009 to 4/6/2010**

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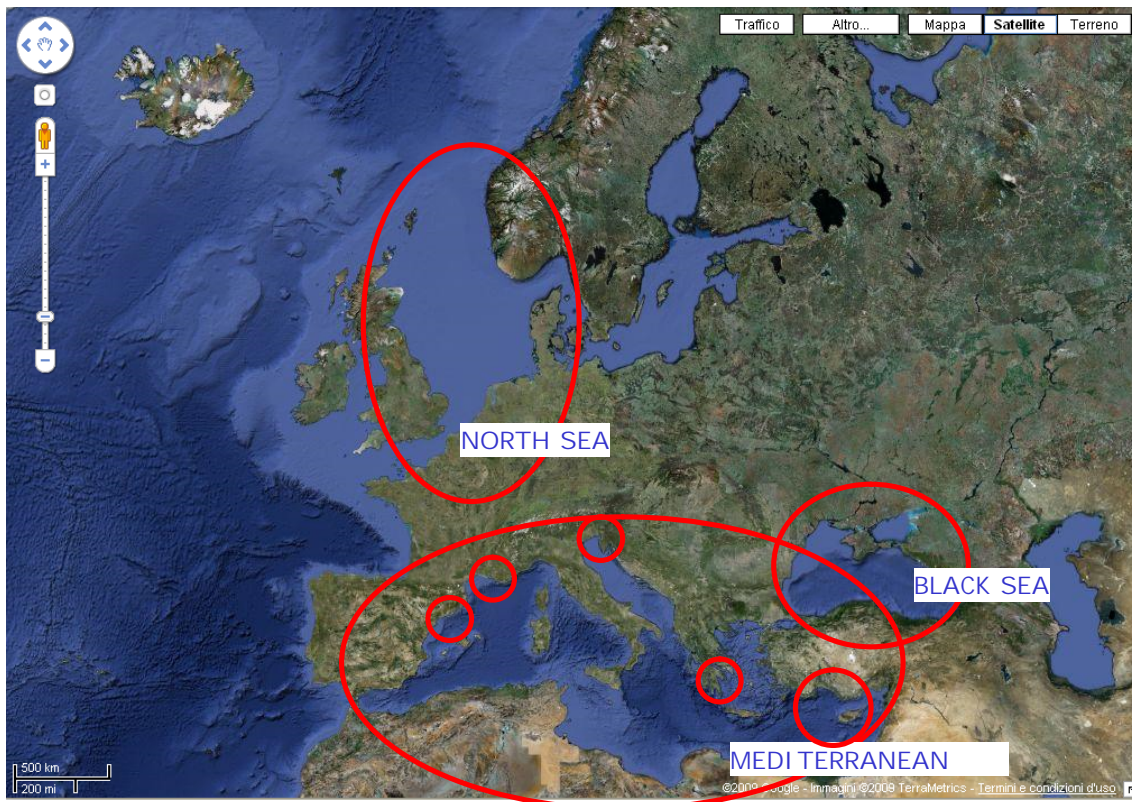
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## INTRODUCTION

EMODnet Chemical pilot is undertaken by **25 partners** representing the SeaDataNet network of Data Centres, selected on their geographical coverage and specific expertise. These Data Centres already manage a large volume of relevant data sets and can enlarge the available data collections with relevant data sets from a number of data holders in their country. Moreover the SeaDataNet partnership includes ICES, which acts as data centre for monitoring data for OSPAR, HELCOM and EIONET, and that brought in this volume of data sets.

The EMODnet Chemical tender asks for data sets from the **Greater North Sea** and the **Black Sea** region. However, we planned to expand the pilot regions with **five spots from the Mediterranean** (Balearic Sea, Gulf of Lion, North Adriatic Sea, Gulf of Athens and NE Levantine basin).



EMODnet Chemical pilot is focused on the **groups of chemicals** required for monitoring the Marine Strategy Directive:

1. synthetic compounds (i.e. pesticides, antifoulants, pharmaceuticals),
2. heavy metals,
3. radionuclides;
4. fertilisers and other nitrogen- and phosphorus-rich substances;
5. organic matter (e.g. from sewers or mariculture);
6. hydrocarbons including oil pollution.

This First Interim Report describes the activities carried out during the first year of EMODnet chemical pilot ( 4<sup>th</sup> of June 2009 – 3<sup>rd</sup> of June 2010 ), the deliverables produced by each work package as specified in the Technical Tender Form for Lot 3 – Chemical Data and any deviation from the project tender.

Based on SeaDataNet experience, the following strategy was proposed as approach for the EMODnet pilots:

- Develop a high-end dedicated portal, outfitted with a powerful spatial database, that is complemented with WMS, WFS and WCS services (OGC) to serve users and to provide layers for e.g. the other EMODnet portals, the prototype European Atlas of the Seas, and the broad-scale European Marine Habitats map;
- Provide data sets for producing interpolated maps with specific resolution for each geographical region, that are loaded and integrated afterwards into the portals' spatial database;
- Include a metadata discovery service in the portal, by adopting the SeaDataNet CDI metadata standard, that inter alia gives clear information about the background data, the access restrictions and distributors; this also ensures the connection of the EMODnet portals with the SeaDataNet distributed infrastructure.

In fact, EMODnet Chemical lot has used SeaDataNet V1 infrastructure for the technical set-up. This means:

- SDN Standards for background data, metadata and product,
- CDI mechanism to access data with data policy,
- ODV format for background data exchange,
- SDN Security Services for users registrations, and SDN Delivery Services for data access and downloading,
- DIVA software tool to produce gridded data products and error maps as NetCDF files,
- SDN Products catalogue (CAMIOON system) and SDN Products viewing services for free unlimited discovery, access, visualization and downloading of data products.

This First Interim Report is organised into 4 sections, where the progress made in the 4 work packages according to the tender planning of activities is summarised. These are:

- 1 – Project management,
- 2 - Data collection and metadata compilation,
- 3 - QC/QA and products,
- 4 - Technical development and portal operation.

Some final remarks are given in the final section.

## 1. PROJECT MANAGEMENT (WP1)

The project organization, as described in the Technical Tender Form for Lot 3 – Chemical Data includes the following elements: the project coordinator (OGS), the technical coordinator (MARIS), the Coordination group (OGS, MARIS, NERC-BODC, NERI-MAR, MHI, HCMR, ICES and IFREMER) and the Partners.

The service contract was signed the 4<sup>th</sup> of June 2009, fixing the official starting date for the Lot 3 – Chemical Data

OGS prepared a Consortium Agreement, that was revised and signed by all partners, including the table with costs breakdown and the expected payments for each partner. In parallel, all partners sent to OGS the relevant invoice or debit note and was paid for the pre-financing portion.

During the first year of EMODnet chemical pilot ( 4<sup>th</sup> of June 2009 – 3<sup>rd</sup> of June 2010 ) the following meeting were organised:

- Kick-off meeting (with the Coordination group), 2-3 July 2009, Trieste (Italy),
- Joint EMODNet- SeaDataNet meeting (with SDN Technical Task Team and Coordination group), September 2009, Antibes (France),
- 3<sup>rd</sup> Coordination group meeting, 21 January 2010, Paris (France),
- The first annual Partner group meeting was organised at the UNESCO Headquarters in Paris (France), soon after the SeaDataNet plenary meeting, April 2 2010. A total of 34 participants of partners institutes from 19 countries contributed to the event.

A report and/or action list is available in EMODnet Extranet for each event.

Moreover, OGS and representatives from the Chemical lot participated to:

- EMODnet Preparatory Actions Seminar and Kick-off meeting, 4 June 2009, Brussels,
- Progress meeting for ur-EMODnet Preparatory Actions, 24 November 2009, Brussels,
- Second six-monthly progress meeting for ur-EMODnet preparatory actions, 25 May 2010, Copenhagen.

The communication for the management activities is facilitated by the use of the following mailing lists:

[emodnet-all@googlegroups.com](mailto:emodnet-all@googlegroups.com)

[emodnet-coordination@googlegroups.com](mailto:emodnet-coordination@googlegroups.com)

Five bi-monthly progress reports were produced from August 2009, sent to EU and posted on Extranet.

Leaflet showing project objectives and results

All documents are included in EMODnet Extranet

## 2. DATA COLLECTION AND METADATA COMPILATION (WP2)

The contribution to data collection and metadata compilation by each EMODnet partner was presented at the first annual meeting and extensively described in the meeting report (available on Extranet).

The overview of the progress on data collection and metadata compilation in the three regions is given here.

