



EMODnet Lot 3 – Chemical data

MAINTENANCE REPORT

4/6/2011 to 03/6/2012

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INTRODUCTION

BACKGROUND

This Maintenance Report describes the activities carried out during the last year of EMODnet chemical pilot (4th of June 2011 – 3rd of June 2012), corresponding to the Maintenance and operation phase (M25-M36). Here we present the results achieved in this last phase of the project, the deliverables produced by each work package, the challenges faced and any deviation from the project tender, including the final conclusions.

The general description of the EMODnet Chemical pilot is already given in the Final Report that was delivered after Month 24. It describes also the Consortium, the project objectives, the studied areas, the selected parameters, the principles and tools applied for gathering, quality control and compilation of data and metadata, the methodology applied for preparing data products, and the infrastructure that is used for providing access to the metadata, data and data products.

In this Maintenance Report we focus therefore on the progress of the project activities in the 3rd year - the Maintenance phase. This included gathering and processing of more data as well as further developments and finetuning of the technical infrastructure and its services. During this last project phase, a number of technical improvements took place:

- the Sextant Products metadata catalogue was fully developed and implemented;
- the Ocean Browser Products viewing services was upgraded in many parts;
- the ODV/DIVA softwares were continuously upgraded to produce additional maps, time series plots and related metadata (DivadoXML).

This Maintenance Report is organised into 5 sections, where the progress made in the 5 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,
- 5 – Analysis and evaluation.

Some final conclusions and recommendations are given in the final section.

A list of acronyms is given in Annex 1 and further explanation of the standards and tools is provided in Annex 2.

PROJECT MANAGEMENT (WP1)

The project organization, as detailed 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) which was extended during the project with Gher and AWI, and the Partners.

During the last year of the EMODnet chemical pilot (4th of June 2011 – 3rd of June 2012) the following meeting were organised:

- 7th Coordination group meeting, 5 July 2011 in videoconference,
- Product validation and 8th Coordination group meeting, 24 November 2011, Liverpool,
- 9th Coordination group meeting, 27 February 2012 in videoconference,
- Products Metadata Catalogue finalization meeting, 2 May 2012, in videoconference.

A report and/or action list is available in EMODnet Extranet for each event. Moreover, all meetings were described into the bi-monthly progress reports that were produced for the whole project duration, sent to EU and posted on the Extranet.

OGS and representatives from the Chemical lot participated in:

- 4th ur-EMODnet progress meeting, 7 June 2011, Brussels,
- 5th ur-EMODnet progress meeting, 7 February 2012, Brussels.

The main event was the Product validation meeting, where the commonly agreed rules to be followed for products generation and publication were defined for interpolated maps and time series. The aim was to standardise all the project available results in the three regions.

To facilitate the communication for the management activities the following mailing lists were used:

EMODnet-all@googlegroups.com,

EMODnet-coordination@googlegroups.com,

EMODnet-timeseriesprod@googlegroups.com.

Finally, OGS with the contribution of all partners edited and revised the Final Report. Once accepted by DG MARE, the expected payments were distributed to each partner, after the relevant invoice or debit note was received.

All documents are available in EMODnet extranet website

DATA COLLECTION AND METADATA COMPILATION (WP2)

INTRODUCTION

This section gives an overview of the progress on data collection and metadata compilation in the three regions Greater North Sea, Black Sea and selected spots in the Mediterranean Sea during the 3rd year of the project.

The list of chemical parameters selected in the 3 matrices (water column, sediment, biota) for product generation in the three regions is described in the Final Report, together with the SDN codes mapping (mainly P021 - Parameter Discovery Vocabulary used for CDI generation, P061 - Data Storage Units used for units, and P011- Parameter Usage Vocabulary used for ODV files generation).

As reported in the Final Report, data collection started with nutrients in the water column, and was then extended to all other selected chemicals in the water column (organic matter – DOC and TN, etc) and to synthetic compounds, hydrocarbons and heavy metals in the sediments and biota. For contaminants in biota the target species ‘Mytilus’ (Mussel) was chosen. These parameters and matrices were chosen for all 3 regions, but the available data distribution was and continues to be different. This is due to differences in data availability in each area.

Furthermore, 3 regional background data pools were defined (at NERI-MAR for the Greater North Sea; at HCMR for the Mediterranean; and at MHI for the Black Sea) for streamlining the data products generation process while the discovery and access of the background data sources is provided to users using the SeaDataNet CDI Service. The data flow and the analysis of the data sources are described in the Final Report.

Here we present the results in data collection and metadata compilation with the total final numbers and collected data per region.

2.1. DATA COLLECTION IN THE NORTH SEA REGIONAL DATA POOL

The status for the data collection in the Greater North Sea for the selected EMODnet parameters that have been made available through the CDI is shown below. Data availability through the EMODnet CDI User Interface is important for user access and a necessary base for derivation of time series products at the EMODnet portal. The following table shows samples per parameter group per matrix for data in the Greater North Sea (status end of May 2011):

Chemical group	Water column	Sediment	Biota
Pesticides	213	1037	709
Antifoulants	1560	1898	636
Pharmaceuticals	0	0	0
Heavy metals	3399	1198*	2577
Hydrocarbons (PAH)	323	3422	536
Radionuclides	773	345	0
Fertilisers/Nitrogen	101265	0	Not applicable
Fertilisers/Phosphate	108945	0	Not applicable
Organic matter (C)	9158	2106	-
Organic matter (N)	65419	401	-

**actual figure is much greater however the term "Metal concentrations in sediment" has been changed to term "Inorganic chemical composition of sediment or rocks" resulting in the 0 count*

2.2. DATA COLLECTION IN THE BLACK SEA

At the end of the 2nd year of the EMODnet Chemistry project the Black Sea Commission Secretariat has been asked to evaluate how complete the inventory for the Black Sea region is. From this evaluation it came forward that all Black Sea countries are sourcing data from a variety of institutes, but that still relevant data sets were missing from a number of institutes in the region:

- the data centres IO BAS (Bulgaria), IMS METU (Turkey), UKRSCES (Ukraine), MHI (Ukraine), IFR (Bulgaria) and General Ecology Laboratory (Bulgaria) were already involved in the inventory but hold more data for the period 2000-2010 and should be approached for making these data available, both in the CDI system and for internal use in the data products.

Additional data sources should also be available from:

- Russia:
 - Southern Branch of the Shirshov Institute of Oceanology, Gelendzhik
 - State Oceanographic Institute – SOI
- Turkey:
 - Istanbul University (which is implementing MoE monitoring program in the Black Sea during last 5 years)
- Ukraine:

- Southern Scientific Research Institute of Marine Fisheries and Oceanography – YugNIRO
- Ukrainian Hydrometeorological Institute - Marine Branch (UHI – MB)
- Romania:
 - GeoEcomar
 - Delta Danube Institute
- Georgia:
 - Batumi Institute

Fortunately all of the data centres mentioned above, except for Batumi Institute, have been partners in the EU FP7 Upgrade Black Sea SCENE project which was coordinated by MARIS over a 3 year period from 1st January 2009 till 31st December 2011. As part of this UBSS project the Black Sea data centres have been connected to the SeaDataNet infrastructure which eased the path towards further population of the CDI service with their metadata and data. Therefore in the 3rd year synergy took place between the EMODnet Chemistry and the UBSS projects. led by MARIS, to gather and describe more chemistry data sets for the Black Sea region in the CDI service. Moreover UBSS partners were encouraged to give MHI copies of relevant data sets for internal use in the EMODnet Chemistry data products, because many chemistry data sets from the Black Sea region are labelled as restricted by their data owners.

The synergy with the UBSS project has been successful and many more data sets have been described with CDI metadata and included in the CDI Data Discovery and Access service as can be seen in the table below with an overview of CDI population for Black Sea institutes at the end of the 2nd year and 3rd year. Also more data centres have been engaged.

LAST YEAR INCREASE OF DATA SETS FROM THE BLACK SEA REGION INSTITUTES				
Partner	Country	May 2012 Datasets	May 2011 Datasets	Difference
All-Russia Research Institute of Hydrometeorological Information - World Data Centre (RIHMI-WDC)	Russian Federation	39627	39628	-1
Ankara University	Turkey	24	24	0
Bulgarian National Oceanographic Data Centre(BGODC), Institute of Oceanology	Bulgaria	228	162	66
Danube Hydro-meteorological Observatory	Ukraine	44	0	44
Dokuz Eylul University, Institute of Marine Science and Technology	Turkey	1603	76	1527
Institute of Biology of the Southern Seas, NAS of Ukraine	Ukraine	72	5	67
Institute of Fishery Resources (IFR)	Bulgaria	173	138	35
Institute of Marine Sciences, Middle East Technical University	Turkey	3079	3081	-2
Istanbul University, Institute of Marine Science and Management	Turkey	196	173	23
Iv.Javakhsivili Tbilisi State University, Centre of Relations with UNESCO Oceanological Research C	Georgia	96	43	53
Karadeniz Technical University, Faculty of Marine Sciences	Turkey	244	34	210
Laboratory of Marine Ecology - Central Laboratory of General Ecology	Bulgaria	0	2	-2
Marine branch of Ukrainian Hydrometeorological Institute	Ukraine	1936	256	1680
Marine Hydrophysical Institute	Ukraine	3345	2050	1295
National Institute for Marine Research and Development Grigore Antipa	Romania	4215	3374	841
National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences	Bulgaria	837	205	632
Odessa National I.I.Mechnikov University	Ukraine	825	826	-1
P.P.Shirshov Institute of Oceanology, RAS	Russian Federation	13473	13470	3
Scientific - Research Firm GAMMA	Georgia	903	308	595
Scientific Research Institute of Ecological Problems (USRIEP)	Ukraine	4	4	0
Sinop University, Fisheries Faculty	Turkey	183	183	0
Southern Scientific Research Institute of Marine Fisheries and Oceanography	Ukraine	18205	11308	6897
Taurida V.I. Vernadsky National University	Ukraine	55	39	16
Ukrainian scientific center of Ecology of Sea (UkrSCES)	Ukraine	4840	4587	253
	TOT RECORDS	94207	79976	14231

Overview of CDI records for EMODnet Chemistry from Black Sea institutes - May 2011 - May 2012

Looking at data sets gathered for the regional Data pool at MHI, the present status is summarized in the table below:

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	10149	47550	877	306	127	839	379	2361	2601	436	488
16	IO-BAS	BG	124	920	301	748	337	0	0	0	0	0	0
17	NIMRD	RO	2268	9995	6548	0	0	0	10207	6892	7729	5275	0
18	TSU-DNA	GE	370	139	103	68	150	95	68	126	135	112	68
	YugNIRO	UA	1227	7237	5372	116	219	3599	5520	1738	946	109	441
	UkrSCES	UA	954	0	1701	866	1732	0	0	1264	560	0	871
	Mb UHMI	UA	144	745	214	0	0	64	118	0	0	0	0
	IMS METU	TU	1864	15015	18816	0	6258	165	16310	4879	1417	475	79
	AU	TU	24	144	0	0	144	0	0	0	0	0	0
	IMST	TU	76	537	599	0	0	0	427	578	382	0	0
	KDTU	TU	178	8608	413	0	12908	0	413		340	0	0
	SU	TU	343	6135	125	0	7264	0	125	142	126	0	0
	TOTAL		18772	103256	39586	2356	32769	5683	36891	19945	14877	7316	2113

Nr	Partner	Country	Total profiles	Heavy metals in water column (Pb, Hg, Cd, Cu)	Radionuclides in water column (Cs-137, Cs-134, Sr-90)	Heavy metals in sediments (Pb, Zn, Cu, Ni, Co, Cr, As, Sr)
14	RIHMI-WDC	RU	398	398	0	0
15	MHI	UA	1343	0	1267	76
17	NIMRD	RO	859	456	0	403
	TOTAL		2600	854	1267	479

Table: Data sets collected in the Black Sea regional database at MHI (status at April 2012)

This overview lists the data sets (since 1923 till 2011) that have become available to the central pool for the Black Sea at MHI per April 2012.

During the Maintenance year additional data have been received from Ankara University, IMS METU, Karadenis University, Sinop University, and IMST. 15356 profiles passed the expert quality check procedure in MHI. This was mostly done in synergy with the UBSS project.

From the overviews it can be concluded that good progress has been achieved with getting more data sets and data providers identified and engaged for the Black Sea region. However

there is still a large volume of data sets that have not yet been described in the CDI service, especially for recent 5 years, and that not have made available for internal use in the regional buffer database at MHI.

These institutes will be urged in a future extension to EMODnet Chemistry to make the Black Sea overview more complete and to make their relevant data sets available to the project for inclusion in future EMODnet analyses and data products. Thereby also synergy will be sought with the ongoing EU FP7 SeaDataNet II project which includes NODCs from the 6 Black Sea countries in its partnership. Moreover synergy with the MSFD implementation which is relevant for the EU members Romania and Bulgaria, but also has interest from the Black Sea Commission and the other 4 Black Sea countries, should lead to improved results.

2.3. DATA COLLECTION IN THE MEDITERRANEAN SEA

In the Mediterranean Sea 5 areas were identified: the Balearic Sea, the Gulf of Lion, the North Adriatic Sea, the Gulf of Athens and the NE Levantine basin.

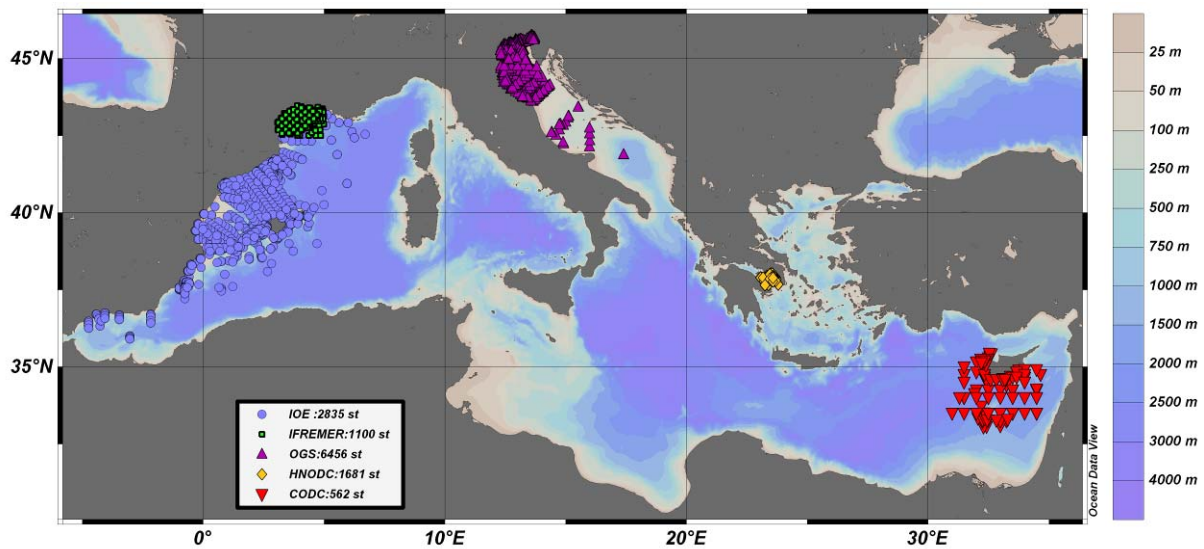
DATA COLLECTED IN THE WATER COLUMN

The data collected for the water column in the 5 areas of the Mediterranean Sea collected by the relevant institutes are summarized in the following table and figures (status at June 2012):

