



EMODnet Thematic Lot n° 4/SI2.749773

EMODnet Phase III - Trimonthly Report

Reporting Period: 01/07/2017 - 30/09/2017

Date: 13/10/2017

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1. Highlights in this reporting period

The highlights for the period July-September 2017 are listed below:

- The strategy for marine micro-litter data gathering, the micro-litter data format and vocabularies developed by EMODnet Chemistry network has been tuned taking into consideration input received by MSFD Technical Group on Marine Litter (mainly HELCOM, Germany and JPI Ocean BASEMAN)
- Set-up of the mailing list for EMODnet Chemistry Board of MSFD experts, further extended with input from RSCs and from the marine research community
- Start the agreement with OSPAR about the set-up of a web service to share beach litter data. Development of the first central EMODnet internet database, including beach litter data and modelled after the OSPAR-MCS approach.
- Define the terms of reference for the set-up of a regular harvesting from ICES DATRAS (the Database of Trawl Surveys), which includes also Baltic International Trawl Surveys (BITS) data, and is used for national fish trawl litter
- Consolidating EMODnet Chemistry approach for the collection of Marine Litter data with the drafting of the Guidelines and forms for gathering marine litter data (in progress)
- Finalization of the contribution to Mediterranean Quality Status Report (QSR2017) 2017 by UNEP-MAP, with the Use of EMODnet Chemistry nutrient and chlorophyll-a data buffer to derive products required by UNEP-MAP
- Contribution to EEA thematic report on contaminants and eutrophication in Europe's seas. The aim was to collate available data (contaminants in water, sediments and biota plus bioeffects + total nitrogen, dissolved inorganic nitrogen (all types), total phosphorus, dissolved inorganic phosphate in the water column) and to identify 'problem areas' and 'non-problem areas' with regard to contaminants and to eutrophication in transitional, coastal and marine waters.
- Develop the new design, layout and revised sitemap for EMODnet Chemistry portal. In the new design, special focus is given to Data Access (CDI service) and Data Products (DIVA Maps and aggregated validated and harmonized data collections) developed and maintained by the Chemistry lot with relevance for MSFD. The portal will also communicate easily to users that it deals with marine chemistry concerning Eutrophication, Pollution, Ocean Acidification and Marine Litter.
- All data providers updated and further populated EMODnet Chemistry data infrastructure with new CDI and ODV entries, focusing on data concerning eutrophication (nutrients, chlorophyll and oxygen) with a deadline by October 2017.

2. Meetings held since last report

Date	Location	Topic	Short Description
5-6/07/2017	Genova	EMODnet Central Portal TWG	Technical meeting for the discussion of the central portal features and new reporting requests
25/07/2017	Skype	Meeting with OSPAR and MCS	Meeting between OSPAR, OGS and MCS to set the terms of reference for beach litter data exchange
29/08/2017	Skype	Meeting with UNEP/MAP	Meeting between UNEP/MAP and OGS to clarify administrative issues linked to their subcontracting
12/09/2017	Lisbon	JPI Ocean BASEMAN	Invitation to BASEMAN workshop to present and discuss EMODNet Chemistry format for micro-litter
13-15/09/2017	Rome	8 th EMODnet Steering Committee	Presenting project progress and contributing to discussions
25-26/09/2017	Gotheborg, Sweden	EMODnet Chemistry Steering Committee	Monitoring progress and planning further activities

3. Work package updates

In the following, the updates per WP mainly focused to the period July-September 2017.

WP1 – Project Management

The coordination activity continued for the trimester.

The Consortium Agreement was finalised with signing by the 27 partners and posted on the Chemistry portal. Bilateral Subcontracts were finalised by 14 subcontractors. Further contacts are on-going with 4 subcontractors (the two Crimean MHI and IMBR, UNEP/MEDPOL and BSCS).