Based on MSFD requirement, on the data distribution in time and space (as time series geographically representative), a set of chemicals was selected from the 8 groups in the 3 matrices (water column, sediment, biota), to make a set of 17 selected parameters for product generation in the three regions. All these parameters was mapped to SeaDataNet vocabularies (mainly P021 for CDI and P061 for units, and P011 for ODV) as reported in the following tables.

	water column			
EMNC	Chemical group	Parameter	SDN P021 CODE	SDN PARAMETERS P021 TERM
C1	Pesticides	Dichlorodiphenyltrichloroethane (DDT)	PEWB	Pesticide concentrations in water bodies
C2	Pesticides	Hexachlorobenzene (HCB)	PEWB	Pesticide concentrations in water bodies
C3	Antifoulants	Tributyltin (TBT)	WCOC	Concentration of other organic contaminants in the water column
C4	Antifoulants	Triphenyltin (TPT)	WCOC	Concentration of other organic contaminants in the water column
C5	Pharmaceuticals	Oxytetracycline (C <sub>22</sub> H <sub>24</sub> N <sub>2</sub> O <sub>9</sub> )	PHWB	Pharmaceutical concentrations in water bodies
C6	Heavy metals	Mercury (Hg)	MTWD	Dissolved metal concentrations in the water column
C6	Heavy metals	Mercury (Hg)	MTWT	Total metal concentrations in the water column
C6	Heavy metals	Mercury (Hg)	MTWP	particulate metal concentrations in the water column
C7	Heavy metals	Cadmium (Cd)	MTWD	Dissolved metal concentrations in the water column
C7	Heavy metals	Cadmium (Cd)	MTWT	Total metal concentrations in the water column
C7	Heavy metals	Cadmium (Cd)	MTWP	particulate metal concentrations in the water column
C8	Heavy metals	Lead (Pb)	MTWD	Dissolved metal concentrations in the water column
C8	Heavy metals	Lead (Pb)	MTWT	Total metal concentrations in the water column
C8	Heavy metals	Lead (Pb)	MTWP	particulate metal concentrations in the water column
C9	Hydrocarbons	Anthracene (C <sub>14</sub> H <sub>10</sub> )	PCHW	column
C10	Hydrocarbons	Fluoranthene (C <sub>16</sub> H <sub>10</sub> )	PCHW	column
C11	Radionuclides	Tritium	WRAD	Radioactivity in the water column
C12	Radionuclides	Cesium 137	WRAD	Radioactivity in the water column
C13	Radionuclides	Plutonium 239	WRAD	Radioactivity in the water column
C14	Fertilisers/Nitrogen	Nitrate (NO <sub>3</sub> )	NTRA	Nitrate concentration parameters in the water column
C15	Fertilisers/Phosphorus	Phosphate (PO <sub>4</sub> )	PHOS	Phosphate concentration parameters in the water column
C16	Organic matter	Organic Carbon (C)	CORG	Particulate total and organic carbon concentrations in the water column
C17	Organic matter	Organic Nitrogen (N)	NTOT	Particulate total and organic nitrogen concentrations in the water column

	sediment			
EMNC	Chemical group	Parameter	SDN P021 CODE	SDN PARAMETERS P021 TERM
C1	Pesticides	Dichlorodiphenyltrichloroethane (DDT)	PESD	Pesticide concentrations in sediment
C2	Pesticides	Hexachlorobenzene (HCB)	PESD	Pesticide concentrations in sediment
C3	Antifoulants	Tributyltin (TBT)	SCOC	Concentration of other organic contaminants in sediment samples
C4	Antifoulants	Triphenyltin (TPT)	SCOC	Concentration of other organic contaminants in sediment samples
C5	Pharmaceuticals	Oxytetracycline (C <sub>22</sub> H <sub>24</sub> N <sub>2</sub> O <sub>9</sub> )	PHSE	Pharmaceutical concentrations in sediments
C6	Heavy metals	Mercury (Hg)	MTSD	Metal concentrations in sediment
C7	Heavy metals	Cadmium (Cd)	MTSD	Metal concentrations in sediment
C8	Heavy metals	Lead (Pb)	MTSD	Metal concentrations in sediment
C9	Hydrocarbons	Anthracene (C <sub>14</sub> H <sub>10</sub> )	SCAH	sediment samples
C10	Hydrocarbons	Fluoranthene (C <sub>16</sub> H <sub>10</sub> )	SCAH	sediment samples
C11	Radionuclides	Tritium	SRAD	Radioactivity in sediment
C12	Radionuclides	Cesium 137	SRAD	Radioactivity in sediment
C13	Radionuclides	Plutonium 239	SRAD	Radioactivity in sediment
C16	Organic matter	Organic Carbon (C)	CBSD	Carbon concentrations in sediment
C17	Organic matter	Organic Nitrogen (N)	NTSD	Nitrogen concentrations in sediment
C14	Fertilisers/Nitrogen			
C15	Fertilisers/Phosphorus			

	biota			
EMNC	Chemical group	Parameter	SDN P021 CODE	SDN PARAMETERS P021 TERM
C1	Pesticides	Dichlorodiphenyltrichloroethane (DDT)	PEBI	Pesticide concentrations in biota
C2	Pesticides	Hexachlorobenzene (HCB)	PEBI	Pesticide concentrations in biota
C3	Antifoulants	Tributyltin (TBT)	BCOC	Concentration of other organic contaminants in biota
C4	Antifoulants	Triphenyltin (TPT)	BCOC	Concentration of other organic contaminants in biota
C5	Pharmaceuticals	Oxytetracycline (C <sub>22</sub> H <sub>24</sub> N <sub>2</sub> O <sub>9</sub> )	PHBI	Pharmaceutical concentrations in biota
C6	Heavy metals	Mercury (Hg)	BCMT	Metal concentrations in biota
C7	Heavy metals	Cadmium (Cd)	BCMT	Metal concentrations in biota
C8	Heavy metals	Lead (Pb)	BCMT	Metal concentrations in biota
C9	Hydrocarbons	Anthracene (C <sub>14</sub> H <sub>10</sub> )	BCAH	Concentration of polycyclic aromatic hydrocarbons
C10	Hydrocarbons	Fluoranthene (C <sub>16</sub> H <sub>10</sub> )	BCAH	Concentration of polycyclic aromatic hydrocarbons
C11	Radionuclides	Tritium	BRAD	Radioactivity in biota
C12	Radionuclides	Cesium 137	BRAD	Radioactivity in biota
C13	Radionuclides	Plutonium 239	BRAD	Radioactivity in biota
C14	Fertilisers/Nitrogen			
C15	Fertilisers/Phosphorus			
C16	Organic matter			
C17	Organic matter			

Data collection started with nutrients in the water column, was then extended to all other selected chemicals in the water column (organic matter – DOC and TN, ...), and to synthetic compounds, hydrocarbons and heavy metals in the sediments and biota (considering the target species MYTILUS). This was the target for 3 regions, but at the data distribution is very different. This is mainly depending by the historical background on the geographic area that has a strong impact on present data monitoring and data management activity.

All partners produced ODV files and sent them to the regional task leaders (NERI, MHI, HCMR). Besides, all partners produced the CDI entries to link the collected data to EMODnet CDI User interface.

## 2.1 DATA COLLECTION IN THE NORTH SEA – REGIONAL DATA POOL

A lot of the data concerning the EMODnet chemical parameters are also available in the ICES database DOME. Therefore an extraction from DOME to the regional data pool (EMODnet Chemical Buffer Database) has been done. The Greater North Sea partners only have to report additional datasets (except nutrients, that were not collected at ICES). For this purpose ICES distributed to all partners in the region a worksheet with the content of the database per parameter and per matrix. The boundaries for the area covered are the following:

Name	Language Name	Source
	English	North Sea (preferred) ICES ( <a href="http://www.ices.dk/aboutus/icesareas.asp">http://www.ices.dk/aboutus/icesareas.asp</a> )
<b>PlaceType</b>	ICES Ecoregion	
<b>Latitude</b>	56° 56' 47.5" N (56.9465°)	
<b>Longitude</b>	3° 2' 35.3" E (3.0431°)	
<b>Source</b>	ICES ( <a href="http://www.ices.dk/aboutus/icesareas.asp">http://www.ices.dk/aboutus/icesareas.asp</a> )	
<b>Relation</b>	Part of <a href="#">ICES Ecoregions</a> (General Region) [ <a href="#">View Hierarchy</a> ]	

Map



The EMODnet Chemical Buffer database (North Sea regional data pool) was initially created from ICES database (DOME). The buffer aggregates all the data from the regional partners. All the data will be used to produce the products, even restricted data. However these will be treated as restricted in case of user requests. All metadata will be included in SeaDataNet infrastructure (CDI User Interface).

A short overview of the content of the EMODnet Chemical Buffer database in the Greater North Sea with collected samples per parameter per matrix is shown in the table (status mid May 2010):