<i>PARAMETERS</i>	<i>SPAIN: 2835 st</i>	<i>FRANCE: 1100st</i>	<i>ITALY:6456 st</i>	<i>GREECE: 2161 st</i>	<i>CYPRUS: 562 st</i>
FERTILISERS					
NTRA [millimole/m3] NITRATE (C14)	1392	887	3968	1665	384
PHOS [millimole/m3] PHOSHATE (C15)	1445	891	4147	1668	528
ORGANIC MATTER					
TOCW [millimole/m3] TOTAL ORGANIC CARBON (C16)				274	
Particulate Organic Carbon (C16)					
POCP [milligram/m3]PARTICULATE ORGANIC CARBON/POC		56	826		
PC1P [millimole/m3] PARTICULATE ORGANIC CARBON/POC				629	
Dissolved Organic Carbon (C16)					
GORG [millimole/m3] Dissolved Organic Carbon		56	725		
Particulate Organic Nitrogen (C17)					
PONP [milligram/m3] PARTICULATE ORGANIC NITROGEN		42	826		
PN1P [millimole/m3] PARTICULATE ORGANIC NITROGEN		17			
Dissolved Organic Nitrogen (C17)					
NORG [millimole/m3] DISSOLVED ORGANIC NITROGEN		57			

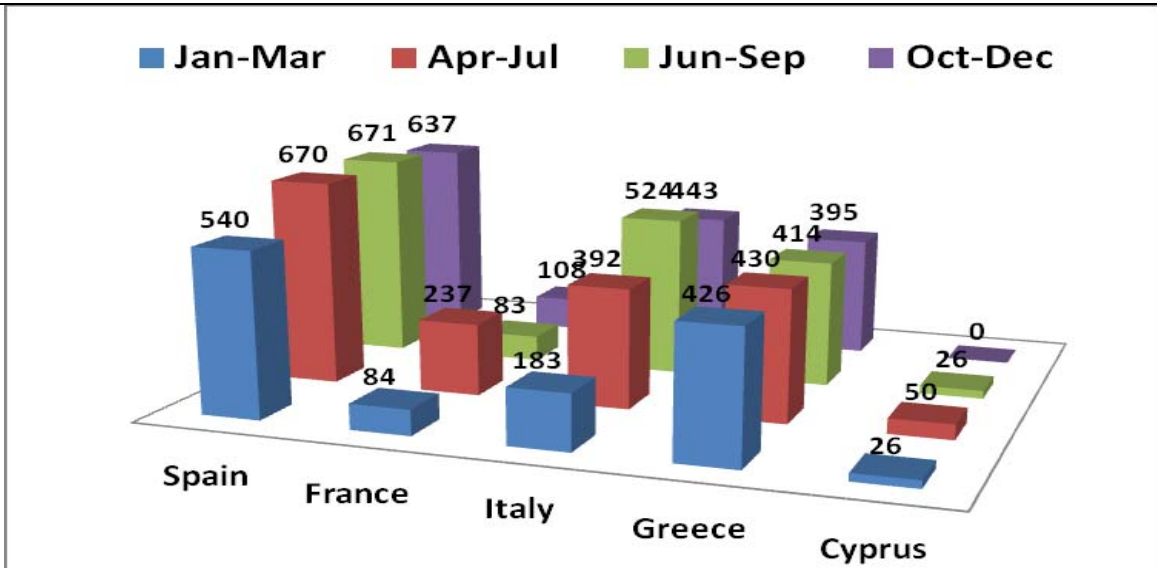
NORG [micromole/kg] DISSOLVED ORGANIC NITROGEN			725		
HEAVY METALS					
Dissolved Cd [ng/l] (C7)				701	
Dissolved Pd [ng/l] (C8)				702	
Suspended Cd [ng/l] (C7)				486	
Suspended Pd [ng/l] (C8)				550	
RADIONUCLIDES					
Cesium 137 [mBq/l] (C12)					15

The spatial distribution of the nutrients stations (13114) which where use for the diva maps production at the 5 regional spots is shown at the figure below.

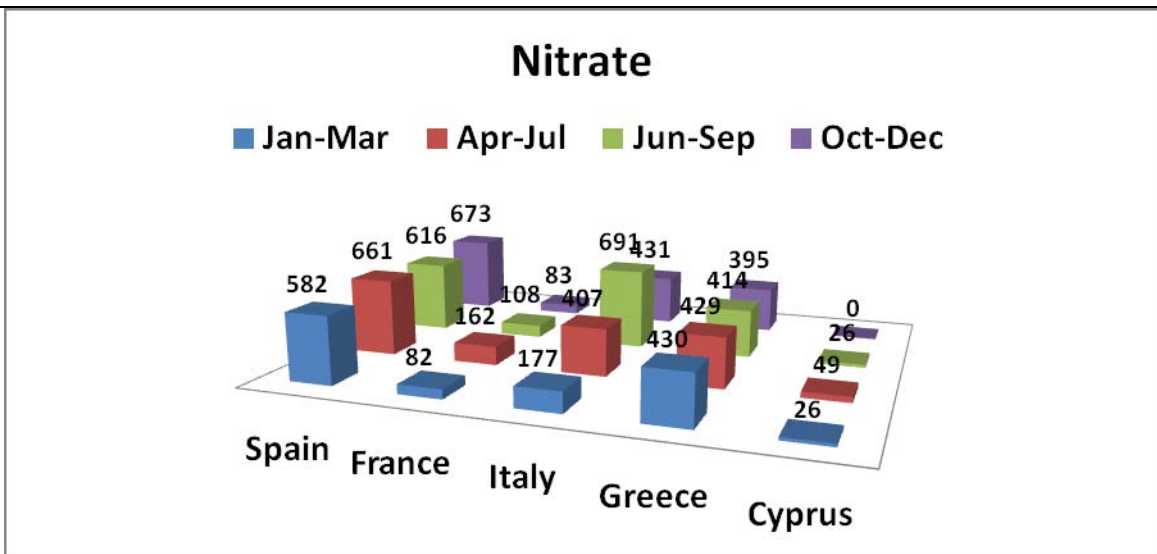


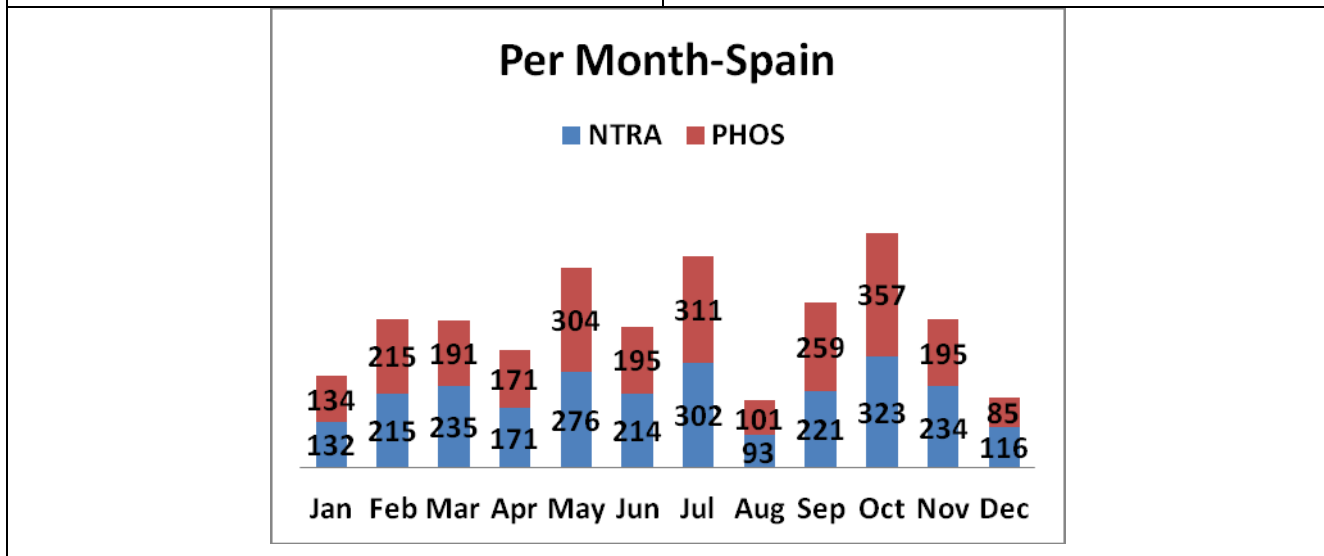
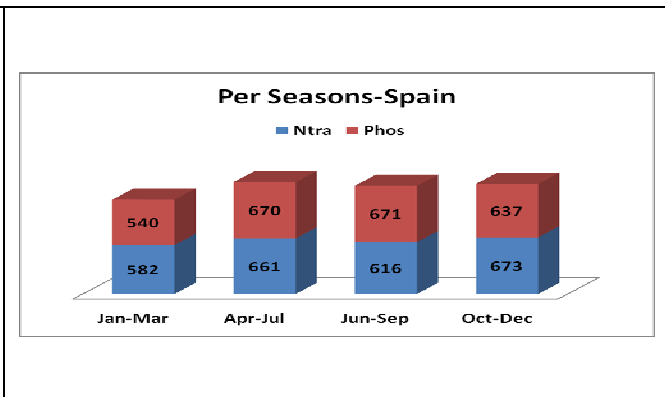
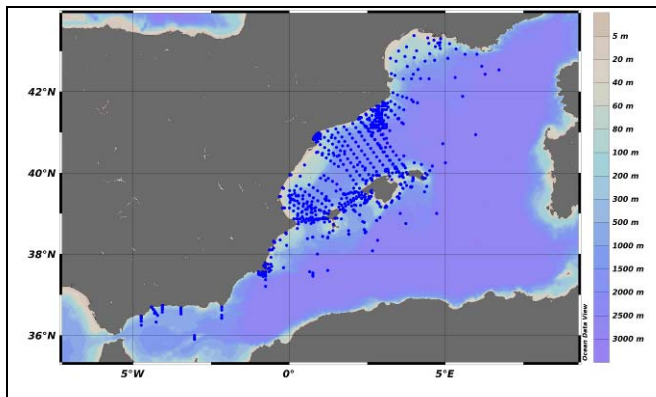
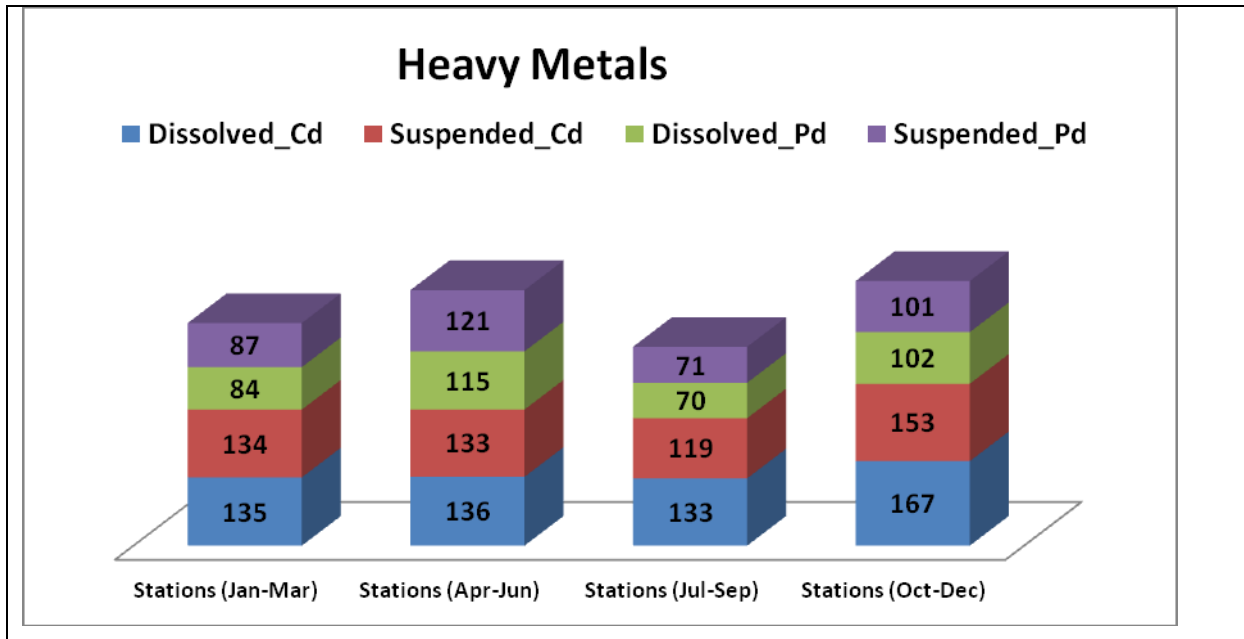
The analysis of the data availability revealed that the seasonal resolution is the most appropriate time scale for the products generation. The figures below also provide a summary per region of the available nutrient stations per region and their seasonal distributions.