A series of Memorandum of Understanding covering different subjects are under discussion and finalization. These concern:

- the MoU with INFO-RAC to formalise the synergy between EMODnet Chemistry and Info-RAC information platforms and improve marine data management in the Mediterranean region by adopting and adapting existing consolidated standards and tools and by encouraging data sharing from additional data centres. This will be beneficial for regional projects, MSFD implementation and UNEP/MAP;
- the MoU with BSCS and UNEP/MAP, setting the cooperation framework needed to define the subcontracts of these Regional Sea Conventions with EMODnet Chemistry 3 ;
- the MoU with OSPAR for the beach litter data exchange;
- the MoU with ICES for the seafloor litter data exchange;
- the MoU with EEA, setting terms and conditions to use the regional aggregated data products as part of their use case.

WP2 – Data collection and metadata population

The WP2 activity was undertaken by the majority of the partnership and was mainly focused on gathering data concerning **eutrophication (nutrients, chlorophyll and oxygen)** and selected **contaminants** as an extension of the previous EMODnet Chemistry Phase 2. This scope will be expanded with **riverine input of nutrients** on a second time. A review of current metadata already included in the infrastructure was requested to insert additional information on monitoring/research purpose (with EDMERP project/program references) and on Quality Assurance and Quality Control (QA/QC) procedures. Activity deadlines are the following:

all data providers needs to update and gather and populate new CDI and ODV entries into the SeaDataNet CDI service and review existing entries, with focus on data concerning eutrophication (**nutrients, chlorophyll and oxygen**) by **October 2017** and focus on selected **contaminants** by **May 2018**.

Updated guidelines for dataset preparation and formatting have been circulated to the whole EMODnet Chemistry partnership to solve possible problems raised managing data collected in sediment and biota matrixes.

In parallel, OGS has finalised the guideline for describing marine **micro litter** data sets using CDI and ODV files, based on inputs received so far by JRC, TG Marine Litter, JPI Ocean BASEMAN, with the ultimate aim to establish official support and adoption of the guideline by TG ML. The guidelines are updated and are now under finalization.

In addition, IFREMER is defining the Guidelines and forms for gathering beach litter (nets, bottles etc) and seafloor litter (i.e. litter collected by fish trawl surveys), following the approach as earlier agreed.

Finally, OGS in cooperation with the Technical Working Group (TWG) has started the development of the first central EMODnet internet database to store beach litter data and modelled after the OSPAR-MCS approach. The agreement with OSPAR about the set up of a web service to share beach litter data is under finalisation. The terms of reference for the set up of a regular harvesting from ICES DATRAS (the Database of Trawl Surveys), which includes also Baltic International Trawl Surveys (BITS) data and is used for national fish trawl litter, has been defined. The regular harvesting will start soon.

WP3 – Generation of data products

The planning of the WP3 activities are summarized below:

A first version of concentration maps of **marine and beach litter** – **end February 2018**

Updated data collections and DIVA maps for **eutrophication** – **end April 2018**

Updated data collections and dedicated maps on **contaminants** – **end October 2018**

Higher resolution DIVA maps near **major river** mouths – **end December 2018**

WP4 – Technical development and operation

EMODnet Chemistry portal has been redesigned to give more emphasis to data and products released. Special focus is given to the data themes managed by the Chemistry lot with reference to MSFD, namely **Eutrophication, Contaminants, Ocean Acidification and Marine Litter**. The restyled and upgraded portal has been released internally and the review of the content is under finalisation. It will be officially launched by end October 2017.

Besides, activities are undertaken for restyling and adding extra functionalities to the EMODnet Chemistry portal services such as:

- **CDI Data Discovery and Access Service**, giving facilities for searching and retrieving chemistry source data sets;
- **OceanBrowser Viewing Service**, giving facilities for viewing, browsing and downloading Chemistry data products;
- **Sextant Products catalogue service**, giving facilities for searching and downloading Chemistry data products through the link with the OceanBrowser viewing service.
- **Advanced viewing services for timeseries and profiles**, giving facilities for generating and viewing dynamic plots of time series and profiles of selected parameters from data sets, selected from the harmonised, aggregated and validated data collections.

The second Technical Working Group meeting is planned for the beginning of December 2017.

WP5 – Uptake, outreach and interaction

The Board of MSFD experts has been finalised and the dedicated mailing list will be used soon to organise a remote conference focused on D5 (within November 2017). The questionnaire developed to illustrate EMODnet Chemistry objective and needs and to facilitate collection of feedbacks will be used to start the discussion and define which might be the improvements highlighted by the Board.