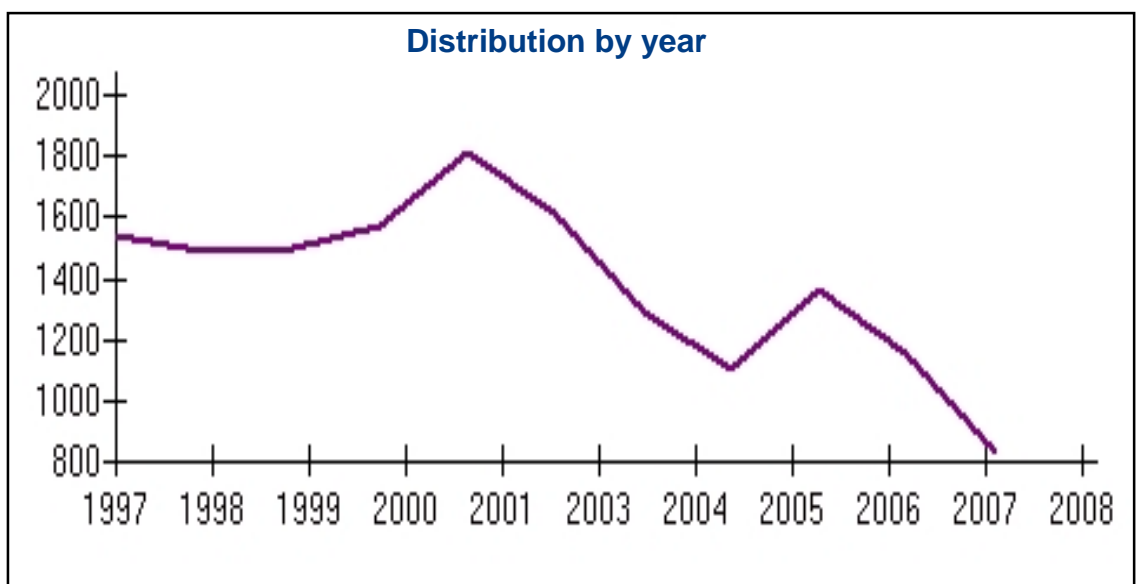
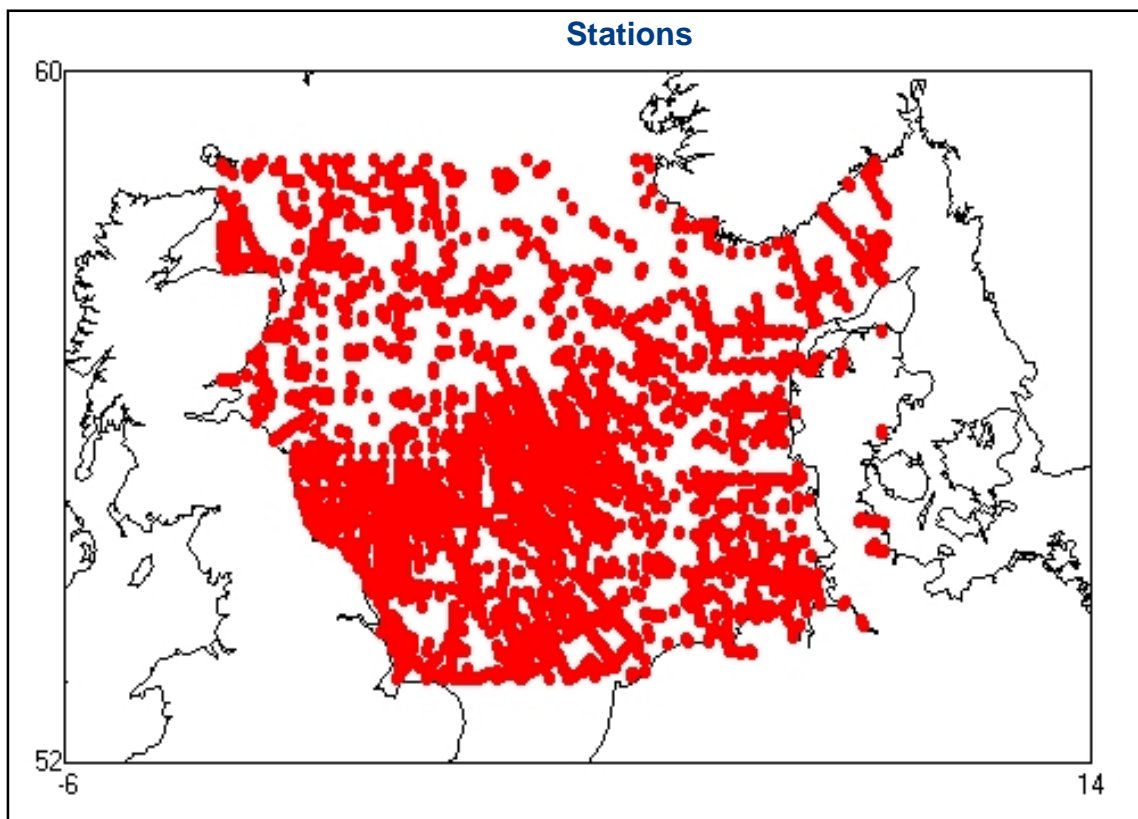


In order to give a good visibility on the EMODnet chemical CDI user interface (the EMODnet chemical portal) it was decided to make a first attempt at CDI's for the chemicals in the regional data pool in the Greater North Sea, with the exception of nutrients. ICES have made this attempt at CDI's for a 'cut-off' date in the middle of May 2010 for entries to the regional data pool.

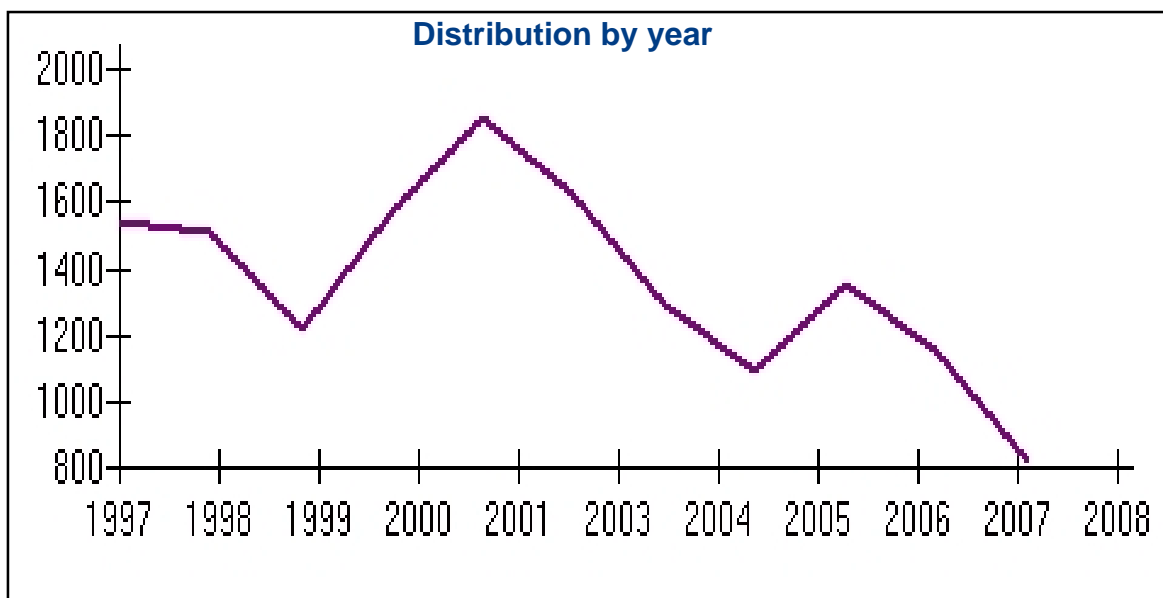
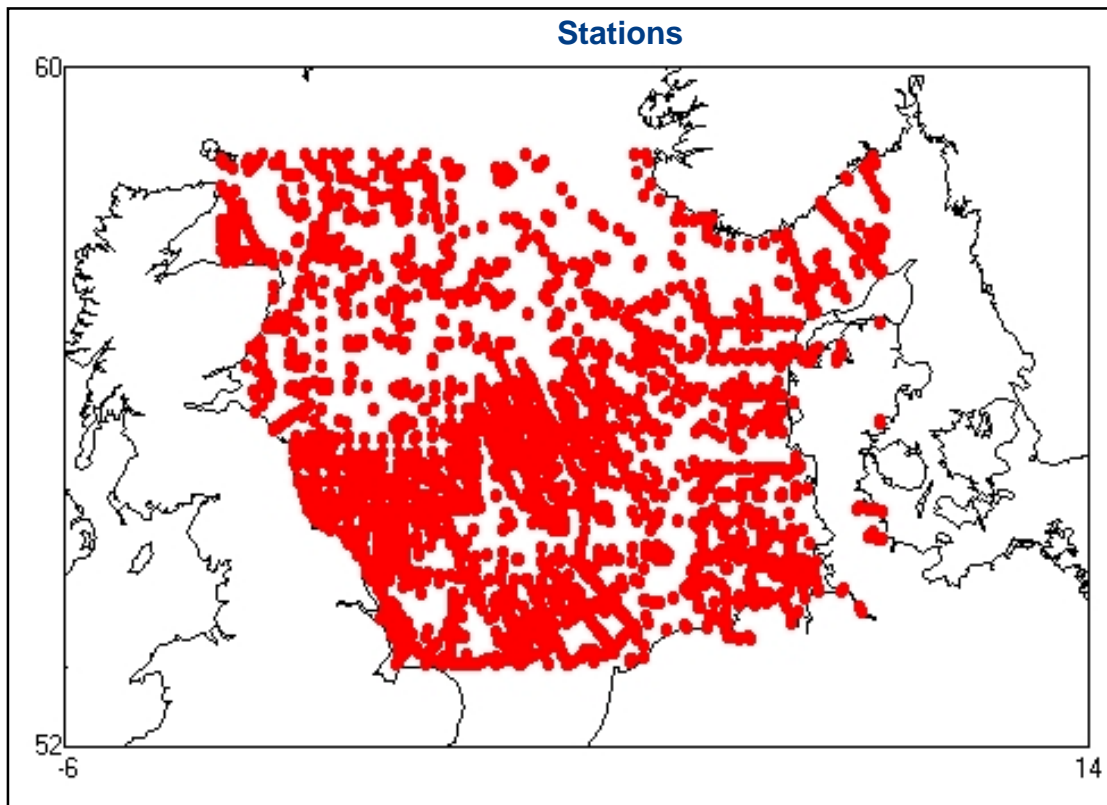
It is important to emphasize that there will be a continuous and ongoing CDI-generation for the selected parameters to EMODnet chemical CDI user interface (the EMODnet portal) from each partner in the Greater North Sea.