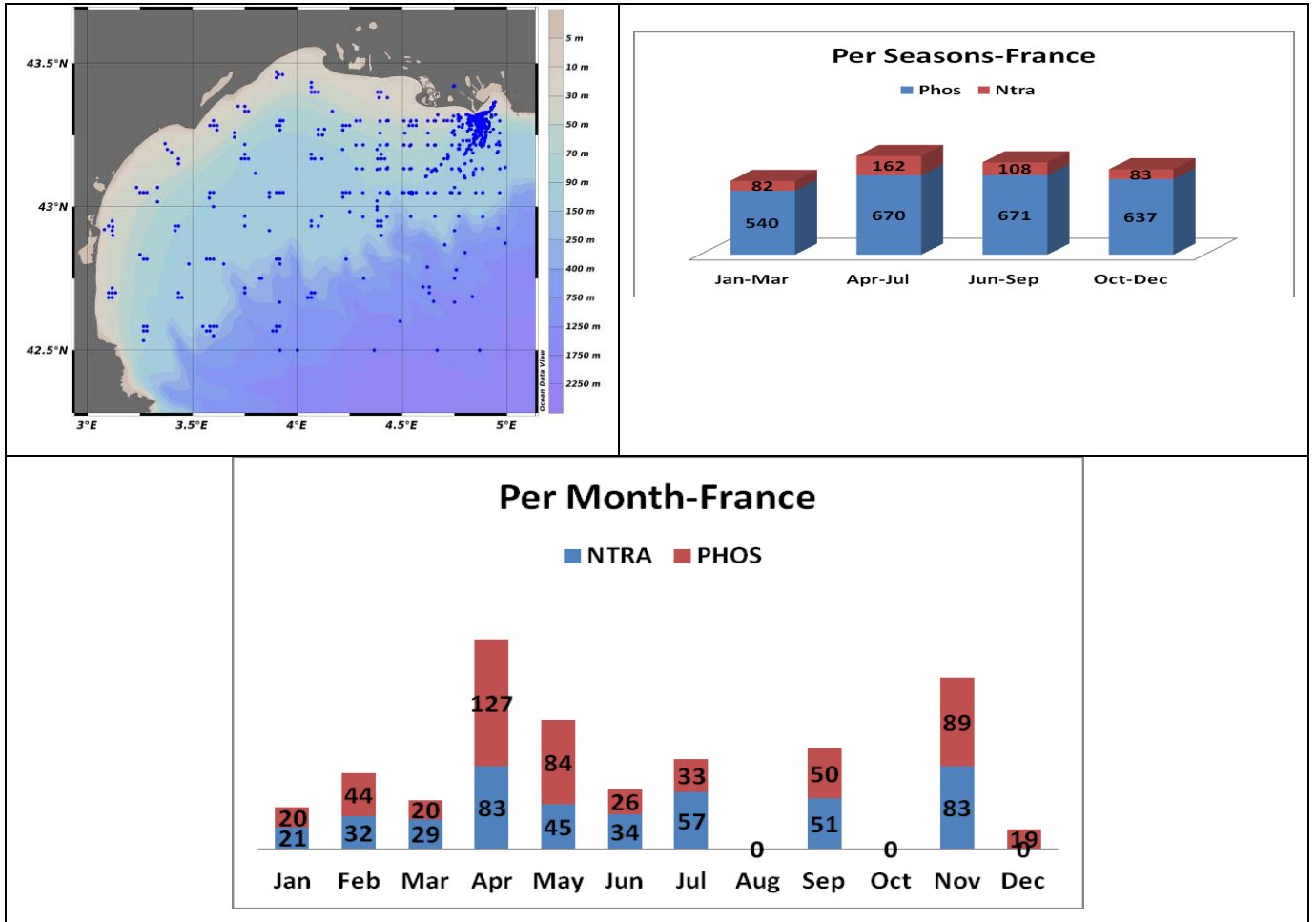
- Phosphate per season

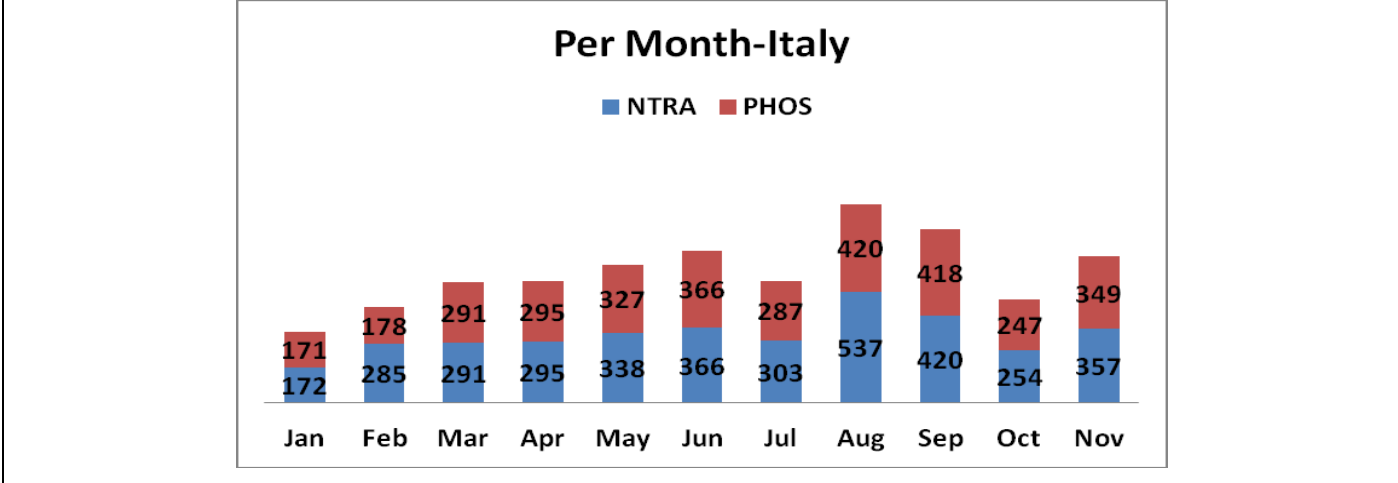
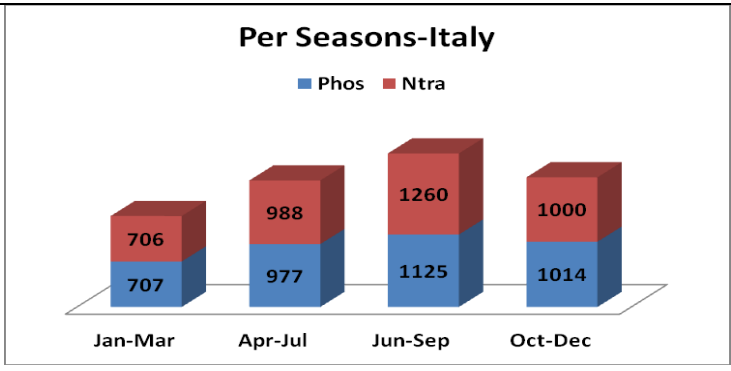
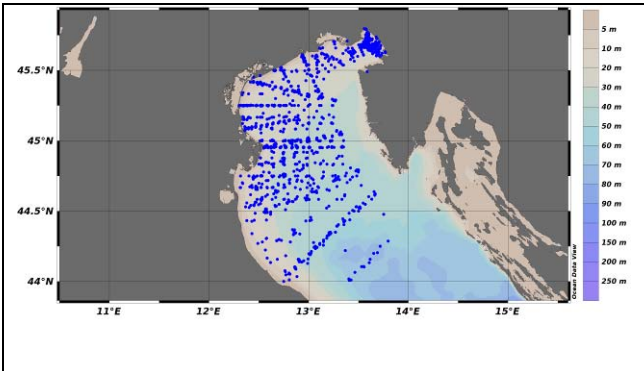


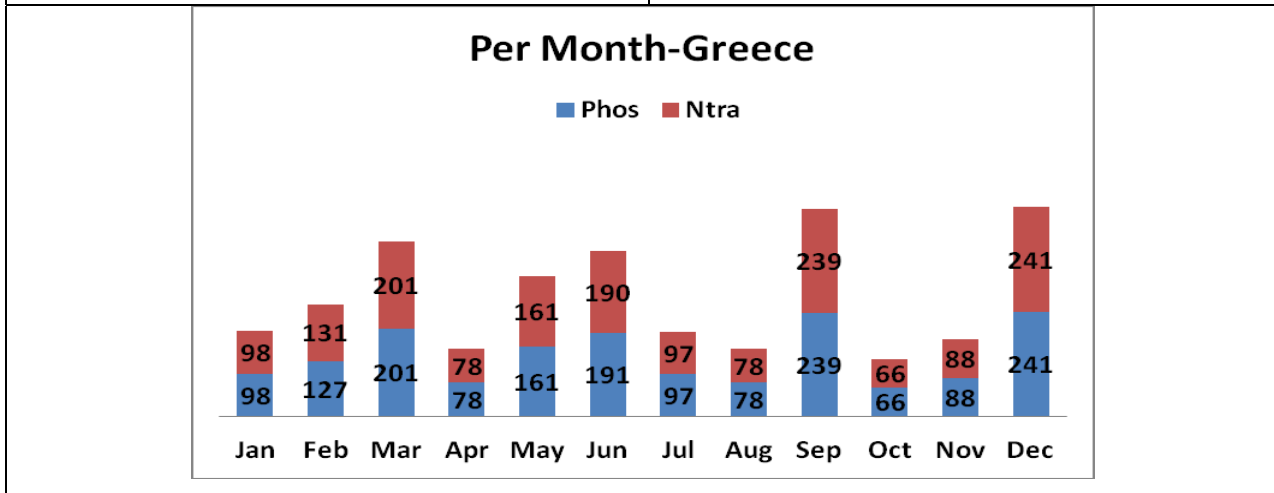
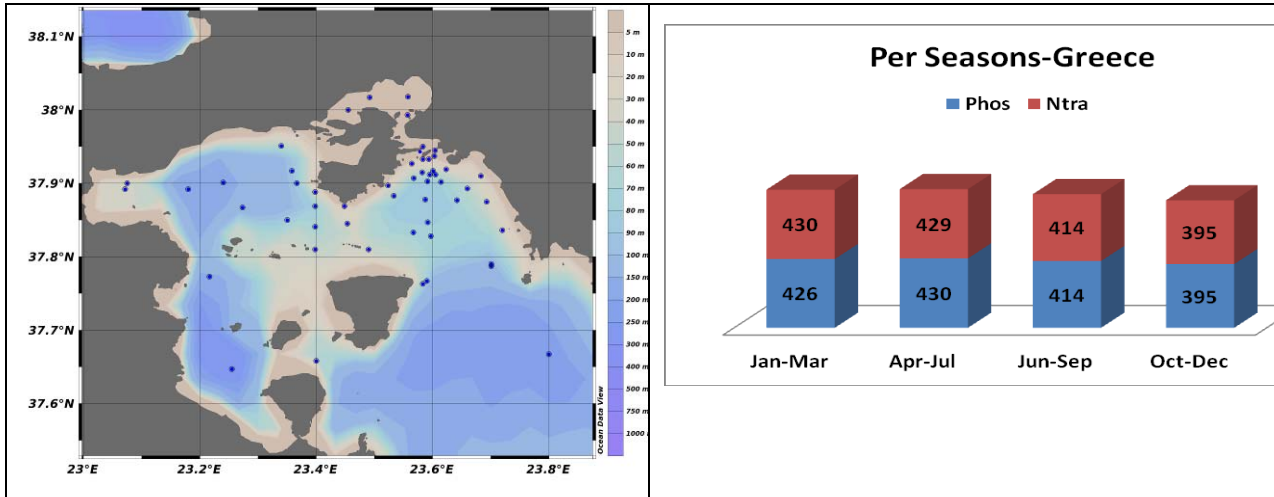
- Nitrate per season



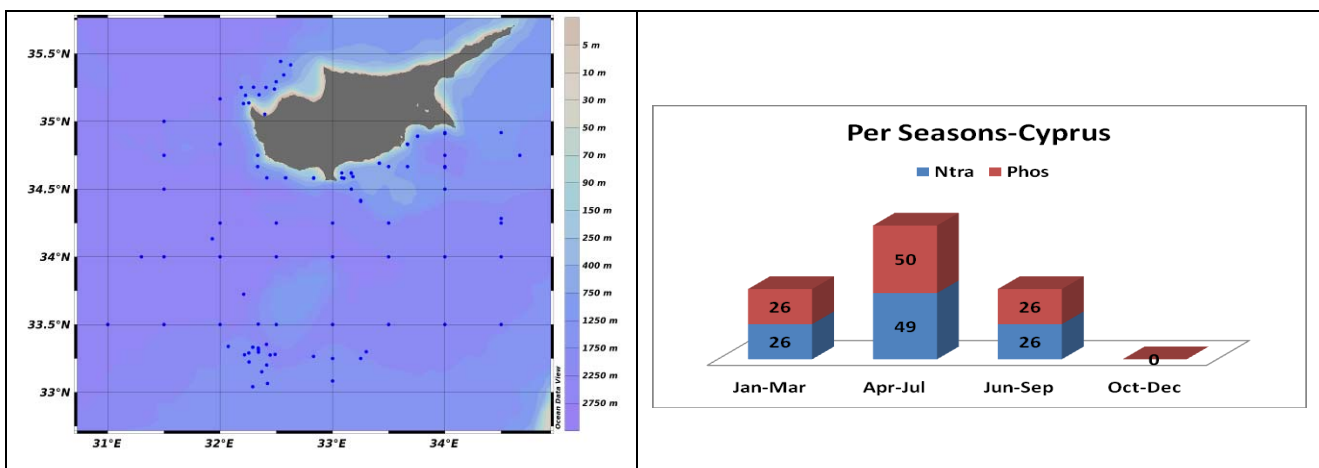




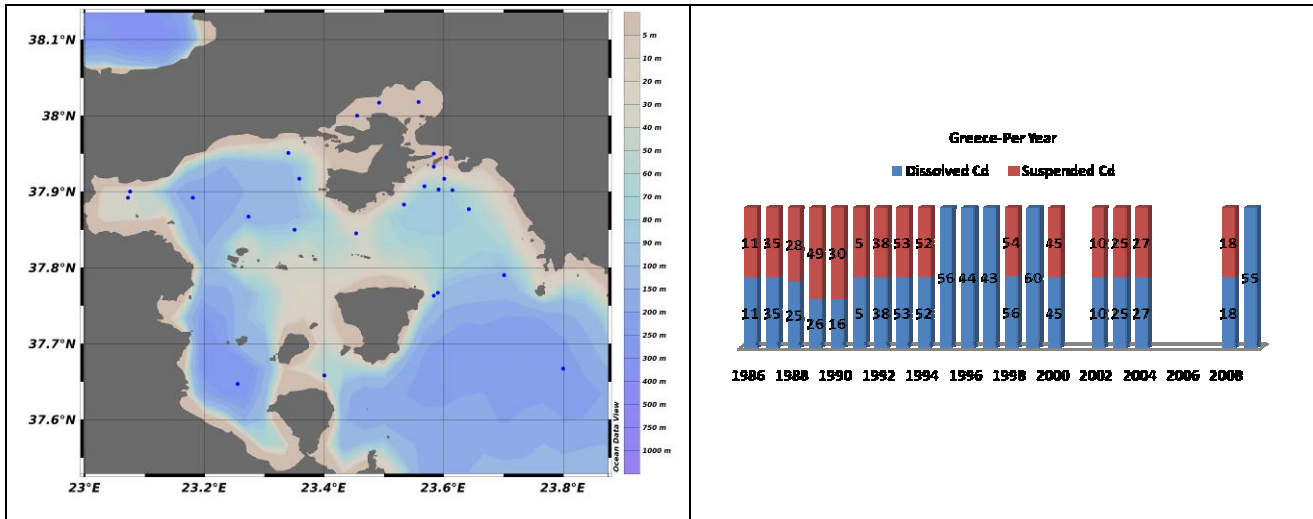




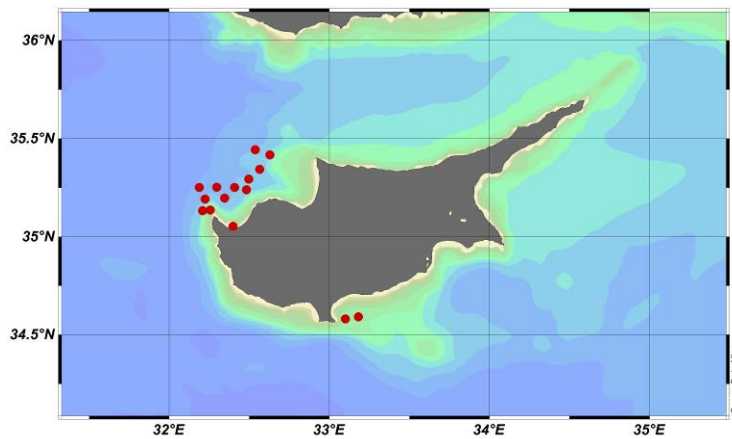
At the Cyprus case we gathered data from 3 years: 2000, 2001 and 2002



The spatial distribution of heavy metals stations at Saronikos Gulf is shown at the figure below.