4. Specific challenges or difficulties encountered during the reporting period

- Evaluation of the fitness for use of EMODnet Chemistry data products for the assessment of Environmental Status according to MSFD. In particular, we would need to review the parameter chosen for current visualization products (e.g. are Nitrate+Nitrite useful?), the spatial resolution and the temporal resolution (are seasonal maps useful? Would it be better to produce maps at annual basis? Would a 6 years window be more fit to the MSFD assessment cycle?). The collection of feedback is slowed down.
- Definition of dedicated maps for contaminants.
- The development of the two European EMODnet Central ML databases, one for **beach litter**, modelled after the OSPAR-MCS approach, and one for **seafloor litter**, modelled after the ICES-DATRAS approach used for national fish trawl litter. Discussions are ongoing with the relevant regional systems, their responsible managers and related networks in order to get their support and to arrange formal cooperation and set up of data exchange mechanisms.
- Integration of litter categories lists from several relevant systems.

5. User Feedback

The full Help service with telephone, online chat and email with answer in 2 working days is not operative yet. Nevertheless, we received a couple of contacts by the chat already working on the portal with some feedback as listed below:

Date	Name	Organization	Type of user feedback (e.g. technical, case study etc)	Response time to address user request
07/24/17 11:37 AM	Tiago Santos	CEFAS	The user was quering the "Emodnet-chemistry CDI search" with some selected options (he attached a file with the criteria), when he added the result to the basket he received an error (a screenshot has been added). The problem has been reported to the web search interface's administrators.	<1 min
07/31/17 12:53 PM	Tiago Santos	CEFAS	The user asked for the possibility to do a search "based on a list of files in a txt file" (for example by submitting this list through the "Emodnet-chemistry CDI search" interface). The issue has been reported to the web search interface's administrators.	<1 min

6. Outreach and communication activities

Date	Media	Title	Short description and/or link to the activity
25/08/2017	Presentation	EMODnet Chemistry	EMODnet Chemistry data portal presented to CMEMS-Med-MFC-Biogeochemistry group
12/09/2017	Presentation	EMODnet Chemistry	EMODnet Chemistry approach and the micro-litter data format

7. Updates on Progress Indicators

Using the indicator as a header list the metrics collated and the time interval. If there was no activity to report leave the section under the indicator header blank.

Indicator 1 - Volume of data made available through the portal

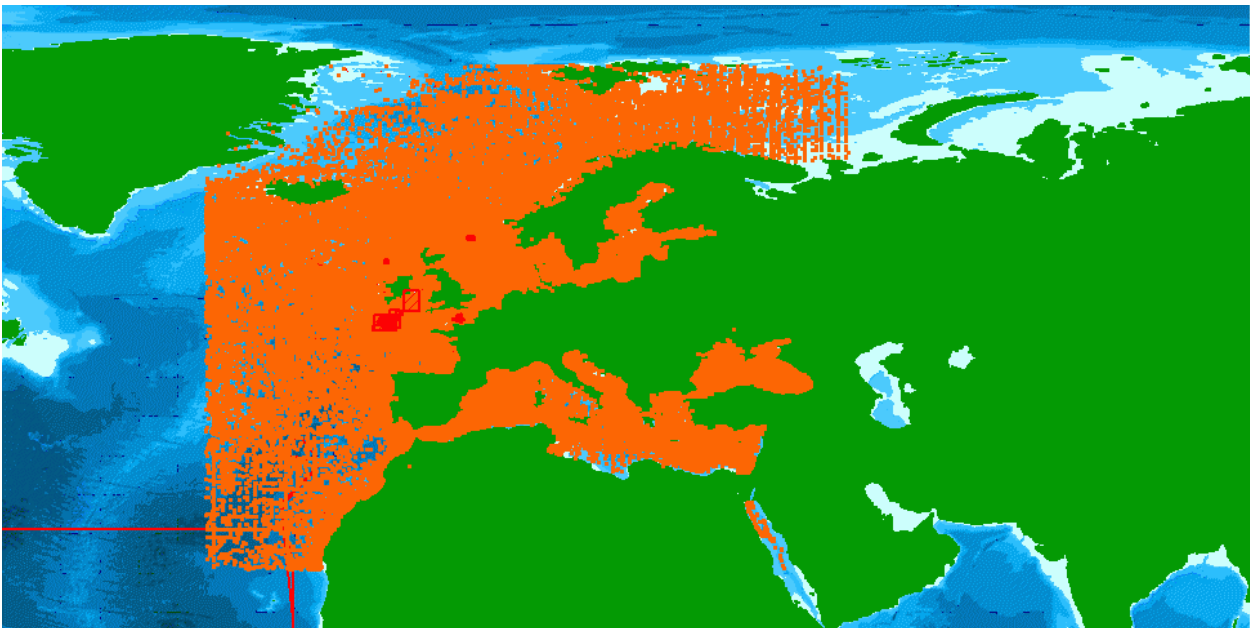
The total number of CDIs for chemistry data sets has increased from: **847981 to 865281**.