EMNC	Chemical group	Parameter	Water column	Sediment	Biota
C1	Pesticides	Dichlorodiphenyltrichloroethane (DDT)	321	1260	8264
C2	Pesticides	Hexachlorobenzene (HCB)	225	1311	10129
C3	Antifoulants	Tributyltin (TBT)		951	657
C4	Antifoulants	Triphenyltin (TPT)		400	
C5	Pharmaceuticals	Oxytetracycline (C <sub>22</sub> H <sub>24</sub> N <sub>2</sub> O <sub>9</sub> )			
C6	Heavy metals	Mercury (Hg)	517	4722	14110
C7	Heavy metals	Cadmium (Cd)	978	4726	12495
C8	Heavy metals	Lead (Pb)	664	5235	11211
C9	Hydrocarbons	Anthracene (C <sub>14</sub> H <sub>10</sub> )	53	5210	1949
C10	Hydrocarbons	Fluoranthene (C <sub>16</sub> H <sub>10</sub> )	88	5375	2092
C11	Radionuclides	Tritium			
C12	Radionuclides	Cesium 137	68		
C13	Radionuclides	Plutonium 239			
C14	Fertilisers/Nitrogen	Nitrate (NO <sub>3</sub> )	49178		
C15	Fertilisers/Nitrogen	Phosphate (PO <sub>4</sub> )	48734		
C16	Organic matter	Organic Carbon (C)	52	5744	
C17	Organic matter	Organic Nitrogen (N)		280	

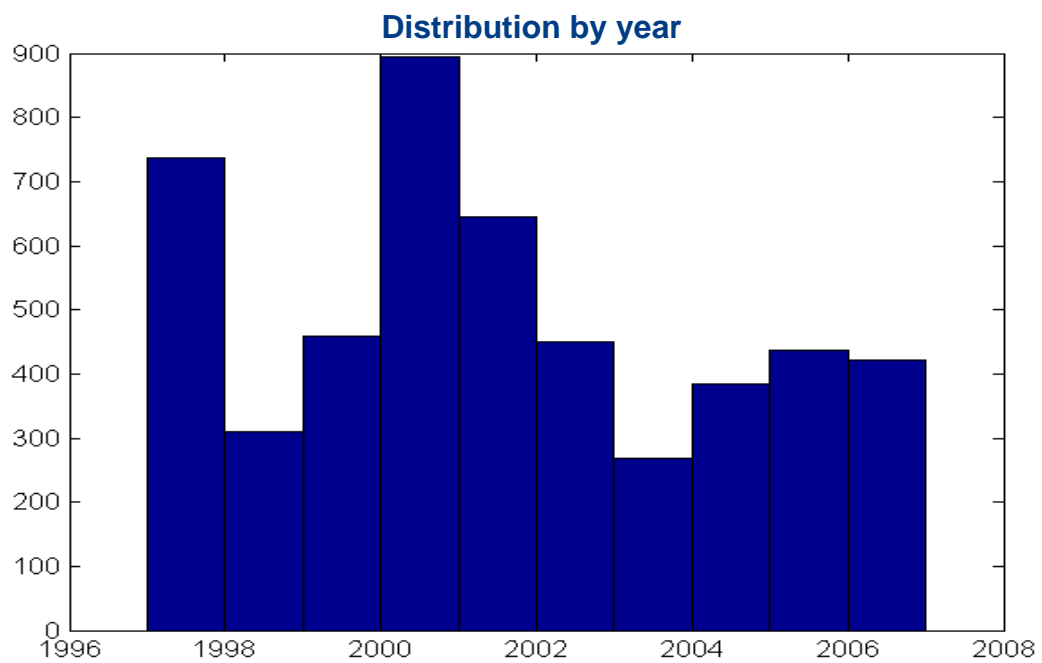
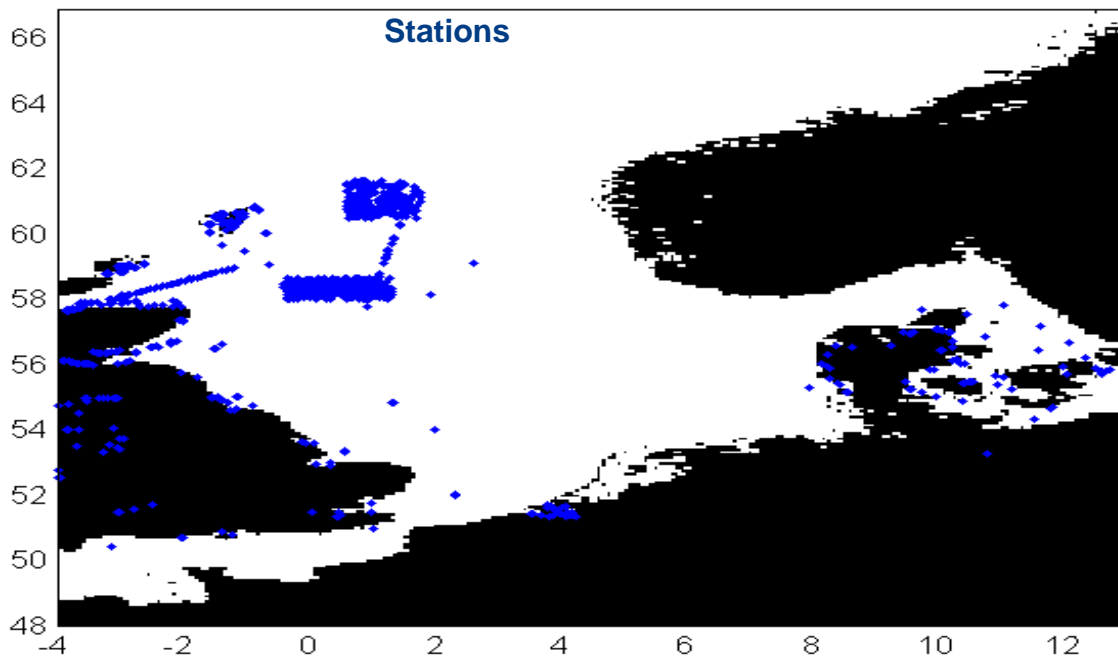
Data distribution - Nitrate ( $\text{NO}_3$ ) in the water column



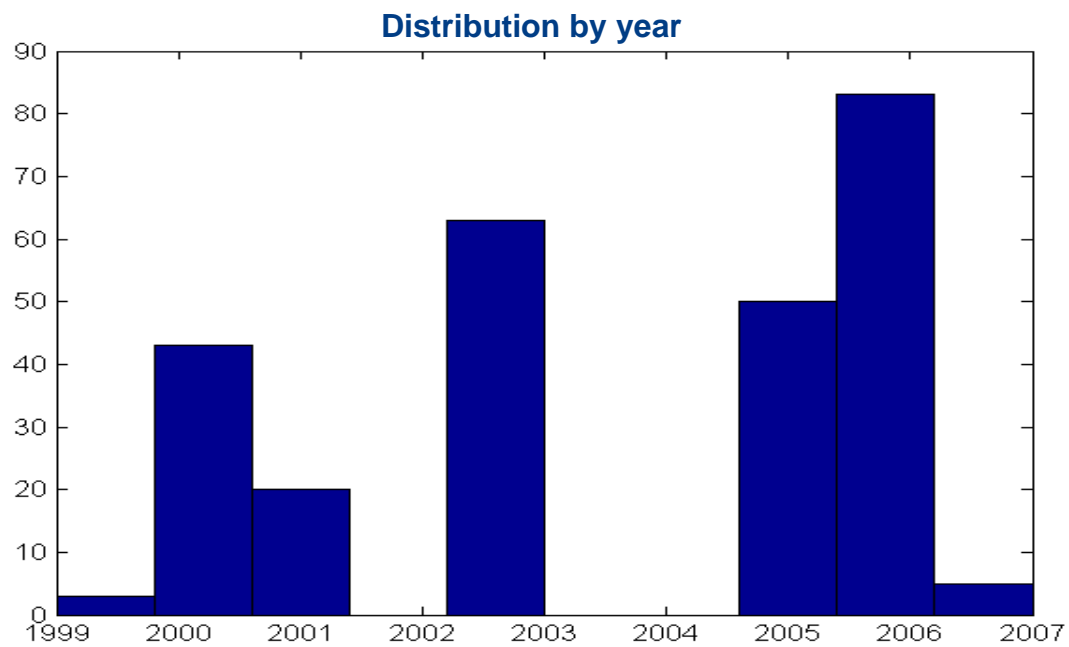
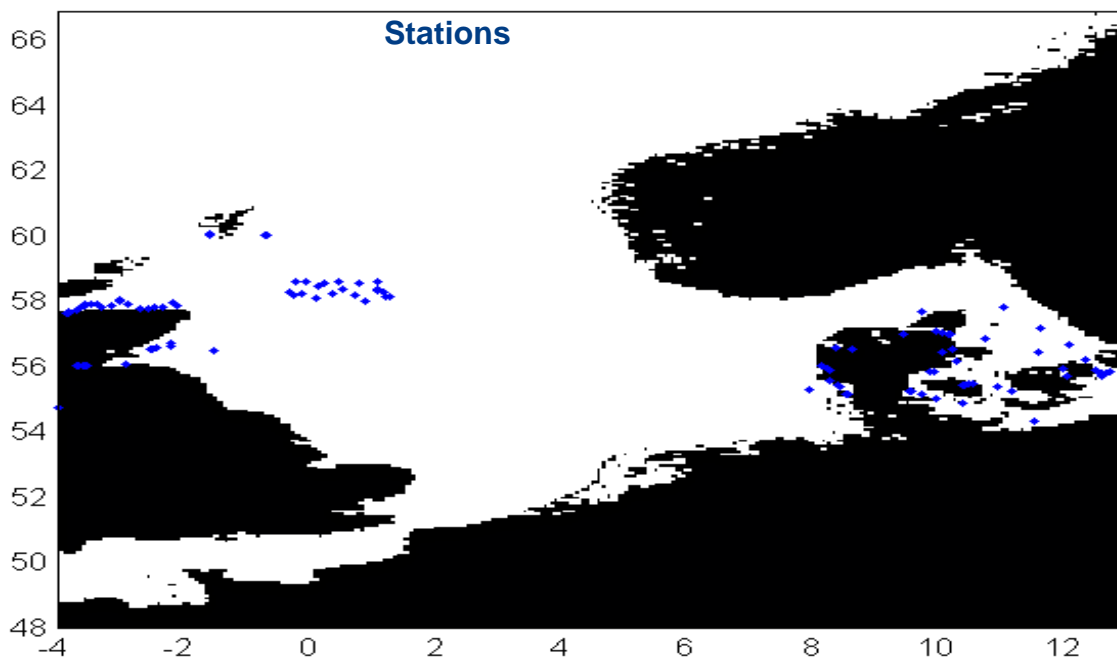
Data distribution - Phosphate (PO<sub>4</sub>) in water column