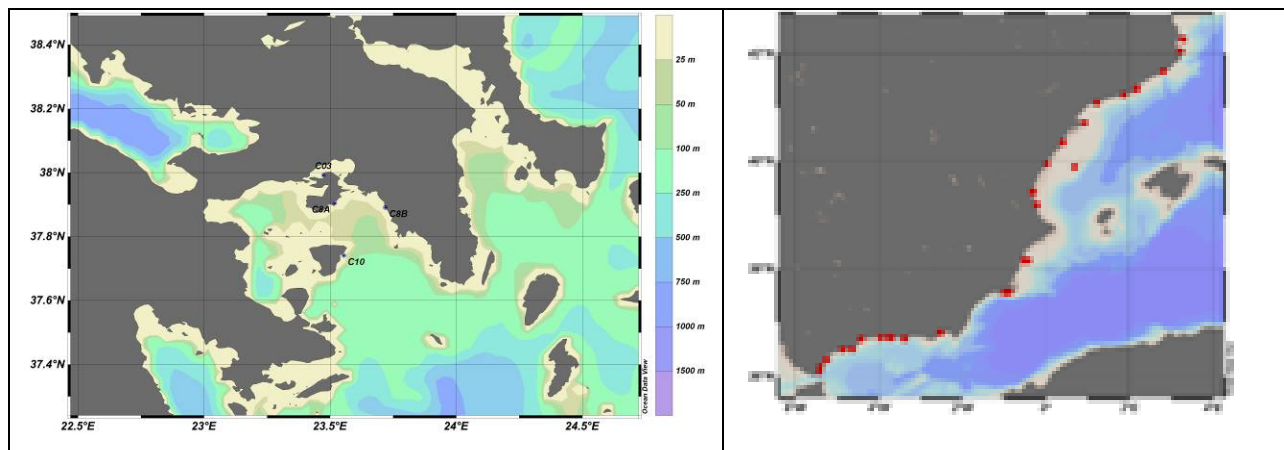


The spatial distribution of radionuclide's stations at Cyprus is shown at the figure below (15 stations (Cs-137))



DATA COLLECTED IN BIOTA

The current status of **Biota** stations is shown below for Greece and Spain. The Italian time series analysis and plots production was done by OGS and made available to the Ocean Browser.



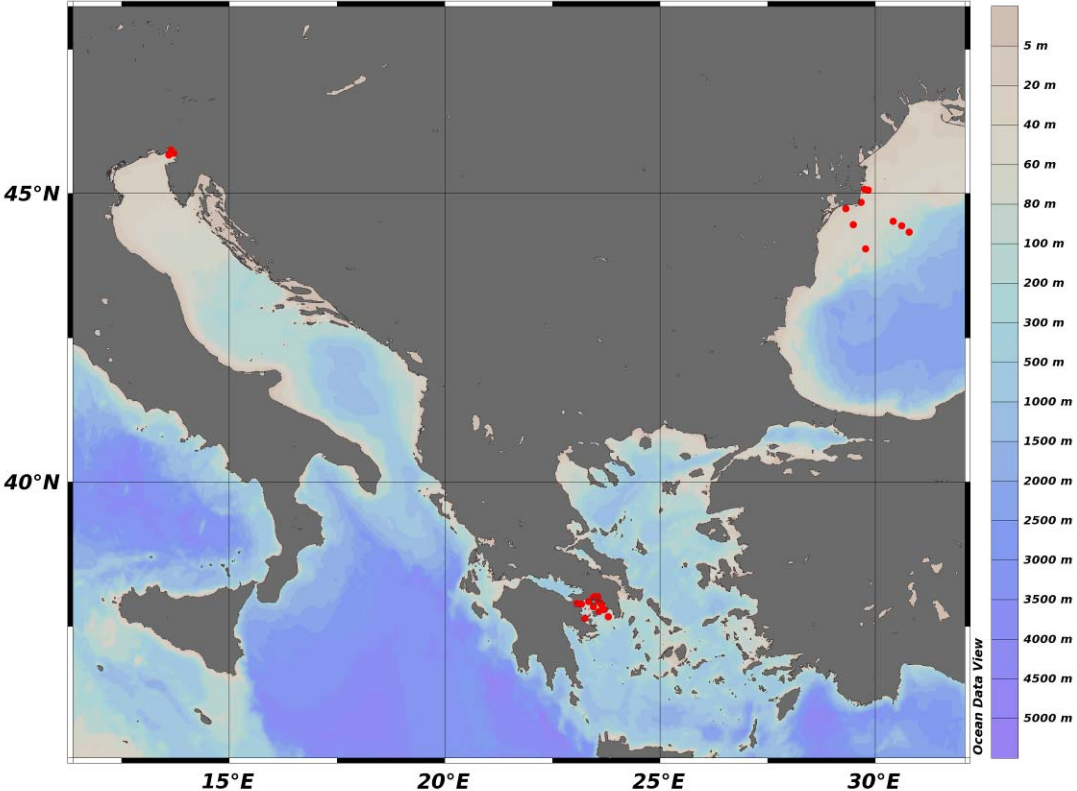
The **Biota/Mussel** status per parameter is shown at the table below

<i>PARAMETERS</i>	<i>SPAIN</i>	<i>GREECE</i>
PESTICIDES		
DDT (C1)	33 stations	74 samples
HCB (C2)	33 stations	54 samples
HEAVY METALS		
Mercury (Hg) (C6)	33 stations	
Cadmium (Cd) (C7)	33 stations	133 samples
Lead (Pd) (C8)	33 stations	21 samples
HYDROCARBONS		
Anthracene (C9)	33 stations	

DATA COLLECTED IN SEDIMENT

The current status of the **Sediment** stations distribution (Italy and Greece):

<i>PARAMETERS</i>	<i>ITALY</i>	<i>GREECE</i>	
		Saronikos	Black Sea
Syntetic Compounds	48 stations	30 Stations	
Heavy metal	48 stations	62 stations	9 stations
Hydrocarbons including oil pollution		30 Stations	
Organic matter	16 stations		5 stations
Fertilizers and other nitrogen and phosphorus rich substances	16 stations		



2.4. METADATA COMPILATION

All data providers have been encouraged and supported to populate their relevant data sets in the CDI Data Discovery and Access service by means of metadata, following the CDI format, and by means of data, following the ODV ASCII format.

The following table gives the total number of CDI entries for the EMODnet Chemistry scope per May 2012 and its increase in the 3rd year.

LAST YEAR INCREASE OF DATA SETS FROM ALL DATA CENTRES				
Partner	Country	May 2012	May 2011	Difference
		Datasets	Datasets	
All-Russia Research Institute of Hydrometeorological Information - World Data Centre (RIHMI-WDC)	Russian Federation	39627	39628	-1
Ankara University	Turkey	24	24	0
BRGM / Office of Geological and Mining Resources	France	1389	0	1389
British Oceanographic Data Centre	United Kingdom	23807	23807	0
Bulgarian National Oceanographic Data Centre(BGODC), Institute of Oceanology	Bulgaria	228	162	66
Cyprus Oceanography Center	Cyprus	499	499	0
Danube Hydro-meteorological Observatory	Ukraine	44	0	44
Dokuz Eylul University, Institute of Marine Science and Technology	Turkey	1603	76	1527
Faculty of Geography and Earth Sciences, University of Latvia (LU)	Latvia	572	0	572
Finnish Meteorological Institute (FMI)	Finland	2084	2084	0
Flanders Marine Institute	Belgium	1619	1382	237
Geological Survey of Estonia	Estonia	542	0	542
German Oceanographic Datacentre (NODC)	Germany	16423	16423	0
Hellenic Centre for Marine Research, Hellenic National Oceanographic Data Centre (HCMR/HNODC)	Greece	19172	19110	62
IEO/Spanish Oceanographic Institute	Spain	11374	0	11374
IFREMER / IDM/SISMER	France	37174	35069	2105
Institute of Biology of the Southern Seas, NAS of Ukraine	Ukraine	72	5	67
Institute of Fishery Resources (IFR)	Bulgaria	173	138	35
Institute of Geology and Geography of Nature Research Centre	Lithuania	118	0	118
Institute of Marine Sciences, Middle East Technical University	Turkey	3079	3081	-2
Institute of Oceanography and Fisheries	Croatia	1477	1477	0
International Ocean Institute - Malta Operational Centre (University Of Malta) / Physical Oceanograph	Malta	128	128	0
Israel Oceanographic and Limnological Research (IOLR)	Israel	3119	3119	0
Istanbul University, Institute of Marine Science and Management	Turkey	196	173	23
Iv.Javakhishvili Tbilisi State University, Centre of Relations with UNESCO Oceanological Research C	Georgia	96	43	53
Karadeniz Technical University, Faculty of Marine Sciences	Turkey	244	34	210
Laboratory of Marine Ecology - Central Laboratory of General Ecology	Bulgaria	0	2	-2
Latvian Institute of Aquatic Ecology	Latvia	134	134	0
LNEG - National Laboratory of Energy and Geology	Portugal	584	0	584
Management Unit of the North Sea and Scheldt estuary Mathematical Models, Belgian Marine Data C	Belgium	8086	7480	606
Marine branch of Ukrainian Hydrometeorological Institute	Ukraine	1936	256	1680
Marine Hydrophysical Institute	Ukraine	3345	2050	1295
Marine Institute	Ireland	4554	4521	33
National Environmental Research Institute, University of Aarhus, Department of Marine Ecology	Denmark	148444	148440	4
National Institute for Marine Research and Development Grigore Antipa	Romania	4215	3374	841
National Institute of Biology - NIBMarine Biology Station	Slovenia	3242	3242	0
National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences	Bulgaria	837	205	632
Netherlands Institute for Ecology, Centre for Estuarine and Marine Ecology	Netherlands	7987	7987	0
NIOZ Royal Netherlands Institute for Sea Research	Netherlands	4137	4137	0
Odessa National I.I.Mechnikov University	Ukraine	825	826	-1
OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), Department of Oceanography	Italy	35046	38545	-3499
P.P.Shirshov Institute of Oceanology, RAS	Russian Federation	13473	13470	3
Rijkswaterstaat Waterdienst	Netherlands	13222	13050	172
Scientific - Research Firm GAMMA	Georgia	903	308	595
Scientific Research Institute of Ecological Problems (USRIEP)	Ukraine	4	4	0
Sinop University, Fisheries Faculty	Turkey	183	183	0
Southern Scientific Research Institute of Marine Fisheries and Oceanography	Ukraine	18205	11308	6897
Swedish Meteorological and Hydrological Institute	Sweden	60456	57623	2833
Taurida V.I. Vernadsky National University	Ukraine	55	39	16
Ukrainian scientific center of Ecology of Sea (UkrSCES)	Ukraine	4840	4587	253
	TOT RECORDS	499596	468233	31363

Overview of CDI records for EMODNET chemistry - May 2012 and increase since May 2011

Not all data sets as described are freely accessible for registered users of the CDI service. This depends on the data access restriction that has been given in the CDI metadata by their data providers. The following table gives statistics on the data access restrictions for the complete CDI collection end May 2012. It appears that for a total of 499.596 records, 423.353 data sets can be freely downloaded from EMODNET CDI User Interface.

DATA ACCESS RESTRICTIONS FULL COLLECTION	
Per Data Access Restriction	Datasets
SeaDataNet licence	253625
unrestricted	169728
by negotiation	68763
no access	6046
academic	865
licence	555
moratorium	14
TOTAL	499596
FREE ACCESS	423353

Overview of data access restriction of CDI records for EMODNET chemistry- May 2012

MSFD categories	entryterm_p021	Total CDI numbers		
		North Sea	Black Sea	Med Sea
Antifoulants	Concentration of other organic contaminants in biota	24		
	Concentration of other organic contaminants in sediment samples	1898	177	
	Concentration of other organic contaminants in suspended particulate material	636		
	Concentration of other organic contaminants in the water column	1560	2142	1
	Organometallic species concentration parameters in biota	129		
Fertilisers/Nitrogen	Organometallic species concentration parameters in sediments	583		
	Ammonium concentration parameters in the water column	86575	5450	10166
	Dissolved inorganic nitrogen concentration in the water column	1448	65	1415
	Dissolved total and organic nitrogen concentrations in the water column		1770	
	Dissolved total or organic phosphorus concentration in the water column		1141	
	Nitrate concentration parameters in the water column	101316	10589	18278
	Nitrite concentration parameters in the water column	43223	10286	16380
Heavy metals	Nutrient concentrations in sediment pore waters			16
	Phosphate concentration parameters in the water column	108996	22059	19512
	Dissolved metal concentrations in the water column	3399	412	1
	Inorganic chemical composition of sediment or rocks	1198	663	88
	Metal concentrations in biota	2577		33
Hydrocarbons	Particulate metal concentrations in the water column	961		
	Total metal concentrations in water bodies	609	514	
	Concentration of other hydrocarbons in the water column	205	1677	
	Concentration of polycyclic aromatic hydrocarbons (PAHs) in biota	536		33
	Concentration of polycyclic aromatic hydrocarbons (PAHs) in sediment samples	3422		
Organic matter	Concentration of polycyclic aromatic hydrocarbons (PAHs) in suspended particulate material	1051		
	Concentration of polycyclic aromatic hydrocarbons (PAHs) in the water column	323		
	Carbon concentrations in sediment	2106		22
	Carbon concentrations in suspended particulate material	3159		
	Concentration of organic matter in sediments	29		6
	Dissolved organic carbon concentration in the water column		236	
	Dissolved organic carbon concentrations in sediment pore waters			16
	Nitrogen concentrations in sediment	401		16
	Nitrogen concentrations in suspended particulate material	3752		
Others	Particulate total and organic carbon concentrations in the water column	9163	20	2003
	Particulate total and organic nitrogen concentrations in the water column	65424	1956	3030
	Particulate total and organic phosphorus concentrations in the water column	61477	2034	1115
	Alkalinity, acidity and pH of the water column	12686	4968	27712
	Concentration of suspended particulate material in the water column	9026	984	6987
	Dissolved oxygen parameters in the water column	168279	33680	72087
	Raw oxygen sensor output	5151		
Pesticides	Suspended particulate material grain size parameters			72
	Total dissolved inorganic carbon (TCO2) concentration in the water column		25	19
	Concentration of polychlorobiphenyls (PCBs) in biota			33
	Concentration of polychlorobiphenyls (PCBs) in sediment samples	1325		
	Concentration of polychlorobiphenyls (PCBs) in suspended particulate material	163		
	Concentration of polychlorobiphenyls (PCBs) in the water column	323	384	
Radionucleides	Pesticide concentrations in biota	709		33
	Pesticide concentrations in sediment	1037	233	
	Pesticide concentrations in water bodies	213	904	
	Radioactivity in the water column	773	1195	48

Overview of CDI records for EMODNET chemistry categories in the regions - May 2012



QC/QA AND PRODUCTS (WP3)

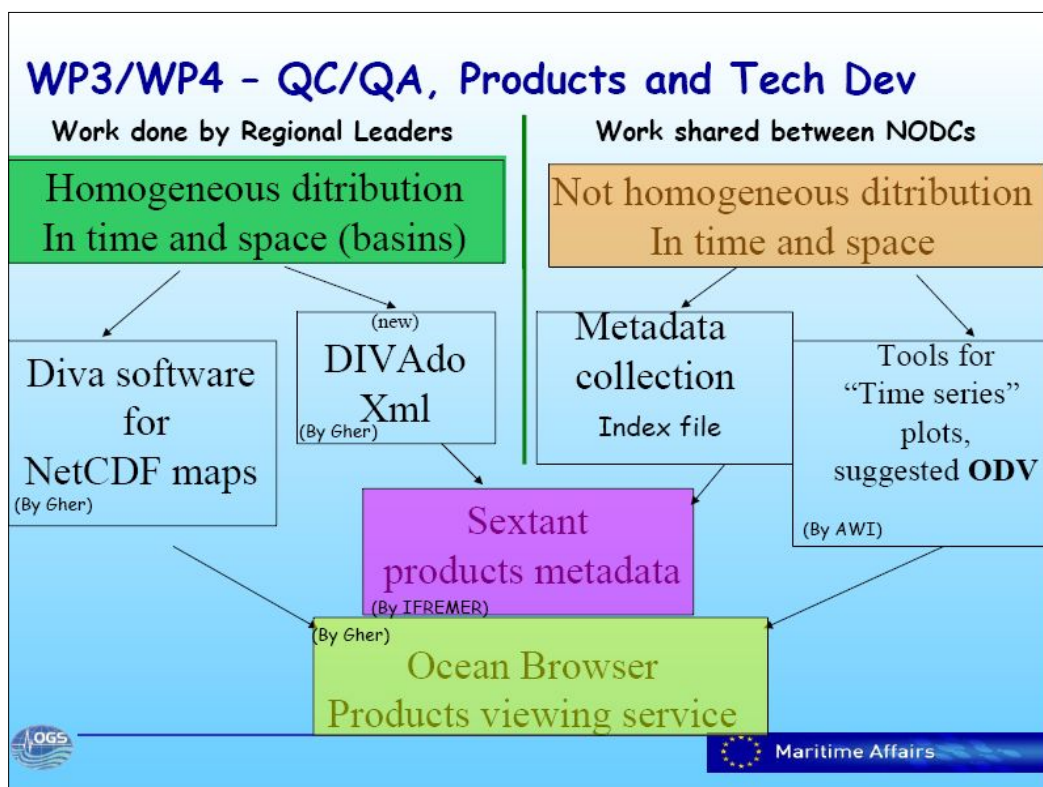
One of the key aims of the EMODnet Chemical lot is to make more data available and to generate freely available data products. Data products are also an important tool to understand what data are available, and how to use it. In the 3rd year of the project, the consortium made a clear distinction between products that it can produce that reflect the data, and products that imply some form of further analysis, interpretation and implied knowledge. In addition, in this final year, an activity to apply the EMODnet data discovery and download mechanism was undertaken to see if these data could be used in a real world example.