This covers the whole globe. Specifically relevant for European waters have increased from:

741779 to 758232.

Lat Long box: **N80, W-30; N20, E45**

Of these **636771** are unrestricted (unrestricted and SeaDataNet license), while others (**121461**) require (possible) negotiation due to restrictions.



The division per **Discovery Parameter** at 30th September 2017 is as follows:

Parameter	No of CDIs	No restrictions	Restrictions
Dissolved oxygen parameters in the water column	483486	429118	54368
Salinity of the water column	473554	423854	49700
Temperature of the water column	468062	422103	45959
Phosphate concentration parameters in the water column	336867	287391	49476
Nitrate concentration parameters in the water column	281257	239102	42155
Silicate concentration parameters in the water column	265629	221489	44140
Vertical spatial coordinates	216501	163895	52606
Chlorophyll pigment concentrations in water bodies	216415	193363	23052
Ammonium and ammonia concentration parameters in water bodies	196052	160253	35799
Nitrite concentration parameters in the water column	189746	154649	35097
Alkalinity, acidity and pH of the water column	112002	83775	28227
Particulate total and organic nitrogen concentrations in the water column	101508	95162	6346
Particulate total and organic phosphorus concentrations in the water column	91776	87925	3851
Dissolved total or organic phosphorus concentration in the water column	84837	72532	12305
Dissolved total and organic nitrogen concentrations in the water column	62855	60394	2461
Density of the water column	59953	56550	3403
Phaeopigment concentrations in the water column	37983	31757	6226
Concentration of suspended particulate material in the water column	34641	23742	10899
Transmittance and attenuation of the water column	30236	27635	2601
Raw fluorometer output	23273	15049	8224
Concentration of inorganic sulphur species in the water column	22394	20707	1687
Particulate total and organic carbon concentrations in the water column	22346	19369	2977
Dissolved organic carbon concentration in the water column	19433	13859	5574
Electrical conductivity of the water column	18945	17887	1058
Inorganic chemical composition of sediment or rocks	18086	9380	8706
Concentration of other hydrocarbons in the water column	15189	14048	1141

Reference numbers	14786	13336	1450
Pesticide concentrations in water bodies	14083	11178	2905
Visible waveband radiance and irradiance measurements in the water column	13302	11322	1980
Moored instrument depth	13205	13174	31
Secchi disk depth	12850	8647	4203
Concentration of polycyclic aromatic hydrocarbons (PAHs) in sediment samples	11597	5535	6062
Concentration of other organic contaminants in the water column	10808	3995	6813
Redox potential in sediment	10204	0	10204
Dissolved metal concentrations in the water column	9506	7278	2228
Concentration of polychlorobiphenyls (PCBs) in sediment samples	8718	3960	4758
Metal concentrations in biota	8660	3092	5568
Dissolved inorganic nitrogen concentration in the water column	8582	3723	4859
Pollution events	8134	8134	0
Carbon concentrations in sediment	8102	1709	6393
Quality control flags	7622	6846	776
Sediment grain size parameters	7071	5280	1791
Concentration of polychlorobiphenyls (PCBs) in biota	6427	1356	5071
Nitrogen concentrations in suspended particulate material	6285	2624	3661
Carbon concentrations in suspended particulate material	5941	2037	3904
Raw temperature and/or salinity instrument output	5295	1803	3492
Pesticide concentrations in sediment	5289	3919	1370
Concentration of other organic contaminants in sediment samples	5272	4825	447
Raw oxygen sensor output	5250	1822	3428
Variable fluorescence parameters	5012	3607	1405
Optical backscatter	4532	1954	2578
Pesticide concentrations in biota	4222	1887	2335
Sound velocity and travel time in the water column	4040	3978	62
Raw light meter output	3819	1155	2664
Date and time	3754	3435	319
Carotenoid and flavenoid pigment concentrations in water bodies	3666	1439	2227
Sea level	3329	696	2633
Temperature variation in the water column	3312	3312	0