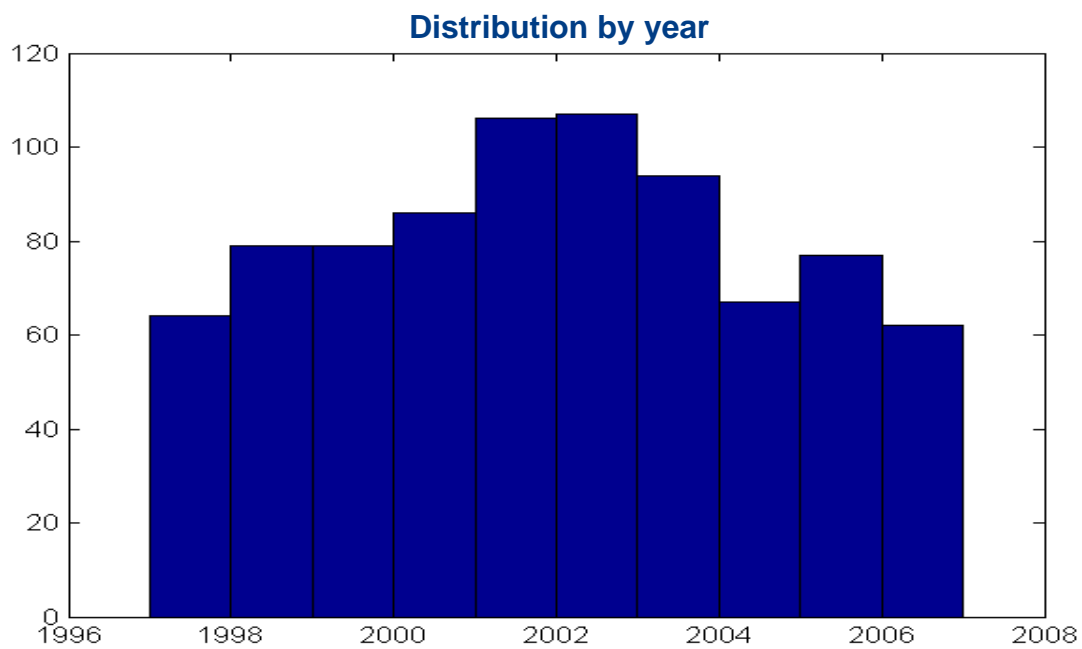
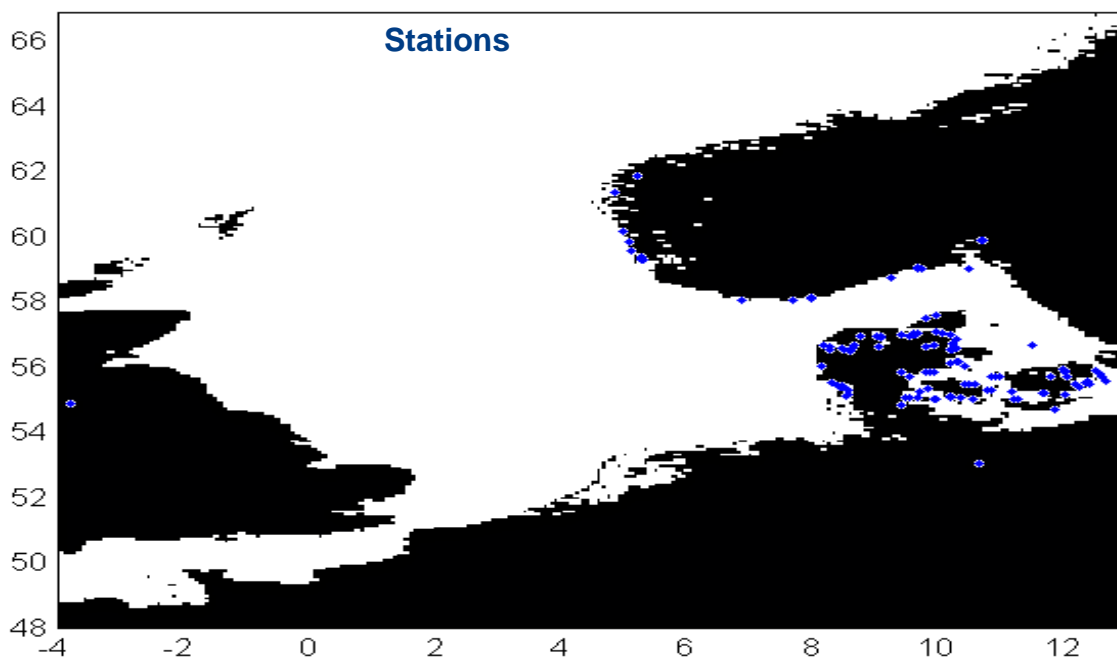


## Data distribution - Total Organic Carbon (%TOC) in sediment



Data distribution - TBT in sediment referred to Total Organic Carbon (%TOC) in the sediment



Data distribution - TBT in biota (species *Mytilus Edulus*)

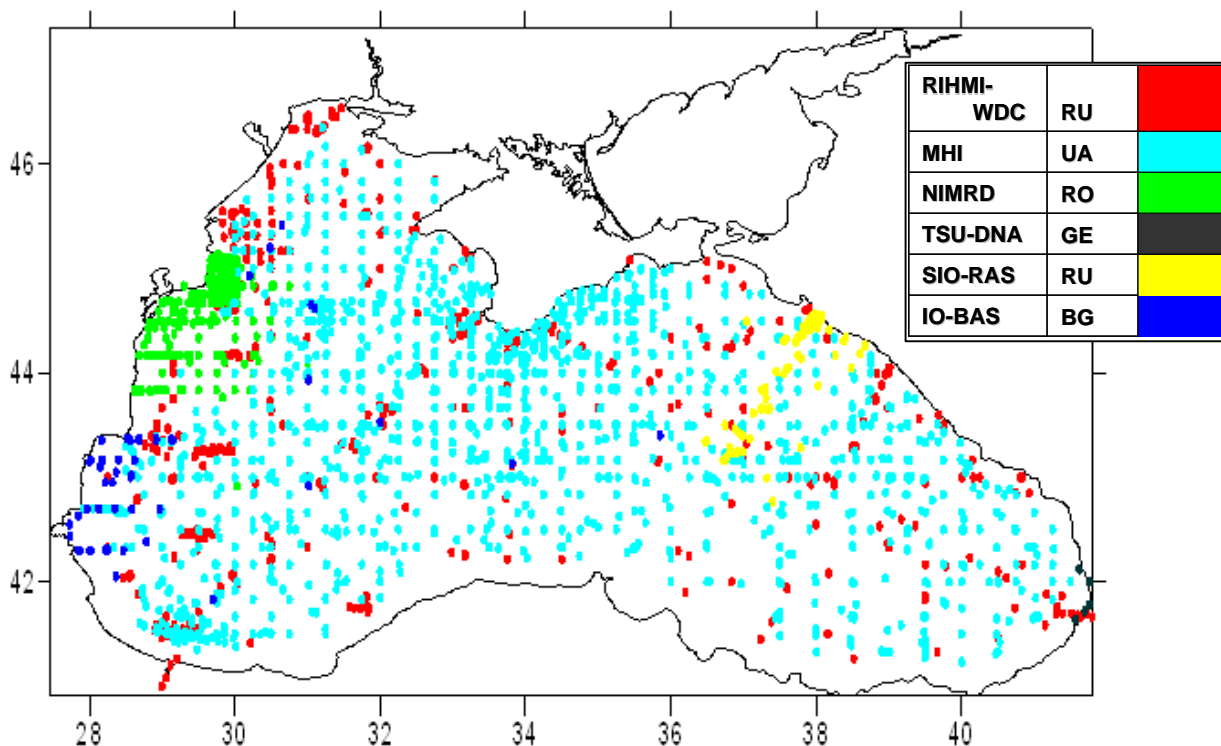
## 2.2 DATA COLLECTION IN THE BLACK SEA

The data collected in Black Sea are summarised in the following table:

Nr	Partner	Country	Total profiles	Measurements									
				O2	PO4	Total P	PH	Alk	SIO3	NO2	NO3	NH4	Total N
13	RIHMI-WDC	RU	904	5343	3680	3	3404	635	2469	1654	280	33	14
14	SIO-RAS	RU	147	888	837	249	226	286	855	311	361	876	152
15	MHI	UA	2500	16946	877	306	127	839	379	2361	2601	436	488
16	IO-BAS	BG	124	865	277	703	248	0	0	0	0	0	0
17	NIMRD	RO	2268	9995	6548	0	0	0	10207	6892	7729	5275	0
18	TSU-DNA	GE	10	20	25	0	0	0	0	27	30	29	27
	<b>TOTAL</b>		<b>5953</b>	<b>34057</b>	<b>12244</b>	<b>1261</b>	<b>4005</b>	<b>1760</b>	<b>13910</b>	<b>11245</b>	<b>11001</b>	<b>6649</b>	<b>681</b>

Additional data collected by NIMRD (heavy metal), RIHMI – WDC (DDT) and MHI (radionuclides) in the water column were reported and have to be included in the table.