During the last year of activity, the attention was focussed on the drafting of the products validation guideline and on the implementation of a selection of “time series” plots.

3.1. DATA PRODUCTS

As described in the Final Report the EMODnet Chemical lot has two main subsets of data products depending on the available data distribution and nature of the data:

1. SDN Standard Interpolated Maps, produced only for parameters with homogeneous distribution and suitable data coverage in time and space (measured on basin scale),
2. “Time series plots”, showing station maps with plots of measured time series (not trends) and link to metadata, produced for heterogeneous datasets i.e. coastal stations with repeated observations over time and/or datasets with fragmented spatial coverage.



Therefore, to discriminate a previous accurate data format Standardization and a Normalization analysis was performed by the partners as first step and then also by the Regional leaders. The above figure describes the product generation workflow commonly agreed with the indication of how DIVA maps and Time series plots are produced and by whom.

3.1.1. DIVA MAPS PRODUCTION

Data products are generated by the three regional task leaders, as described in the Final Report.

The EMODnet Chemical portal gives access to all the integrated maps of selected parameters produced at regional level, through the EMODnet Data Products Viewing and Downloading Service. The EMODnet Data Products Discovery Service includes all related metadata.

3.1.2 “TIME SERIES” PLOTS

For the time-series data, it was judged that using DIVA to produce interpolated maps was not appropriate. It would present a distribution that is inferred by the software, but not supported by thorough expert analysis, in addition the heterogeneous nature of the data and its clustered spatial distribution would erroneously join points in an interpolation that are not comparable.

For this reason, in conjunction with the partners, it was decided to use the ODV software as a tool to generate time-series products. During the last year, the production of the plots was enlarged to all the partners following the same workflow proposed in the first prototype. All generated plots are now available on the web through the Ocean Browser viewing system. In this phase the time series images are stored at a centralized place. For future developments we will consider a place (decentralized approach) to store these images linked to OceanBrowser.

The instructions to generate the plots using ODV software were distributed by the OGS and they can be consulted on the EMODnet Chemistry Web Portal, in the Data Products section; while the suggestions to create the index file were distributed by the GHER on its MediaWiki. During the last year, some simple common agreements about tools and formats were decided:

- follow common standard format agreement (produce EPS files to be converted in SVG)
- suggest ODV as basic software for manual generation of plots;
- evaluate batch mode tools for plots production from NERI and BODC for the next phase of Chemical Lot;
- avoid plots with less than 4 or 5 points;
- avoid lines to connect observation points (use scatter points plots).

3.1.3 PRODUCTS VALIDATION

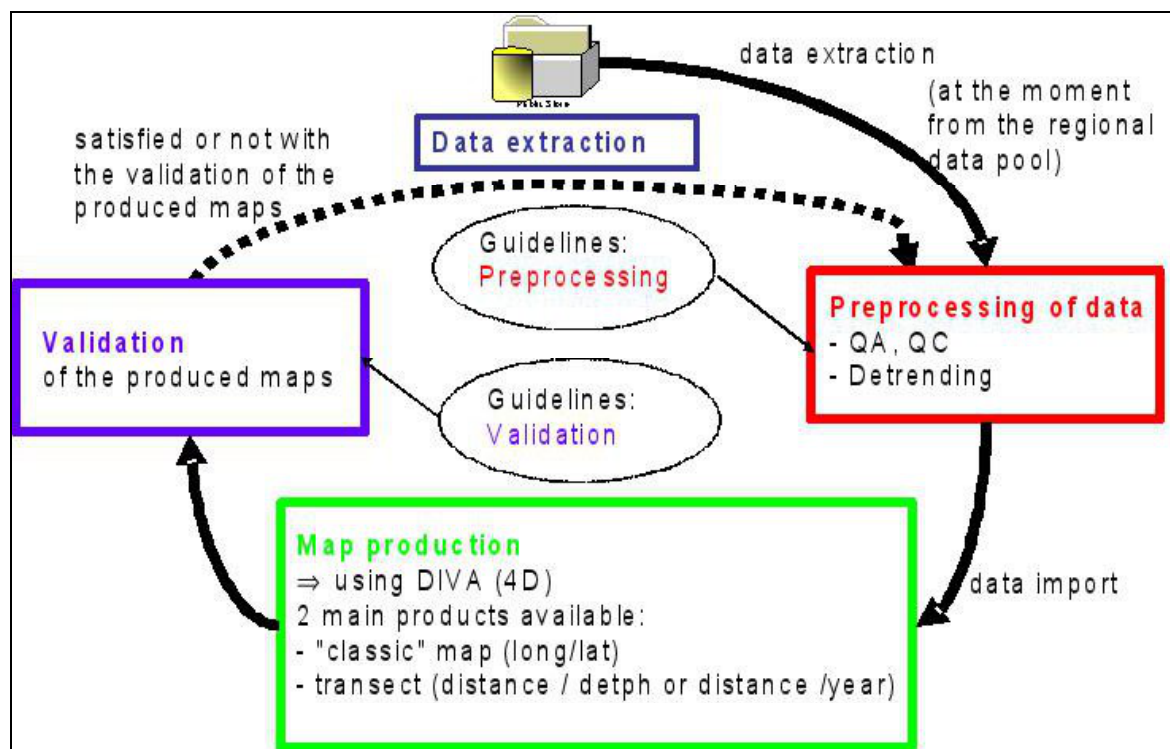
During the third year the activities included the generated products validation. This work had two main phases:

- In September 2011 partners started a product critical revision with the help of their local experts focusing on their specific area of interest;
- BODC hosted The EMODnet Chemistry Lot Product Validation and Coordination Meeting held the 24th of November 2011 in Liverpool (UK).

It was focused on the discussion of the products quality for the 3 geographic areas of interest of EMODnet Chemistry Lot. It started with a summary of work done until now and the decision taken; then the discussion shared between the Regional Leaders and the Coordination group was about the quality check of Chemistry Lot Products.

Thanks to the preliminary work done on the first phase by each partner several critical issues were discussed to find a common solution.

Looking to the below working schema, proposed at the beginning of the Chemistry Pilot, in the first two years we already completed the phases of “Data extraction”, “Preprocessing of data”, “Map production”. In the last year we completed the second half of it, namely the “Validation”. In case of not satisfaction with the validation of the produced maps the loop goes back to “Preprocessing of data” up to the validated final results.



The work resulted in a list of revision actions for the Regional Leaders with the collaboration of single partners and to a small validation guideline available now on the project web site (<http://www.EMODnet-chemistry.eu/portal/portal/EMODnet/Meetings>). This in order to improve the quality of the available products.

3.1.4 PRODUCT VALIDATION GUIDELINE

The commonly agreed progressive steps to apply for the product validation are:

- Scientific QC of source data as first step, to ensure that only trustworthy data will be used for the gridding procedure;
- The educated evaluation of the gridded field for each Region, to highlight the not-meaningful products to be reviewed possibly with help of local experts.
- In case of not-meaningful products, the critical issues to be analyzed should be:
 - data distribution Vs max/min distribution in the gridded field;
 - data distribution Vs area covered by the gridded field;
 - temporal resolution of gridded field (monthly, seasonal, annual...) Vs source data temporal distribution;
 - overlapping between coastlines and gridded field;
 - Diva parameters (correlation length and signal to noise ratio) and physical features proper of the analyzed area;
 - second quality check for source dataset (to evaluate spikes or review the range checks).

Specific decisions taken for the validation work of the Chemistry Lot were:

- to eliminate from the web not meaningful or dubious products;
- to focus on parameters specifically requested by MSFD to the Chemistry pilot;
- to set the temporal resolution of Diva analysis from annual to seasonal, at least for some spots of the Mediterranean Sea and for the Greater North Sea;
- to revise the DIVA analysis parameters (S/N ration, correlation lengths) for specific areas as for the Adriatic ;
- to reduce the extension of the interpolated field to areas well covered by the measured data (like for the northern side of Adriatic);
- to improve the definition of the regular grid for the interpolated field and/or of the coastline to avoid overlapping.

3.2 QUALITY CONTROL/QUALITY ASSURANCE ACTIVITIES

At the Product validation workshop in December 2011, the lead partner on WP3 (ICES) proposed to undertake a task that would validate the output of EMODnet Chemistry against established mechanisms for data assembly and production of products.

This activity took place in the spring of 2012, and was in close cooperation with the EEA. The basic proposal consisted of running the existing process established in the EEA data network (EIONET) to locate, harmonize and produce a dataset that could be used for the production of an existing indicator that is part of the State of the Environment activity for Europe. It was initially planned to target both Nutrients and Heavy Metals, as these have well documented assembly workflows for indicator production. In the event, the exercise was only carried out for Nutrients, however this gave a good indication of the challenges and shortcomings that EMODnet Chemistry will need to tackle in its next phase.

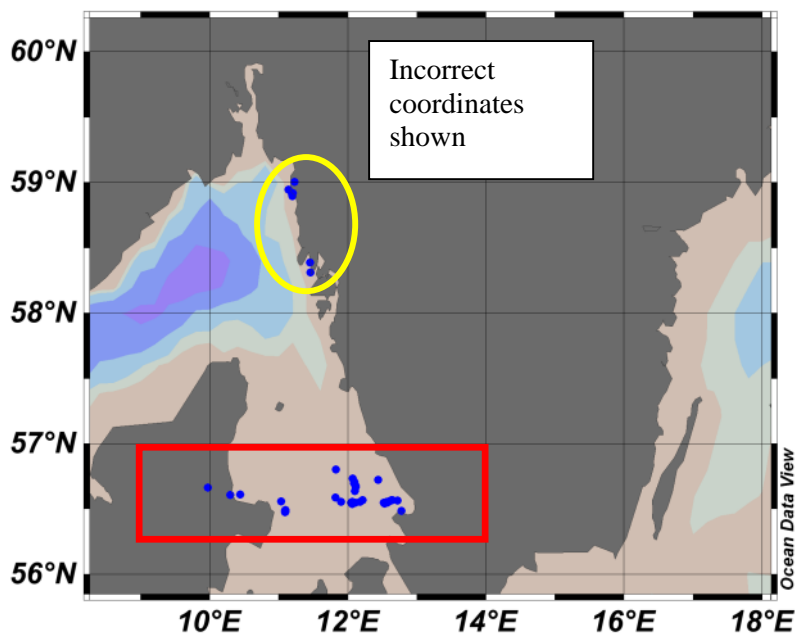
The initial phase of this exercise involved looking at the existing data products (time series plots and DIVA interpolated maps) to determine whether they were sufficient to either complement or cover the requirement for an input dataset to the process. The table below describes the current situation in terms of availability in spatial/temporal dimensions. This overview helped in that it showed where the most data were available, however the products were not sufficient in themselves to base a indicator production on at this point in time. Based on this overview, it was decided to focus on the Greater North Sea area, as this has

the most complete coverage of background data that could be used for analysis. A more comprehensive description of the exercise that was undertaken and the results is included in Annex III of this report.

	Data product	Background Data
Nutrients (DIN, TN)	Black Sea: Annual, Monthly, Seasonal dist. (Nitrates, Nitrite and Nitrogen) Mediterranean (5 spots): Annual, Monthly, Seasonal dist (Nitrates) NE Atlantic (North Sea): Summary over 10 years (Nitrites and Nitrates) Baltic: no products	NE Atlantic (North Sea): Yes Mediterranean (5 spots): Yes Black Sea: Yes (but fewer DIN) Baltic: No
Nutrients (DIP, TP)	Black Sea: Annual, Monthly, Seasonal dist. (Total Phosphates) Mediterranean (5 spots): Annual, Monthly, Seasonal dist (Phosphates) NE Atlantic (North Sea): Summary over 10 years (Phosphates) Baltic: no products	NE Atlantic (North Sea): Yes Mediterranean (5 spots): Yes Black Sea: Yes Baltic: No
Nutrients (TOC)	All regions: No products	All regions: No data

The following summarizes the findings related to quality issues, there were also a number of observations gathered about the overall functionality of the data extraction tools, however they are out of the scope of this section dealing with quality.

- The meta-data (CDI), which the search for relevant data is based on does not always fully agree with the associated data as managed at the distributed data providers and supplied as downloadable files. In some cases it would appear that coordinates are not in sync between the CDI metadata and the ODV data sets. In this example the data (depth information) would suggest the data points to the north actually belong in the red band (the extraction selection based on the CDI query).



-
- Check if there is a coastal “bend” in the way data points are extracted in EMODnet, this was not clear in the extraction.
 - Overall the datasets downloaded contained sufficient information, fields and supporting data (through vocabularies) that the data could be used in a data assembly exercise for the production for Nutrients related indicators
 - It was not possible to make a comparison of quality over a sufficient size of dataset between existing compiled datasets and that was downloaded from EMODnet Chemistry. This was due to the time and effort taken to download data from the portal; at present there are a number of limitations in the download process that make it difficult to get sufficient data assembled in a reasonable time period. Although not strictly a quality issue, it is a severe limitation on the possible use of these data.

These experiences with using the CDI Data Discovery and Access service, both in use functionality and in possible mismatches between geographical locations of data sets as described in their CDI metadata and the actual downloaded ODV files, are now considered and analysed more in detail in the EU FP7 SeaDataNet II project. This will lead to improving the guidelines for data providers and building in more QC checks in the metadata population process. It will also lead to improving the use functionality of the EMODnet CDI Data Discovery and Access service for handling larger requests in a more efficient way than the present limitations of only 500 requests per shopping transaction. It is considered to enlarge the public limitation of 500 requests per transaction to come forward to casual users of the portal. Also in parallel work is ongoing for a machine to machine CDI interface that will facilitate larger and automated searches and data delivery for specific user communities and well specified search profiles. Part of the ongoing analysis in SeaDataNet II is to find solutions for guaranteeing a robust handling of large requests, which can be supported by caching and dosing.