Metal concentrations in sediment pore waters	3239	2708	531
Nitrogen concentrations in sediment	3198	2155	1043
Metadata parameters	3088	2304	784
Concentration of polycyclic aromatic hydrocarbons (PAHs) in the water column	3070	2327	743
Unspecified	2957	2565	392
Total metal concentrations in water bodies	2676	1350	1326
Concentration of polycyclic aromatic hydrocarbons (PAHs) in biota	2651	891	1760
Radioactivity in water bodies	2609	1375	1234
Light absorption in the water column	2577	1624	953
Unclassified pigment concentrations in the water column	2500	273	2227
Organometallic and organometalloid species concentration parameters in sediments	2300	2007	293
Particulate metal concentrations in the water column	2229	1123	1106
Concentration of organic matter in sediments	2076	1125	951
Raw suspended particulate material concentration sensor output	1979	1849	130
Concentration of other organic contaminants in biota	1797	113	1684
Concentration of carbohydrates, phenols, alkanols (alcohols), ethers, aldehydes and ketones in sediment	1743	831	912
Organometallic species concentration parameters in biota	1673	1607	66
Horizontal spatial co-ordinates	1652	1574	78
Lithology	1619	599	1020
Concentration of polychlorobiphenyls (PCBs) in the water column	1517	1153	364
Dissolved concentration parameters for other gases in the water column	1409	844	565
Concentration of polycyclic aromatic hydrocarbons (PAHs) in suspended particulate material	1051	1051	0
Primary production in the water column	1021	651	370
Urea concentration parameters in the water column	1013	704	309
Sedimentary structure	921	0	921
Biota lipid concentrations	884	577	307
SeaDataNet biological format biotic parameters	759	641	118
Concentration of organic matter in water bodies	755	711	44
Sediment water content, porosity and surface area	695	648	47
Suspended particulate material grain size parameters	669	114	555
Horizontal velocity of the water column (currents)	660	660	0

Concentration of other organic contaminants in suspended particulate material	648	648	0
Light extinction and diffusion coefficients	634	0	634
Dissolved trace metalloid and inorganic selenium concentrations in water bodies	538	346	192
Geological sample radioactivity	515	451	64
Total dissolved inorganic carbon (TCO ₂) concentration in the water column	480	366	114
Phosphorus concentrations in suspended particulate material	399	83	316
Stable isotopes in sediment	381	0	381
Visible waveband radiance and irradiance measurements in the atmosphere	339	205	134
Bacteria taxonomic abundance in water bodies	333	0	333
Terrestrial detritus in the water column suspended particulate material	322	322	0
Phytoplankton taxonomic abundance in water bodies	317	317	0
Concentration of alkanes in the water column	316	316	0
Surfactant concentrations in water bodies	297	297	0
Trace metalloid concentrations in biota	294	260	34
Bacteria generic abundance in water bodies	293	257	36
Carbonate chemistry in sediment pore waters	285	120	165
Acoustic backscatter in the water column	283	283	0
Mineralogical composition	254	0	254
Phaeopigment concentrations in sediment	244	228	16
Water body redox potential	231	231	0
Concentration of carbohydrates, phenols, alkanols (alcohols), aldehydes and ketones in water bodies	194	194	0
Concentration of proteins in the water column	194	194	0
Zooplankton and zoobenthos morphological parameters	185	185	0
Concentration of inorganic halogens in water bodies	168	168	0
Concentration of polychlorobiphenyls (PCBs) in suspended particulate material	163	163	0
Other halocarbon concentrations in water bodies	156	83	73
Nutrient concentrations in sediment pore waters	151	120	31
Shellfish morphology, age and physiology	148	82	66
Regenerated production in water bodies	144	144	0
Raw in-situ nutrient analyser output	143	143	0
New production in water bodies	142	142	0
Sediment lipid concentrations	137	121	16