Spatial distribution of the profiles:



## 2.3 DATA COLLECTION IN THE MEDITERRANEAN SEA

In the Mediterranean Sea 5 spots were identified:

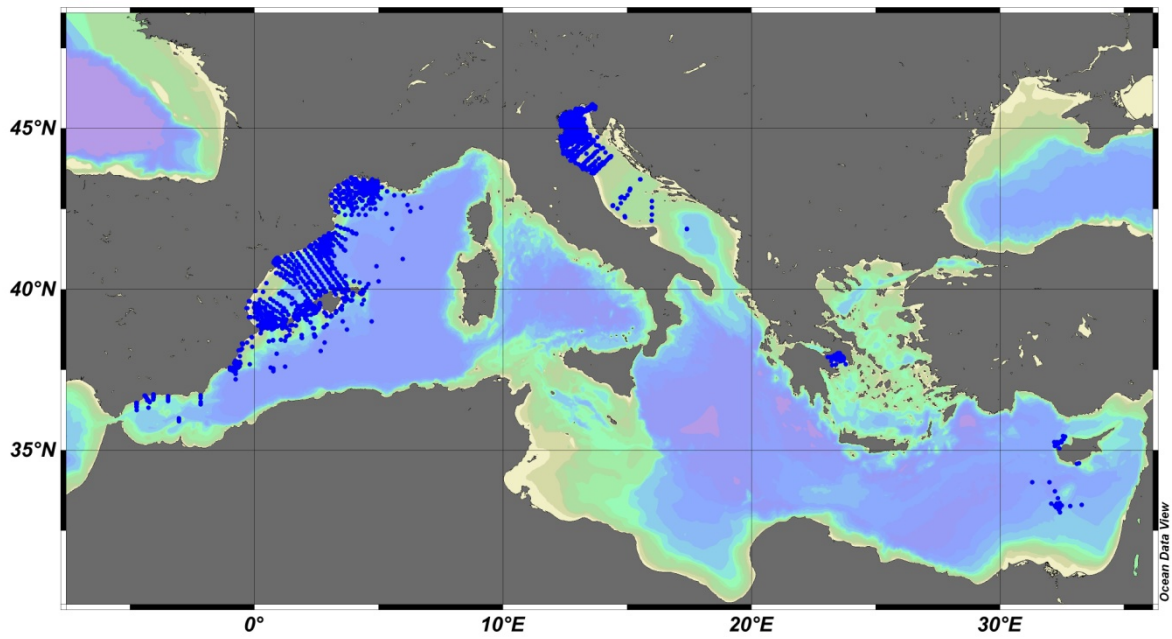
- Balearic Sea
- Gulf of Lion
- North Adriatic Sea
- Gulf of Athens
- NE Levantine basin

The data collected in 5 spots of the Mediterranean Sea are summarized in the 5 column of the following table:

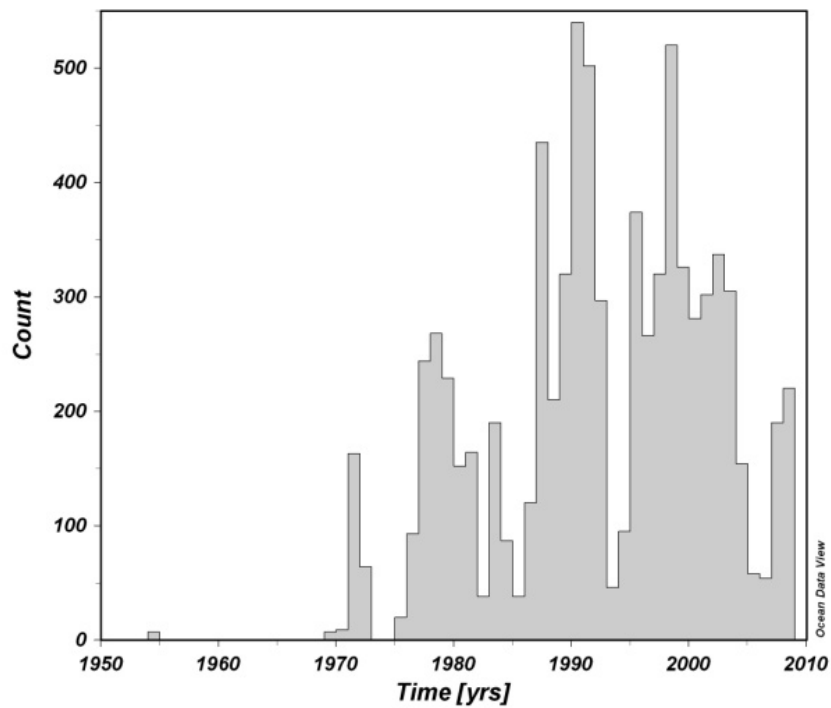
Parameters	Cyprus (36 st)	Greece (1543 st)	France (826 st)	Italy (2482 st)	Spain (3099 st)
Oxygen	40	8604		11539	9940
Phosphate	64	8506	2617	6552	12117
Silicate	79	8492	1824	7553	12860
Nitrite	39	8498	2101	6946	12986
Nitrate	39	8493	1085	7139	11100
Ammonium	244	8505	1496	6756	1223
Nitrate+Nitrite Content	72		925		4251
Total Nitrogen			925	94	
Particulate Organic Carbon		2701			
Total Organic Carbon		1203			
Total particulate Nitrogen		625			
Total particulate Phosphate		482			
Total Particulate Phosphorus				68	
Chorophyll-A Total			869		7509
Chorophyll-B			225		608
Chorophyll-C Total			225		608
Chorophyll- Total			475		2444
PH					832
Total Phosphate					437
Cs 137	14				



Spatial data distribution for nutrient stations:



Data distribution in time:



## 2.4 METADATA COMPILATION

The total CDI inventory for the EMODnet Chemical P021 terms and target areas gives an overview on the data availability through the EMODnet CDI User Interface (as each data profile is identified by a CDI entry).

Partner	Count
National Environmental Research Institute, University of Aarhus, Department of Marine Ecology	54223
Swedish Meteorological and Hydrological Institute, SMHI	40272
All-Russia Research Institute of Hydrometeorological Information - World Data Centre (RIHMI-WDC)	19091
IFREMER / IDM/SISMER	15240
OGS, National Institute of Oceanography and Experimental Geophysics, Department of Oceanography	6390
Spanish Oceanographic Institute	6157
Rijkswaterstaat Waterdienst	4885
Hellenic Centre for Marine Research, Hellenic National Oceanographic Data Centre (HCMR/HNODC)	3072
National Institute for Marine Research and Development Grigore Antipa	2948
Management Unit of the North Sea and Scheldt estuary Mathematical Models, Belgian Marine Data Centre (MUMM-BMDC)	2517
German Oceanographic Datacentre (NODC)	2407
Flanders Marine Institute	478
Marine Hydrophysical Institute	429
P.P.Shirshov Institute of Oceanology, RAS	122
British Oceanographic Data Centre (BODC)	3
	158234

### **3. QC/QA AND PRODUCTS (WP3)**

#### **3.1 QUALITY ASSURANCE AND QUALITY CONTROL STANDARDS**

Ultimately, the usefulness of the data that is collated and distributed through the EMODnet Chemical portal will be largely due to the uniform quality and reliability of these data. The work package is divided into a number of distinct activities, all of which contribute to the overall quality control and assurance of the data in the portal.

#### **3.2 ADOPTING STANDARDS AND PROTOCOLS**

At the outset of the EMODnet Chemical pilot it was stated that existing international standards and best practices would be adopted for the transport and display of data in the portal. By doing this, the partners ensure that they are following the best available knowledge and will most likely contribute to the further refinement of the adopted standards. EMODnet Chemical is using the data formats and vocabularies employed by the established data project “SeaDataNet”.

One of the key areas, from a chemical perspective, has been ensuring the correct mapping and populating of the parameters and methods that make up the SeaDataNet vocabularies. This involves a lot of work and many experts input, as they key to inter-operability is the ability to point to a parameter from 2 distinct places and be confident that it is the same parameter, collected in a comparable way and measured in an acceptable fashion.

In addition, the standards and guidelines from relevant marine conventions (the Black Sea Commission, MEDPOL, Oskar and HELCOM) have been consulted when establishing baseline procedures when choosing matrices, chemical units, methods and other supporting information.

#### **3.3 GUIDELINE DOCUMENTATION**

A basic QC/QA guidance document has been produced for the regional partners [http://nodc ogs.trieste.it/emodoc/QC\\_Guidelines\\_EMD-Chemical\\_version1.1.doc](http://nodc ogs.trieste.it/emodoc/QC_Guidelines_EMD-Chemical_version1.1.doc)

This should be seen as a first working version, which will be amended and enhanced as the project develops. To many marine chemists this document will appear rudimentary and broad in scope. This is because the guideline is designed to be applicable across 3 marine regions and understandable to non-chemists, as the national data centres that co-ordinate the data collection need to be able to follow the QC process.

The guidelines have been extracted from the ICES working procedures for chemical data, which in turn draws from HELCOM COMBINE manual, OSPAR MON recommendations and specific input from ICES working groups that regularly use the data in assessments. However, it should be noted that in a broader EMODnet setting, many of the checks and criteria are not relevant as the guidelines were largely developed from a northern European perspective.

At this stage there are no ‘automated’ checks in place for the data, beyond what the national data centres already perform, however with the documentation in place and with the use of standard formats and vocabularies it is intended to explore how the Ocean Data View (ODV) software may be able to perform some of these functions.