3.3 PRODUCT OVERVIEW

Diva interpolated Maps

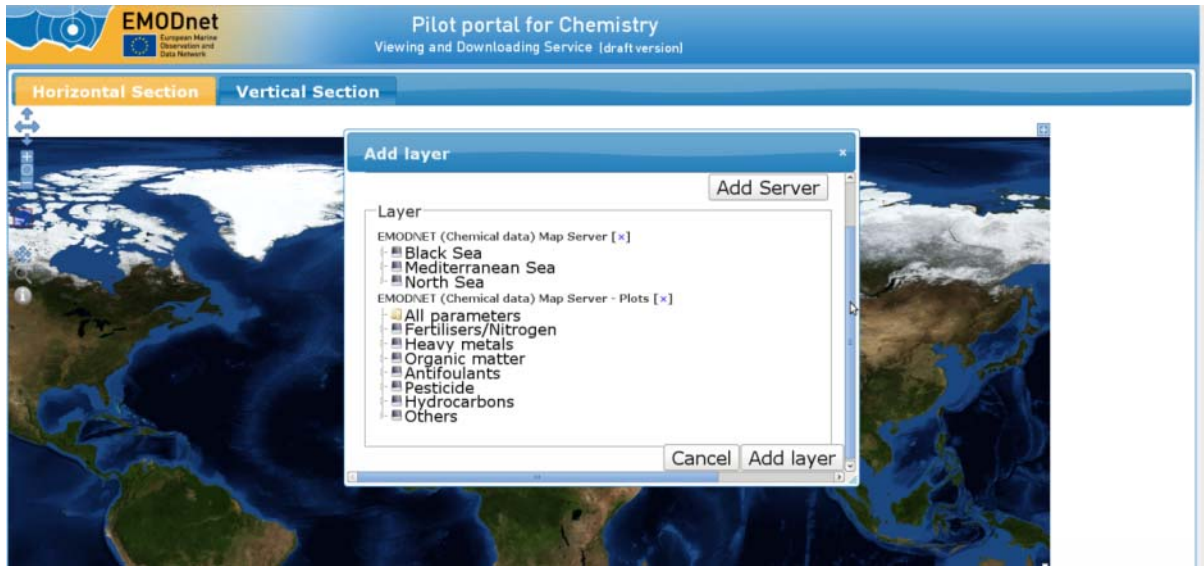
areas	temporal resolution	category
North Sea	Seasonal	nutrients
Black Sea	Annual	Nutrients , Metals, Radionuclides
	Monthly	Nutrients
	Seasonal	Nutrients
Mediterranean Sea – Adriatic	Annual	Nutrients
	Seasonal	Nutrients
Mediterranean Sea – Gulf of Athens	Annual	Nutrients
	Seasonal	Nutrients
Mediterranean Sea – Gulf of Lion	Monthly	Nutrients
Mediterranean Sea – Balearic Sea	Seasonal	Nutrients
Mediterranean Sea – Levantine Basin	Seasonal	Nutrients

Overview of Diva interpolated Maps in the regions - May 2012

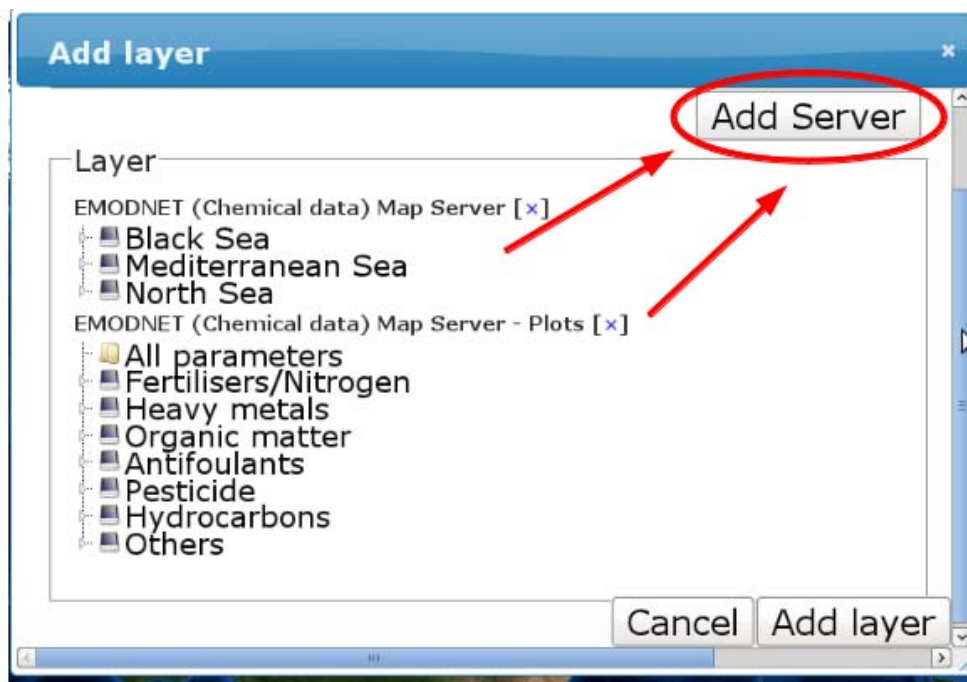
TS Plots

MSFD categories	entryterm_p021	North Sea	Black Sea	Med Sea
Antifoulants	Organometallic species concentration parameters in sediments	5/5		
	Ammonium concentration parameters in the water column	5/5	2/4	
Fertilisers/Nitrogen	Nutrient concentrations in sediment pore waters			2/24
	Nitrate concentration parameters in the water column	8/11	1/2	
	Nitrite concentration parameters in the water column	2/3	1/2	
	Phosphate concentration parameters in the water column	8/17	1/2	
	Dissolved total and organic nitrogen concentrations in the water column	5/12		
	Dissolved total or organic phosphorus concentration in the water column	1/1	2/4	
Heavy metals	Metal concentrations in biota	2/23		11/62
	Dissolved metal concentrations in the water column	3/3	24/72	
	Particulate metal concentrations in the water column	2/4		
	Total metal concentrations in water bodies	2/2		
Hydrocarbons	Inorganic chemical composition of sediment or rocks	9/27		15/132
	Concentration of polycyclic aromatic hydrocarbons (PAHs) in sediment samples	7/10		
	Concentration of polycyclic aromatic hydrocarbons (PAHs) in biota			11/38
Organic matter	Carbon concentrations in sediment			2/6
	Dissolved organic carbon concentration in the water column	1/2		
	Nitrogen concentrations in sediment			2/6
	Dissolved organic carbon concentrations in sediment pore waters			2/6
Others	Particulate total and organic phosphorus concentrations in the water column	1/1		
	Alkalinity, acidity and pH of the water column		2/8	
	Dissolved oxygen parameters in the water column	1/1	2/4	
	Salinity of the water column		2/4	
	Silicate concentration parameters in the water column	2/2	2/4	
	Temperature of the water column	1/1	2/4	
Pesticide	Concentration of suspended particulate material in the water column	1/1		
	Pesticide concentrations in biota	2/23		4/14
	Pesticide concentrations in sediment	4/6		
		72/160	41/110	49/288

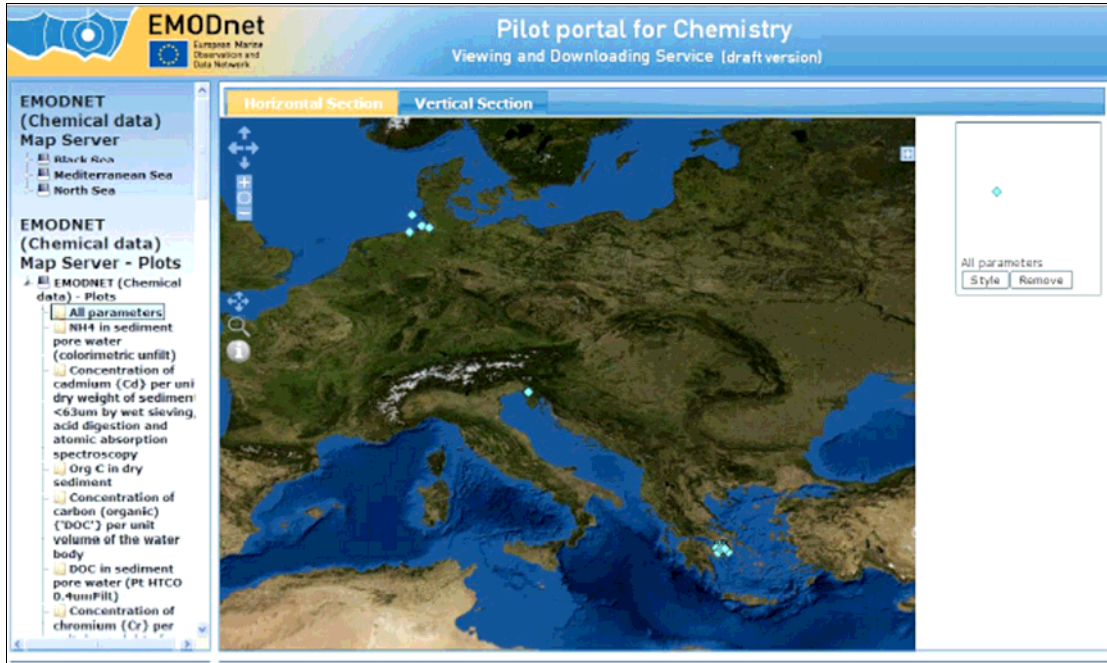
Overview of TS Plots in the regions - May 2012



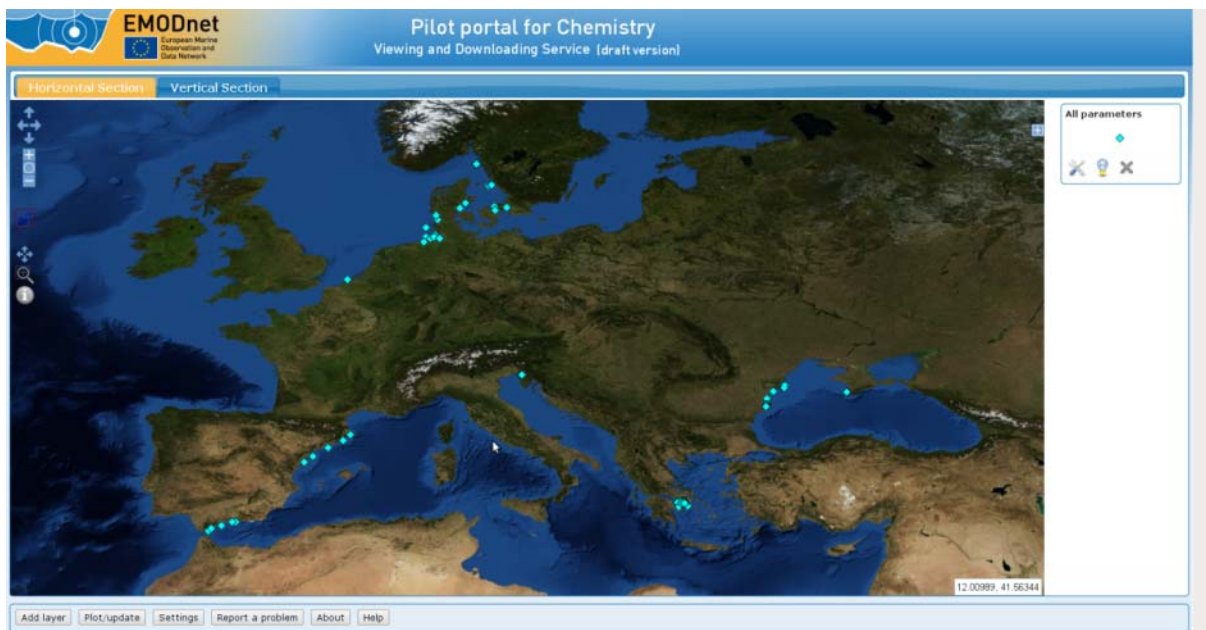
Ocean Browser upgrades from MODEG suggestion.



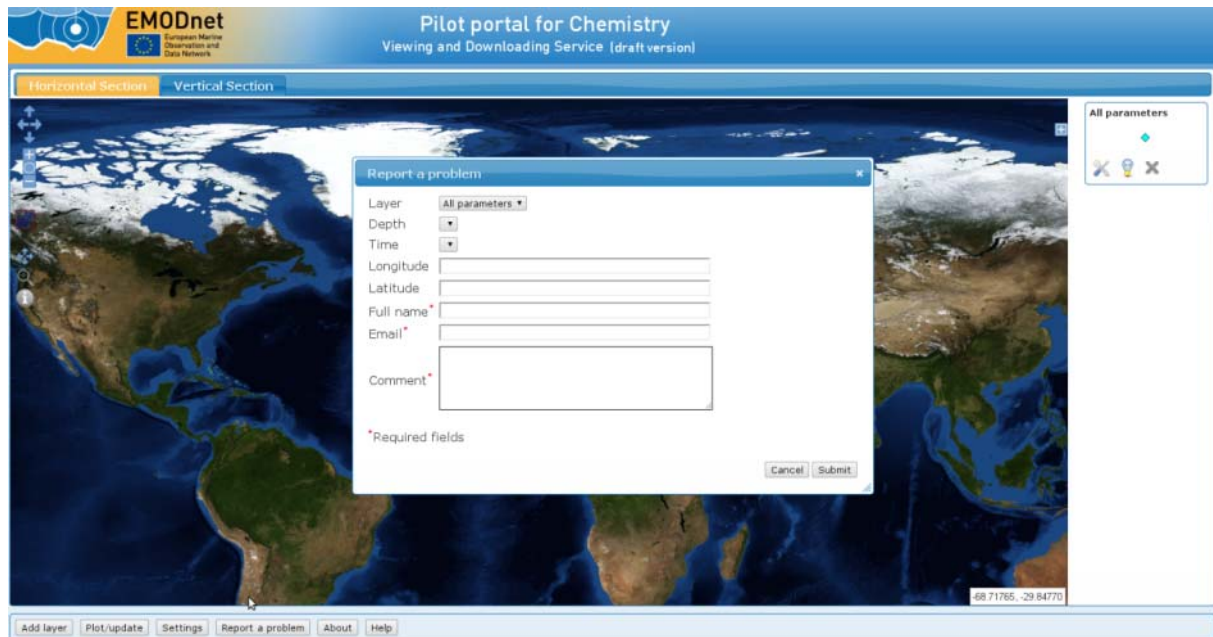
The Add Server interface to choose between the two kind of products available simply adding the WMS layers and clicking the "Add Server" button .



Time series plots stations available during the prototype phase.



Time series plots stations available at the moment (situation updated at May 2012).



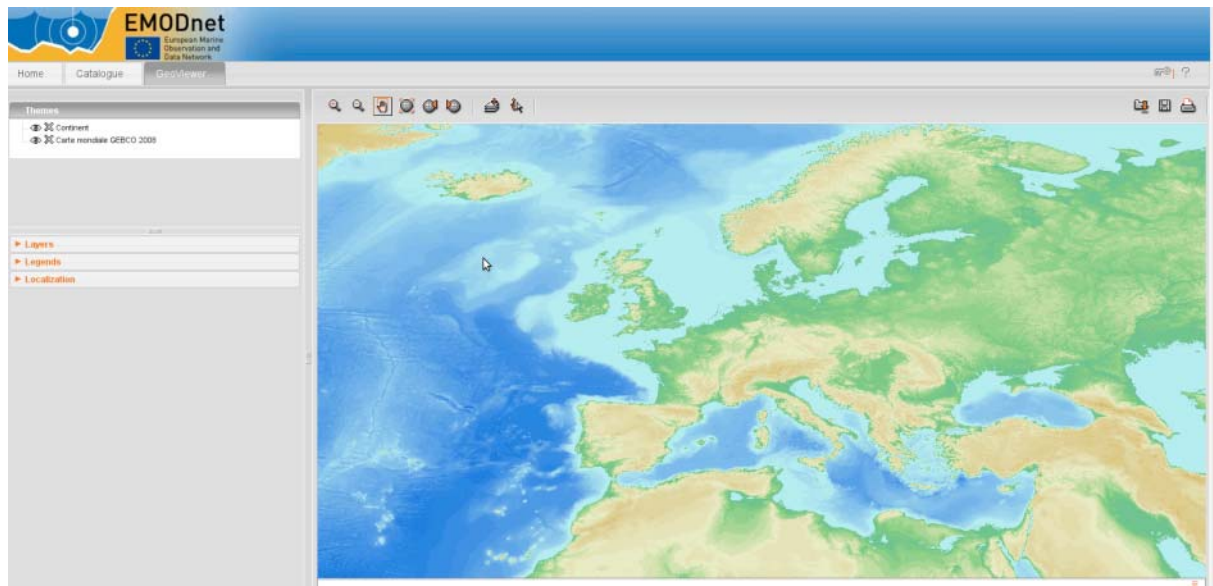
Problems Report interface

4.2. SEXTANT PRODUCTS METADATA CATALOGUE

The EMODnet Chemistry lot and also other EMODnet lots and relevant projects such as SeaDataNet and MyOcean generate data products that can be retrieved and visualized by WMS viewing services. For each data product it is required to populate metadata for describing the data product and its generation, because that will facilitate the exchange and use of data products in various portals.

Initially it was decided to base the Catalogue and Data Products Discovery service for EMODnetEMODnet Chemistry and Hydrography - Seabed Mapping upon the CAMIOON service which had been developed as part of the MyOcean project. However over time it became clear that it was not easy to adapt the CAMIOON service for a wider and more common use as required in EMODnet and SeaDataNet. Therefore at the end of the second year several issues lead to the decision to choose a more suitable tool for this task. The decision was to move to using and adapting the Sextant service which is already in use in France for cataloguing and giving access to marine maps and related data products. It is based on the open source GeoNetwork software which works with the ISO19139 metadata standards and which is compliant to the implementation standards of the INSPIRE Directive..

End 2011 and early 2012 activities were undertaken by partner IFREMER for adopting and adapting the existing Sextant service for EMODnet Hydrography and Chemistry purposes. This included formulating data product metadata profiles, supported by SeaDataNet Common Vocabularies, an online Content Management System and an XML exchange procedure for preparing and maintaining Sextant entries by relevant data product providers, and developing a Sextant user interface for searching and display adopting the EMODnet look & feel.



Sextant web interface

During the first days of May 2012 the EMODnet Chemistry Coordination Group took stock of the status of the EMODnet Sextant development. Together with the partners involved in the Sextant development a videoconference was held to discuss remaining actions for finalizing this service. The action list can be found at the following link <http://www.EMODnet-chemistry.eu/portal/portal/EMODnet/Meetings>.

A summary of the decisions is given below:

- Diva interpolated maps: for the moment metadata will be manually loaded using the Sextant on-line form (the DIVAdoXML metadata automatic generation will need to be synchronized as a next step. At present Diva is generating ISO 19115 metadata, while Sextant is managing ISO 19139 formatted metadata).

- TS products: metadata will be manually loaded using the Sextant on-line form.

The following decisions were taken about how to keep homogeneous granularity between Sextant and the Ocean Browser which is instrumental for visualising the EMODnet Chemistry data products:

- to make a description of TS products for each category of parameters considered by the MSFD. In total there will be 6 descriptions;

- IFREMER will complete the on-line form for these 6 categories of TS products.

- GHER and IFREMER will collaborate for synchronizing the products metadata categories and the granularity of Ocean Browser (by parameter P011:P021:MSFD_categories).

ANALYSIS AND EVALUATION (WP5)

During the Development phases of the project, a couple of dedicated questionnaires were designed for getting feedback from users who discover and use data and in addition from users who access the products. The questionnaire results and the web statistics were presented in the Final Report, together with the evaluation of the project for use in assessment and future developments and a detailed set of recommendations.

Most recommendations were already taken into consideration in this Maintenance phase, as in the set of activities to be undertaken within the project and in view of the next tender calls.

The functionalities of the EMODnet Chemistry portal were further developed to answer to the users requests and comments. Presenting time series at individual points is effective and meets user needs and there are also developments that could be completed to make data more comparable in the future. The data and products made available by the EMODnet Chemical lot can in part be used for measuring ecosystem health.

Summary of lessons learned during three years project:

- Source data are not always easily accessible → there is a need to improve data flow, also for MSFD reporting needs;
- For some areas huge work of data/metadata standardization from source datasets has been and will be required in near future (heterogeneous formats, poor of metadata);
- The complexity of the measurements covering 8 groups of parameters collected on 3 matrices → there is a need to have wide metadata description and continue with adapting process of SDN standards;
- The heterogeneity of the measurements: geographic coverage/measurement methods... → there is a need to split subsets of homogeneous datasets to generate suitable products;
- The “exotic parameters” (contaminants) → there is a need an ad hoc QC protocol (no spikes, difficult to apply ranges);
- Products → there is a need to have an local group of experts for regular revision;

As possible future steps the following elements are highlighted:

- Improve data/metadata flow and continue with development of the infrastructure and its services, including efficiency of use ;
- Enlarge geographic coverage □ eg: Baltic Sea suggested, more Mediterranean areas...;
- Enlarge range of parameters harvested: PCO₂ (acidification) , O₂, silicates, other metals and ChlA;
- Evaluate and develop specific kind of new products beside interpolated maps and time series.

The use of the portal during the last year is evaluated in term of web portal access statistics. These includes the web statistics of the main portal, of the CDI data search interface and of the Ocean Browser viewing service.

WEB statistics:**EMODnet Chemistry web site:**

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
gen-2011	3	5	6	6	76.06 KB
feb-2011	17	35	52	52	48.56 MB
mar-2011	28	56	100	181	1.25 MB
apr-2011	16	29	44	44	742.92 KB
mag-2011	16	42	99	99	672.32 KB
giu-2011	21	32	61	177	1.13 MB
lug-2011	14	26	38	38	495.39 KB
ago-2011	15	32	54	54	762.47 KB
set-2011	4	5	5	5	81.74 KB
ott-2011	15	20	26	26	298.35 KB
nov-2011	15	22	26	26	340.54 KB
dic-2011	16	24	75	247	1.64 MB
Total	180	328	586	955	55.96 MB

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
gen-2012	19	41	143	1099	4.57 MB
feb-2012	18	33	102	919	3.28 MB
mar-2012	17	19	21	21	342.21 KB
apr-2012	7	8	9	9	128.43 KB
mag-2012	17	31	60	216	759.91 KB
giu-2012	0	0	0	0	0
lug-2012	0	0	0	0	0
ago-2012	0	0	0	0	0
set-2012	0	0	0	0	0
ott-2012	0	0	0	0	0
nov-2012	0	0	0	0	0
dic-2012	0	0	0	0	0
Total	78	132	335	2264	9.04 MB

For the CDI Data Discovery and Access service:

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2011	45	54	1,230	3,878	20.94 MB
Feb 2011	52	90	2,461	8,657	53.71 MB
Mar 2011	58	97	6,012	12,233	89.41 MB
Apr 2011	69	104	3,246	9,629	129.04 MB
May 2011	36	69	2,054	7,148	46.86 MB
Jun 2011	55	99	4,353	12,186	78.07 MB
Jul 2011	26	38	573	1,726	11.87 MB
Aug 2011	25	33	903	3,287	16.00 MB
Sep 2011	32	38	863	2,539	20.18 MB
Oct 2011	35	43	788	2,984	17.29 MB
Nov 2011	70	92	2,046	6,029	187.79 MB
Dec 2011	55	88	1,250	2,958	73.99 MB
Total	558	845	25,779	73,254	745.16 MB

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2012	38	49	849	2,487	15.94 MB
Feb 2012	53	74	3,225	8,083	82.65 MB
Mar 2012	35	43	1,815	4,323	106.64 MB
Apr 2012	51	58	1,277	3,504	79.38 MB
May 2012	47	70	1,458	4,033	33.80 MB
Jun 2012	0	0	0	0	0
Jul 2012	0	0	0	0	0
Aug 2012	0	0	0	0	0
Sep 2012	0	0	0	0	0
Oct 2012	0	0	0	0	0
Nov 2012	0	0	0	0	0
Dec 2012	0	0	0	0	0
Total	224	294	8,624	22,430	318.41 MB

Statistics for EMODNET (Chemistry) OceanBrowser (<http://gher-diva.phys.ulg.ac.be/emodnet>)

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
giu 2011	72	151	20899	33667	1.25 GB
lug 2011	28	52	5448	9243	428.90 MB
ago 2011	23	80	19188	23524	498.96 MB
set 2011	34	55	8451	10924	563.11 MB
ott 2011	29	50	3808	6007	416.95 MB
nov 2011	74	172	59002	70167	2.01 GB
dic 2011	41	69	9667	13171	438.59 MB
gen 2012	36	98	9120	12241	436.37 MB
feb 2012	64	151	47687	54468	1.96 GB
mar 2012	59	93	23646	27424	1006.41 MB
apr 2012	58	94	11390	13813	1.25 GB
mag 2012	64	102	14847	19050	1.71 GB
Excluding local traffic from the domain .ulg.ac.be					

CONCLUSIONS

The EMODnet Chemical pilot has represented a great challenge. In fact, the main difficulties were related to:

- The complexity of the measurements covering 8 groups of parameters (pesticides, antifoulants, pharmaceuticals, heavy metals, hydrocarbons, radionuclides, fertilisers, organic matter) collected on 3 matrices (sediment, water column and biota);
- The geographic heterogeneity of the data distribution (coastal points time series Vs homogenous sampling at basin level) and of measurement methods (instrument, method, target species, target basis, grain sizes).

To address the first point, data collection was approached with a priority list to proceed over successive steps, starting with a first release ready at the end of the first year (as a proof of concepts), a process that continued throughout the course of the project and the final release at the end of the project.

To address the second point, as highlighted during the Venice expert meeting (organised in September 2010) two main subsets of data products were identified depending upon the available data distribution:

- DIVA Standard Interpolated Maps, to be produced only for parameters with homogeneous distribution and suitable data coverage in time and space (measured on basin scale),
- Time series plots, to be produced for not homogeneous datasets as coastal points repeated in time and/or datasets with fragmented coverage.

In fact, it is clear that the use of DIVA standard interpolation is suitable only for the more “classic” sets of parameters measured in the water column. For the parameters measured in the other two matrices such as Biota and Sediment the spatial and temporal distribution of available data highlighted the need of a different commonly agreed analysis approach.

Also, great attention was put on the collection and management of data, providing the best metadata available describing for example: sediment fraction measured, dry/wet weights measurements, measurement methodology. This in order to help a correct comparison between different data sets. The continuous update and upgrade of SDN common vocabularies was the helping tool to manage this.

The last phase of the project was dedicated to:

- Continuing with data population and products generation, mainly for time series plots,
- A preliminary work focused on Products critical revision was requested to all partners, starting in September 2011 and based on feedback of local experts and potential users. Then, the Product Validation Meeting in November 2011 is considered as a conclusion event for this work with the production of the Product Validation Guideline for the Chemical lot,
- Increase portal functionalities (in the viewing and harmonisation),
- Set up and populate the Sextant metadata catalogue.

During the last six months of activities, a revision of generated product as a further step for the quality of the Chemical lot results, was done. This experience highlighted the need of a group of local experts to be involved on a periodical critical revision of generated products.

ANNEX I – LIST OF ACRONYMS

BSC	Black Sea Commission
CDI	Common Data Index (SeaDataNet metadata format)
DIVA	Data Interpolating Variational Analysis
DOC	Dissolved Organic Carbon
DOMÉ	Database on Oceanography and Marine Ecosystems
EEA	European Environment Agency
EU	European Union
GHER	GeoHydrodynamics and Environment Research, University of Liège
HCMR	Hellenic Centre for Marine Research
HELCOM	Helsinki Commission (for Baltic marine protection)
ICES	International Council for the Exploration of the Sea
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
IO-BAS	Institute of Oceanology - Bulgarian Academy of Science
MARIS	Mariene Informatie Service 'MARIS' BV
MEDPOL	Mediterranean Pollution Monitoring and Research Programme
MHI	Marine Hydrophysical Institute, Ukraine
MSFD	Marine Strategy Framework Directive
NERC-BODC	National Environmental Research Council – British Oceanographic Data Centre
NERI-MAR	National Environmental Research Institute
NetCDF	Network Common Data Format
NIMRD	National Institute for Marine Research and Development “Grigore Antipa”
OCEAN BROWSER	
ODV	Ocean Data View
OGC	Open Geospatial Consortium
OGS	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale
OSPAR	Oslo/Paris convention (for the Protection of the Marine Environment of the North-East Atlantic)
QA/ QC	Quality Assurance/ Quality Control
RIHMI-WDC	All Russian Research Institute of Hydro-meteorological Information – WDC B
SDN	FP7 EU SeaDataNet project
SIO-RAS	P.P. Shirshov Institute of Oceanology - Russian Academy of Science
TN	Total Nitrogen

TSU-DNA Iv. Javakishvili Tbilisi State University
WCS Web Coverage Service
WFS Web Feature Service
WMS Web Map Service
XML eXtensible Markup Language

ANNEX II – EXPLANATION OF CONCEPTS AND TERMINOLOGY

CDI

The CDI provides an ISO19115 based index (metadatabase) to describe individual data sets (such as samples, time series, profiles, trajectories, etc). It gives users a highly detailed insight in the availability and geographical spreading of marine data. Specifically the CDI metadata supplies core information about Who, When, Where, How, What measured.

ODV4 format

It is one of the official data transport (ASCII) formats. The last version has been extended with a SeaDataNet semantic header. The ODV4 format can be used directly in the popular Ocean Data View (ODV) analysis and presentation software package, which is being upgraded as part of SeaDataNet.

DIVA

It's the official interpolation software chosen by the Chemistry Lot. The DIVA (Data-Interpolating Variational Analysis) software tool developed by GHER group allows to spatially interpolate (or analyse) those observations on a regular grid in an optimal way. The analysis is performed on a finite element grid allowing for a variable spatial resolution and a good representation of the coastline and isobaths. DIVA also supports parameter estimation by cross-validation, anisotropic error covariances, estimation of the a posteriori error variance and isolating trends and cycles in the observations. To facilitate the use of DIVA, a web-based interface has been built called Diva-on-web.

ODV

For the Chemical Lot the tool is specifically used and suggested to visualize data and to generate time series plots for data with a not suitable coverage for DIVA analysis. The Ocean Data View (ODV) tool developed by AWI is a software package for the interactive exploration, analysis and visualization of oceanographic and other geo-referenced profile or sequence data. ODV runs on Windows (7, Vista, XP, 9x, Me, NT, 2000), Mac OS X, Linux, and UNIX (Solaris, Irix, AIX) systems. ODV data and configuration files are platform-independent and can be exchanged between different systems.

CAMIOON

It is a catalogue of products, developed and maintained by IFREMER. Products metadata have to be collected in xml format have to be adopted to to help users on the products search and browsing.

MediaWIKI

Wiki developed by GHER group as a tool to collect and exchange work information.

OceanBrowser

The Gher group has developed the software OceanBrowser in order to give a common viewing service to the interpolated products. It is based on open standards from the Open Geospatial Consortium (OGC), in particular Web Map Service (WMS) and Web Feature Service (WFS). These standards are requested as a core element for the interoperability between EMODnet Lots and for INSPIRE compliance. The web interface can also import third-party layers by using standard WMS requests. The user needs only to specify the URL of the WMS server and its supported version.