### 3.4 DIVA MAPS PRODUCTION

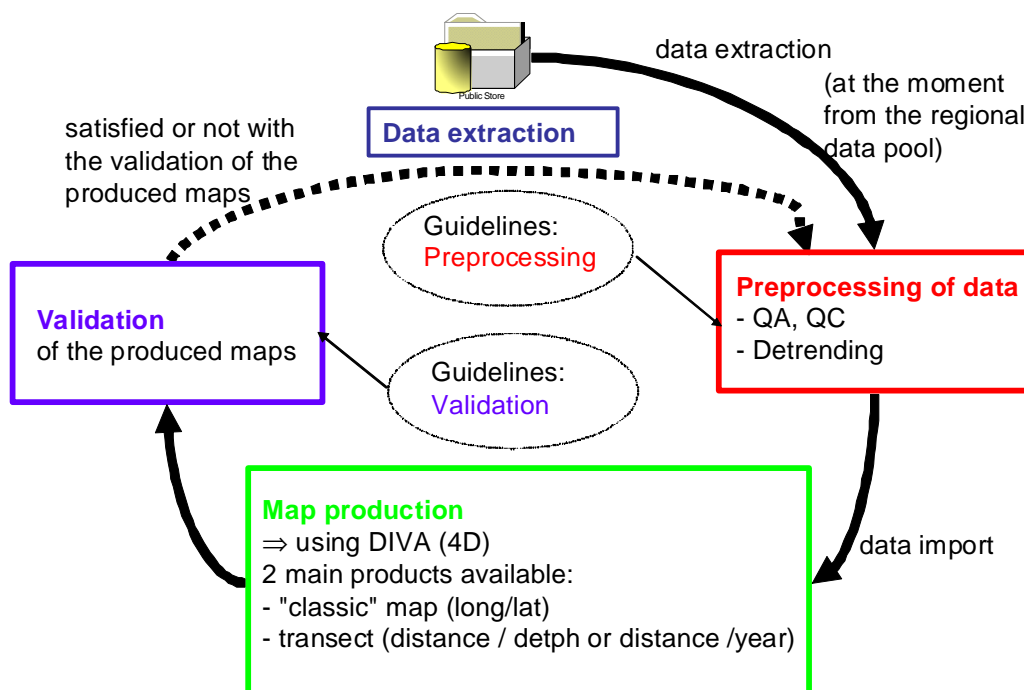
Maps generation started with nutrients in the water column (for the 3 regions), then extended to other chemicals in the water column, and to synthetic compounds, hydrocarbons and heavy metals in the sediments and biota (considering the target species MYTILUS).

As agreed on the first annual meeting for EMODnet Chemical Lot a small working group have interact with domain experts at their institutes to ask them which products could be useful and how to create them (data and map processing). The guidelines for products was shortly presented at the ur-EMODnet meeting in Copenhagen (25th may 2010) and is available at EMODnet chemical portal.

The aim for the guidelines for the DIVA maps production is to establish a common and documented basis for the maps production with focus on the pre-processing of data and the validation of the produced maps. The guidelines are divided into four steps:

1. Data extraction
2. Pre-processing of data
3. Maps production
4. Validation of the produced maps

The regional task leaders, which are responsible for the regional data pools are recommended to work through the listed processes. The following figure describes the overall concept for the DIVA maps production and is recommended as the working process for the maps production.



Besides, we have to be careful in which map we decide to make, on how to validate the gridded field before showing products, because very strong gradients can appear for a lot of this parameters. Probably we have to consider the data availability, and analyse the data distribution in space and time (gap analysis). At the same time, DIVA computes the error field that can be used to mask interpolated fields over a fixed threshold.

DIVA provides a lot of tools to optimize products and we can use it. In parallel is important to ask the experts opinion to understand which kind of maps that make sense. This is to focus on a number of basic products that we must make available at the EMODnet portal.

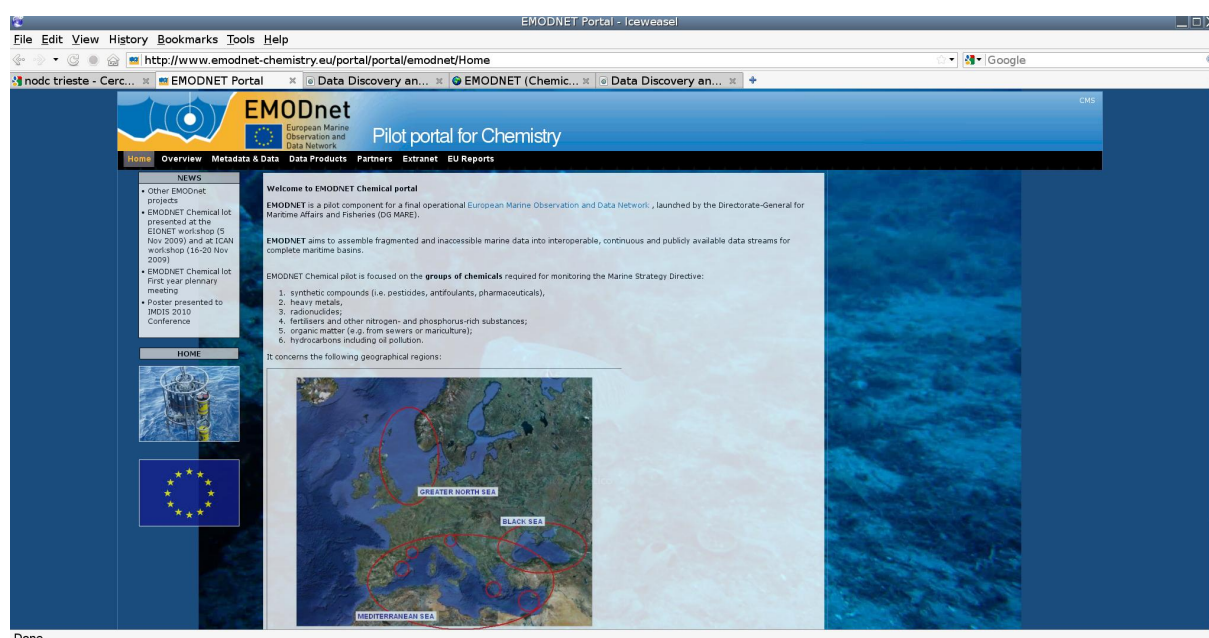
It should also be noticed that many data are time series of coastal monitoring. How to show and manage these data? We have to consider time evolution and spatial evolution. Usually we have a small number of stations for a long time period. Spatial interpolation is not the best way to present this. A nice option will be to make vertical sections along the coast (not supported by the web viewer (EMODnet map portal)).

The EMODnet Chemical portal give access to all the integrated maps of selected parameters produced at regional level, through the EMODnet Data Products Viewing and Downloading Service and the EMODnet Data Products Discovery Service, based upon CAMIOON Catalogue.

## 4. TECHNICAL DEVELOPMENT AND PORTAL OPERATION (WP4)

EMODnet Chemical pilot project technical developments included several actions in the first year of activities.

First of them was to set-up the web portal, centrally operated by OGS and giving link to a set of decentralised core services. A draft map of this portal was presented and discussed during one of the coordination-group meeting. The web portal is available from March 2010 at web site <http://www.emodnet-chemistry.eu/portal/portal/>. EMODnet Chemical portal provides to give a general overview about the European Marine Observation and Data Network and its four lots. There is available a section giving information about partners involved and another about the Chemical lot focus. There are also two separated sections with restricted access for the Extranet, that let partners to share project documents, and for the EU-reports.



EMODNET Pilot portal for Chemistry available at <http://www.emodnet-chemistry.eu>

Within May 2010 the portal was filled with the Metadata and Data Discovery and Downloading service. This was developed by Maris and adapted for EMODnet Chemical lot needs adapting the infrastructure coming from the SeaDataNet CDI mechanism. A quick and an extended search mask are provided through the **Metadata&Data** section of the portal. The masks, as for the SeaDataNet CDI mechanism infrastructure, let to registered users to query with different criteria the available datasets. Data can be flagged as unrestricted, in this case a registered user can immediately download them, or restricted, in this case the user needs to wait the originators decision to share data or not.

The screenshot displays the EMODnet Pilot portal for Chemistry. The main content area features a map of the Mediterranean region with data points overlaid. Below the map is a table of results listing data sets from Italy, including start dates and variables measured.

Data set name	Country	Start date	Variables measured	Instrument / gear type
LBM003CTD	Italy	20021219	Administration and dimensions > Administration and dimensions Chemical oceanography > Dissolved gases Physical oceanography > Water column temperature and salinity	
LBM003CTD	Italy	20021219	Administration and dimensions > Administration and dimensions Chemical oceanography > Dissolved gases Physical oceanography > Water column temperature and salinity	
LBM003CTD	Italy	20021219	Administration and dimensions > Administration and dimensions Chemical oceanography > Dissolved gases Physical oceanography > Water column temperature and salinity	
LBM003CTD	Italy	20021219	Administration and dimensions > Administration and dimensions Chemical oceanography > Dissolved gases Physical oceanography > Water column temperature and salinity	
LBM003CTD	Italy	20021219	Administration and dimensions > Administration and dimensions Chemical oceanography > Dissolved gases Physical oceanography > Water column temperature and salinity	

List of CDI's obtained from the EMODNET Common Data Index (CDI) User Interface

Within May 2010 the portal was completed with the core services giving access to the integrated maps of selected parameters. Through the **DataProducts** section of the portal the EMODnet Data Products Viewing and Downloading Service, based on OGC standards is available. This web based viewer of climatologies called *OceanBrowser* was developed by GHER group of Liege University. The service based on OGC Open Geospatial Consortium standards (WMS,WFS) is implemented on the server side with a Python code running on an Apache web server. Those components works on a hierarchy of NetCDF files organized in folders that can be easily updated by copying a file in the data folder of the WMS server.

The screenshot displays the EMODnet Portal - Iceweasel. The page includes a navigation menu, a news section, and a disclaimer regarding the data quality and usage.

**DISCLAIMER:** The system is operating but we are working for the data quality checking (draft version - these results have not been validated by the regional experts).

EMODNET regional products are obtained with **SeaDataNet DIVA software tool** (Data-Interpolating Variational Analysis). The analyses products are stored as NetCDF CF files and made available as WMS layers for easy browsing and adding. The EMODNET Chemical portal core services give access to the integrated maps of selected parameters.