Sextant

Product metadata catalogue based on GeoNetwork compliant with ISO19139 metadata standards and fulfilling Inspire directive requirements.

ANNEX III – DATA EXTRACTION CASE STUDY (NORTH SEA)

Selected case stories

The initial intention of this exercise was to take a dataset collection for a sea basin area. However, the data extraction facilities in EMODNET Chemistry at present, are not specifically intended for extraction of large regional datasets. The upper limitations in the extractions are 500 datasets. That means that e.g. the extraction for the Kattegat areas described below has to be divided into 3 requests for data. Moreover one is only allowed to put 100 datasets to the shopping basket in one go.

Due to the above mentioned limitations smaller sea areas covering a band going from coast to coast were selected. The time period was further restricted to cover the years 2001-2010. In this way, both coastal areas as well as more offshore areas will be represented.

	Kattegat	North Square	Sea	N North Sea	S North Sea
Upper left/ lower right	56.8 N / 10 E 56.5 N / 13 E	57 N / 7 E 56 N / 8 E		59 N / 4 W 58 N / 7 E	53 N / 0 E 52 N / 7 E
EMODNET	1225	68		446	206
ICES	473	360		2137	1493

Table 1. Overview of the number of dataset/casts in the EMODNET data portal and the ICES Oceanographic database in 4 selected areas. The four areas are defined as boxes with the bounding coordinates listed. The dataset in EMODnet are equal to a cast with a CTD sampling one depth profile. The ICES data were extracted on 20 February 2012.

Kattegat

The requested data from the Kattegat area chosen originates from SMHI (Sweden) and NERI (Denmark). Both institutions released the data almost immediately after the request. The displayed positions of this request on the EMODnet portal seem to fit with the requested area (Fig. 1).

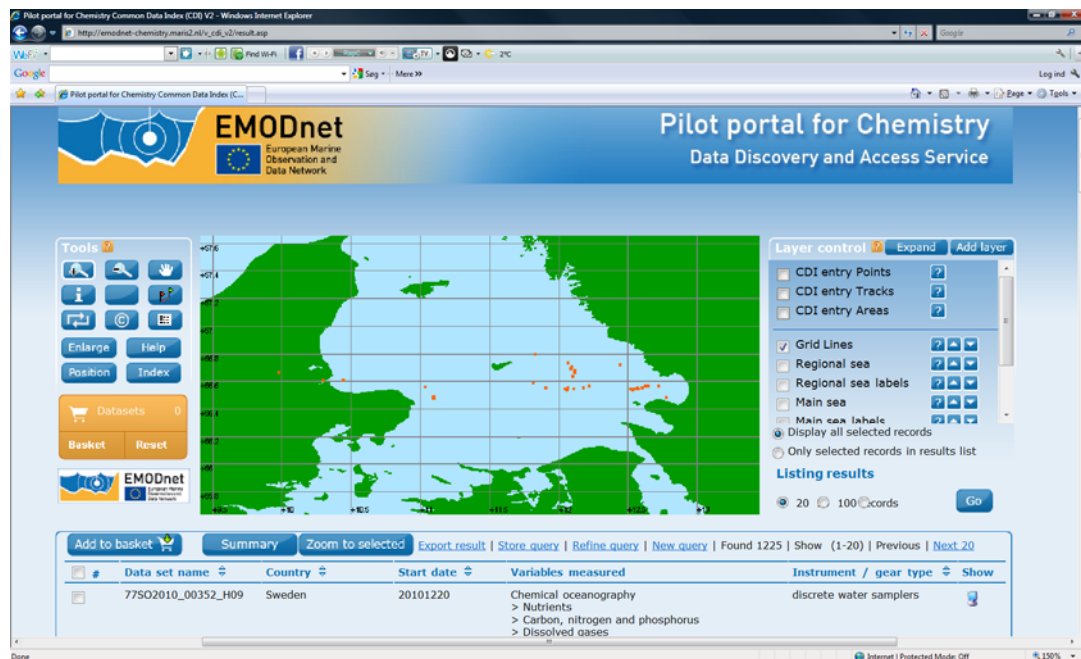


Fig. 1. Screen shot of the request in the Kattegat area from the EMODnet portal.

However after transferring the data to ODV it becomes obvious that some of the datasets are far out of range compared to the request (Fig. 2). Some stations are placed far north of the selected area. By checking some of these datasets it is obvious that specific stations like e.g. Laholmsbukten had coordinates far apart dependent on sampling date. Curiously these dataset situated far apart had e.g. the same bottom depth which is unlikely since the northern stations should lie on deeper waters than in Laholmsbukten. It seems likely that the EMODnet extraction is based on stations names with allocated default coordinates rather than the actual coordinates in the datasets (data from the correct station but with wrong coordinates).

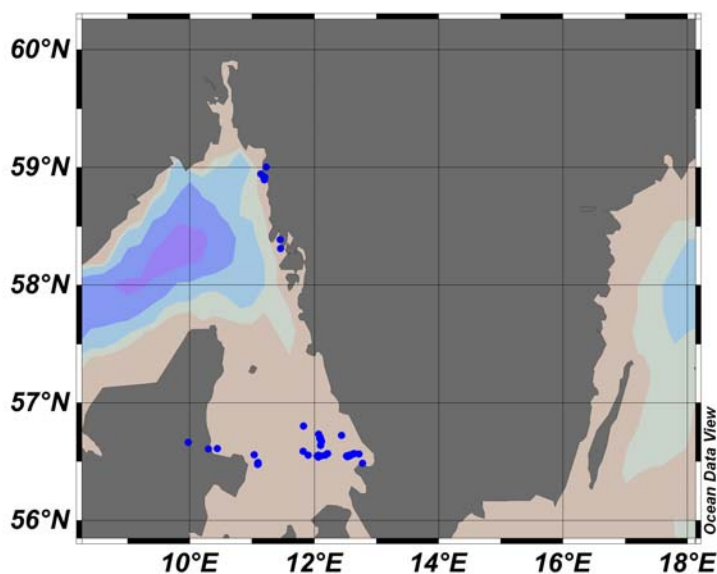


Fig.2. Map produced within ODV of the same data as displayed in fig. 1.

Northern North Sea

The requested data from the Northern North Sea area chosen originates from MERMAN (UK) and MUDAB (Germany). Both institutions released the datasets after 1-4 days. Furthermore UK requested the signing of Public Data Supply Agreement before being allowed to get access to the data. The displayed positions of this request on the EMODnet portal seem to fit reasonably well with the requested area except for at least two datasets that lie south of the requested area (Fig. 3).

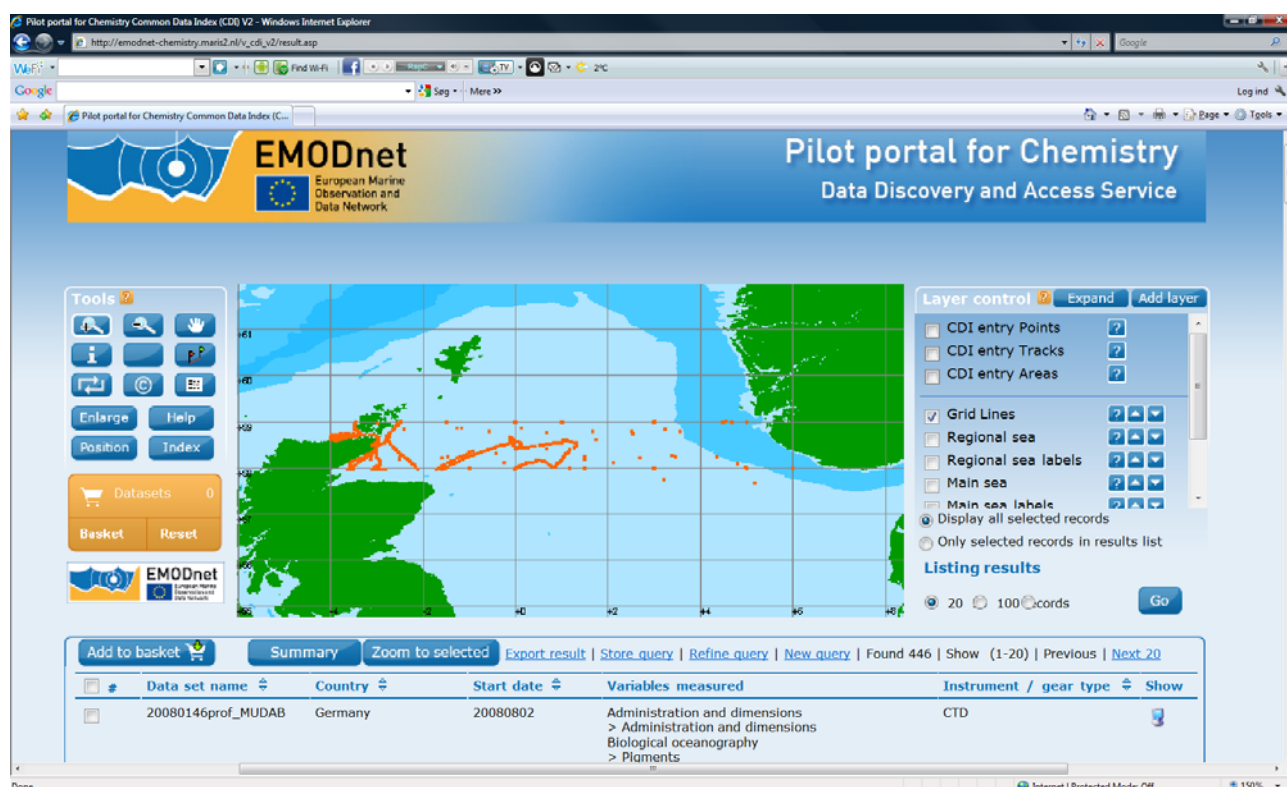


Fig. 3. Screenshot of the request in the Northern North Sea area from the EMODnet portal.

Southern North Sea

The requested data from the Southern North Sea area chosen originates from France (IFREMER), MUDAB (Germany), UK and Netherlands. The institutions released the datasets after 1-4 days, and UK requested the signing of Public Data Supply Agreement before being allowed to get access to the data. The displayed positions of this request on the EMODnet portal does not fit the requested area, as some data sets seem to lie up to half a degree too far north of the selected area (Fig. 4).

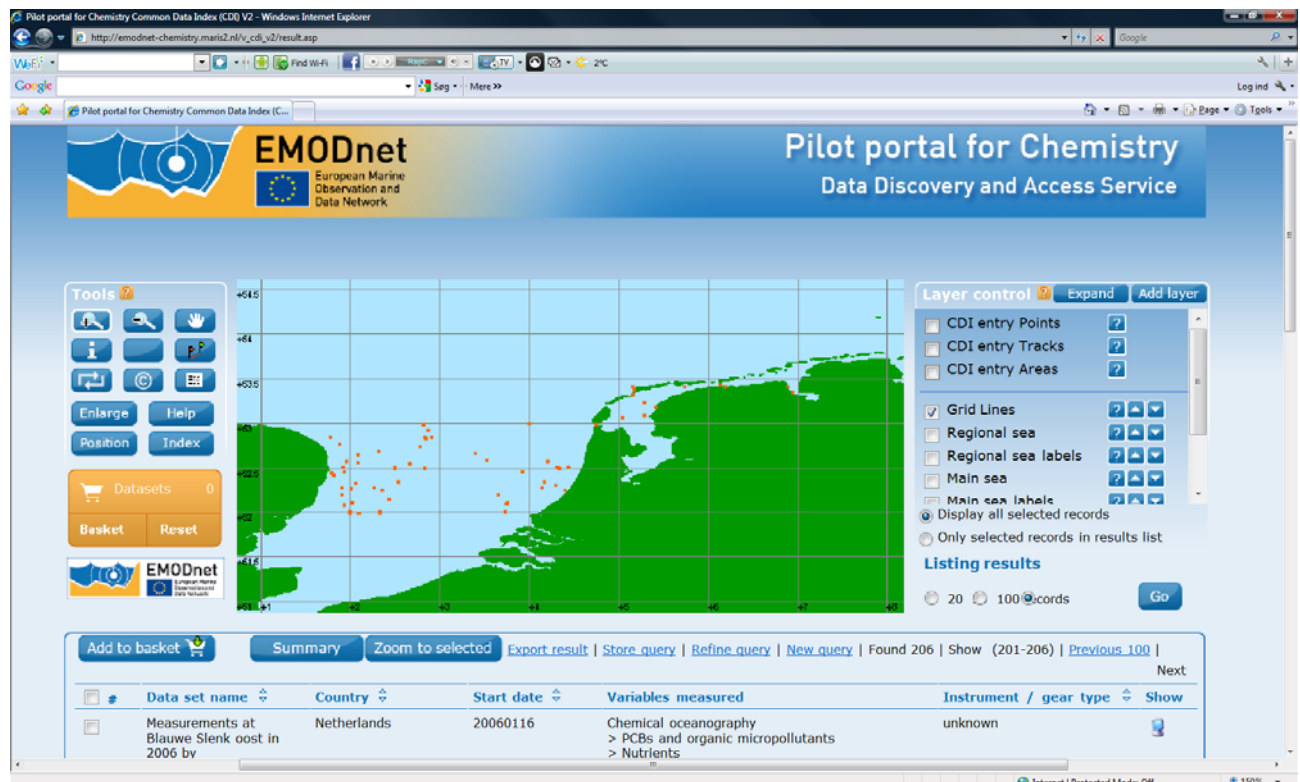


Fig. 4. Screen shot of the request in the Southern North Sea area from the EMODnet portal.

Recommendations and observations to the EMODnet Portal/SeaDataNet services:

Large data extractions are difficult:

1. The upper limit of 500 datasets per request and the upper limit of picking dataset for the shopping basket.
2. The request is dependent on the pending time on the data providers side: some seems to give permission as a default whereas other do not react even after several days
3. In some cases one has to sign a condition of use before being allowed to use the data. This slows the extraction of data
4. Requested data made the same date is put into one single zip file independent on the number of requests

Data are not within the bounding boxes selected:

1. Using the facility of choosing the upper left and lower right of the selected area given data that are outside the selected area (up to half a degree e.g. in the selected area in the Southern North Sea)
2. Transferring data to the Ocean Data Viewer shows that the extractions may contain stations far outside the area

The function to saved maps is not functioning well:

1. The saved maps only contain the positions and not the coastlines

Some SDN-files cannot be exported easily into the ODV facility:

1. The files from MERMAN (UK) could not be imported to ODV – could only be dragged in as single datasets

Further checks/addtions to be made:

- Check if positions far out of range like e.g. Northern Kattegat fits to “real” stations
- Check if there is a coastal “bend” in the way data points are extracted in EMODnet.

Conclusions and experiences discussed within SeaDataNet II

These experiences with using the CDI Data Discovery and Access service, both in use functionality and in possible mismatches between geographical locations of data sets as described in their CDI metadata and the actual downloaded ODV files, are now considered and analysed more in detail in the EU FP7 SeaDataNet II project. This will lead to improving the guidelines for data providers and building in more QC checks in the metadata population process. It will also lead to improving the use functionality of the EMODnet CDI Data Discovery and Access service for handling larger requests in a more efficient way than the present limitations of only 500 requests per shopping transaction. It is considered to enlarge the public limitation of 500 requests per transaction to come forward to casual users of the portal. Also in parallel work is ongoing for a machine to machine CDI interface that will facilitate larger and automated searches and data delivery for specific user communities and well specified search profiles. Part of the ongoing analysis in SeaDataNet II is to find solutions for guaranteeing a robust handling of large requests, which can be supported by caching and dosing.