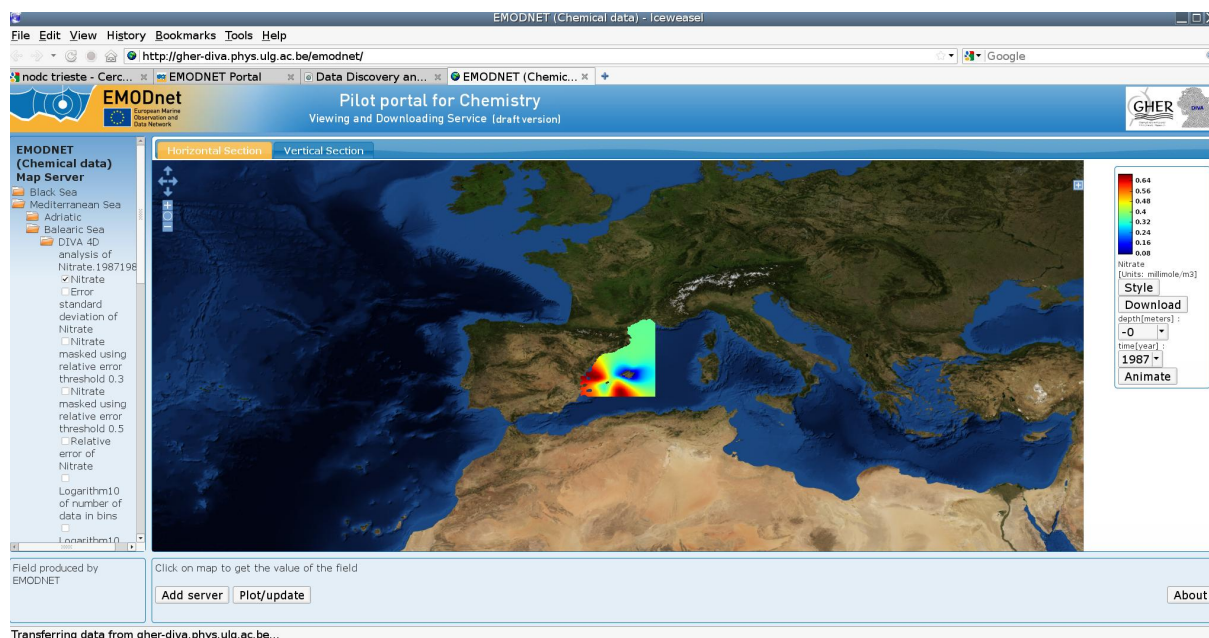
The EMODNET Data Products Viewing and Downloading Service, based on OGC standards is available here.

The EMODNET Data Products Discovery Service, based upon CAMDON Catalogue will be available here.

A WMS Registry listing all WMS services (NetCDF CF files available as WMS layers, CDI service available as WMS layers providing location of specific observation) guarantees full integration between EMODNET Chemical components (CDI, CAMDON and VIEWER), but also between the EMODNET portals.

Data products access from the portal and disclaimer.

The viewer provides output images available as horizontal sections and vertical sections can be drawn by the selection of an appropriate transept. Available outputs are images that can be exported in: png, svg, kml and eps formats. The service let the user to customize the products by choosing some available graphic styles.

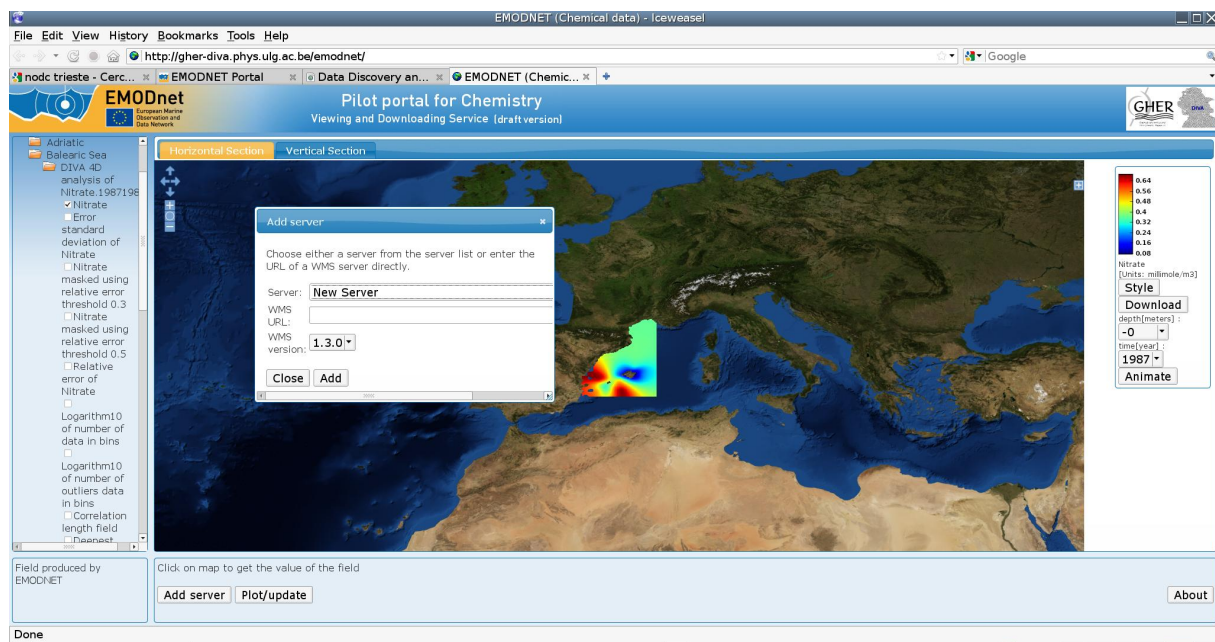


Transferring data from gher-diva.phys.ulg.ac.be...

*Nitrate distribution in the Balearic spot.*

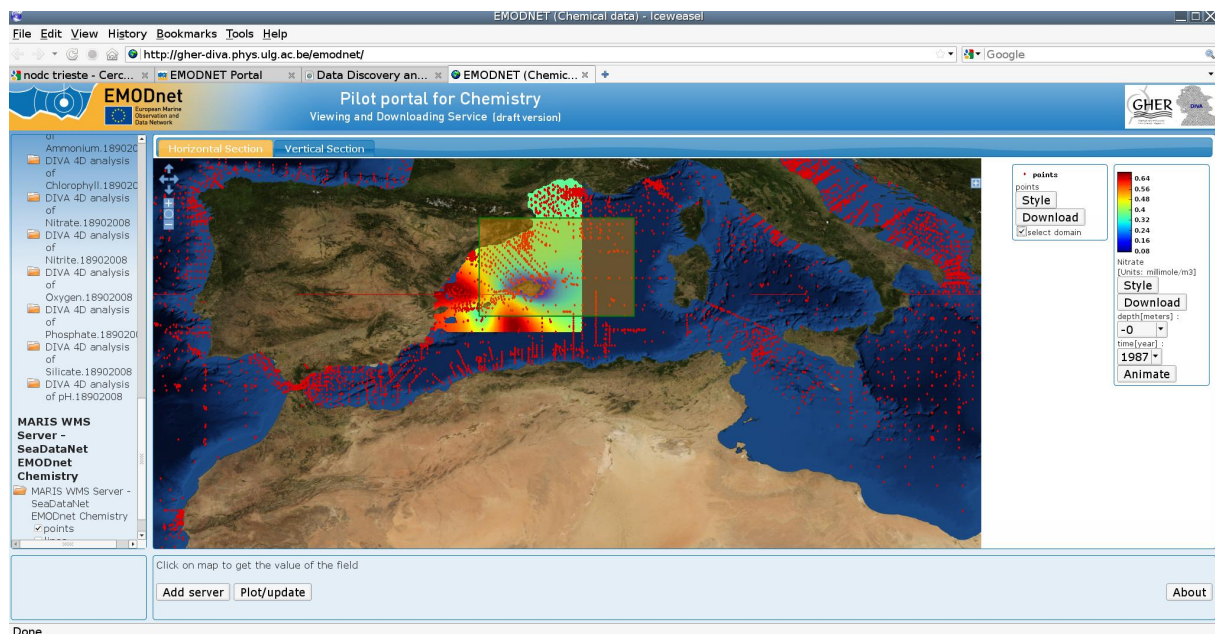
The integration with other Web Map Services is possible thanks to the OGC standards compliance. For this reason is possible to query an inventory of layers from other WMS servers and visualize them in the EMODnet Chemical portal together with the chemical data products.





### Adding WMS server

The WMS link to the Maris Server guarantees to visualize and overlap the data (CDI) layer and to access directly to data download mechanism developed by Maris.



*EMODnet Chemistry CDI layer overlapping the Nitrate distribution in the Balearic spot with a selection of data domain*

## 5. CONCLUSIONS

The EMODnet Chemical pilot represent a great challenge. In fact:

- It is undertaken by a large partnership, that on one side needs coordination but on the other side brings long-term expertise in collecting, processing, management and giving access to datasets and products;
- The complexity of the measurements covering 8 groups (pesticides, antifoulants, pharmaceuticals, heavy metals, hydrocarbons, radionuclides, fertilisers, organic matter) on 3 matrices (sediment, water column and biota)

To face this last point, data collection was approached with a priority list to get a first release ready (as a proof of concepts).

Besides, the cooperation with EEA and Marine Conventions (OSPAR, HELCOM and BSC) is crucial for data assembling, products definition and QC/QA.

The main difficulties faced during the first year of activities are represented by:

- complexity of the measurements, which are related to different environment;
- heterogeneity of the sampling (coastal points in time), which makes it critical the use of DIVA standard interpolation.

Experts and potential users opinion is expected to define the final set of product from chemical data.

This first year of activities was dedicated to set up the system components (that is to say the regional pools, the SDN vocabs which were extended for chemical parameters mapping, the EMODnet portal core services – CDI, discovery, viewing).

The second year is planned to be focused on:

- Continuing with data population and products generation,
- Increase portal functionalities (in the viewing and harmonisation),
- Finalise QC/QA and ask expert opinions (with ICES support),
- Finalise products validation based on feedback from experts and potential users.