Chlorophyll pigment concentrations in sediment	136	120	16
Dissolved organic carbon concentrations in sediment pore waters	136	120	16
Oxygen production and respiration in the water column	136	136	0
Concentration of aliphatic hydrocarbons in sediment samples	133	13	120
Other physical and chemical properties of suspended particulate material	132	132	0
Concentration of inorganic sulphur species in sediment	131	46	85
Colloidal organic carbon concentration in the water column	100	100	0
Geological sample density	80	0	80
Organosulphur and organoselenium species concentration parameters in water bodies	76	76	0
Radioactivity in biota	64	64	0
Bacteria non taxonomy-related biomass expressed as carbon per unit volume of the water column	63	0	63
Excretion rate parameters in the water column	58	58	0
Nitrification rate in the water column	57	57	0
Organometallic and organometalloid species concentration parameters in water bodies	55	42	13
Atmospheric humidity	51	4	47
Stable isotopes in water bodies	46	20	26
Phytoplankton generic abundance in water bodies	41	5	36
Concentration of adenylates in the water column	38	38	0
Fish morphology, age and physiology	38	38	0
Bacterial production in the water column	36	0	36
Phytoplankton generic biomass in water bodies	36	0	36
Geotechnics	32	32	0
Water body lipid concentrations	32	32	0
Air pressure	28	28	0
Air temperature	27	27	0
Plankton biomass expressed as carbon per unit volume of the water column	27	0	27
Wind strength and direction	27	27	0
Concentration of silicon species in the water column	24	9	15
Horizontal platform movement	24	24	0
Wave direction	23	23	0
Wave height and period statistics	23	23	0
Geological sample magnetic, electrical and acoustic properties	22	0	22

Sediment accumulation rate	22	0	22
Phytoplankton taxonomic biomass in water bodies	20	20	0
Chlorofluorocarbon concentrations in the water column	16	16	0
Vertical platform movement	11	11	0
Water body released tracers	11	11	0
Bathymetry and Elevation	10	10	0
Solar Radiation	6	6	0
Concentration of inorganic halogens in sediment pore waters	5	0	5
Concentration of inorganic sulphur species in sediment pore water	5	0	5
Platform or instrument orientation	4	4	0
Dissolved oxygen parameters for sediments	1	1	0
Engineering parameters	1	1	0
Sediment age	1	0	1

Indicator 2 - Organisations supplying each type of data based on (formal) sharing agreements and broken down into country and organisation type (e.g. government, industry, science)

Data provider	Country	No of CDIs	No restrictions	Restrictions
British Oceanographic Data Centre	United Kingdom	65723	39525	26198
German Oceanographic Datacentre (NODC)	Germany	18444	14637	3807
OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), Division of Oceanography	Italy	49935	24215	25720
CNR, Institute of Marine Science U.O.S. of Pozzuolo di Lerici (SP)	Italy	484	1	483
CNR, Institute of Marine Science (ISMAR) - Ancona	Italy	3077	50	3027
CNR, Institute of Atmospheric Sciences and Climate (ISAC) (Rome)	Italy	552	552	0
Institute of Fishery Resources (IFR)	Bulgaria	257	257	0
Institute of Meteorology and Water Management National Research Institute, Maritime Branch in Gdynia (IMWM MB)	Poland	2726	0	2726
Hellenic Centre for Marine Research, Hellenic National Oceanographic Data Centre (HCMR/HNODC)	Greece	11120	6829	4291
IEO/Spanish Oceanographic Institute	Spain	16101	6686	9415
Marine Institute	Ireland	324	324	0
Flanders Marine Institute	Belgium	3534	2736	798
IFREMER / IDM / SISMER - Scientific Information Systems for the SEA	France	34804	34581	223
Swedish Meteorological and Hydrological Institute	Sweden	63257	63187	70
IHPT, Hydrographic Institute	Portugal	3974	3037	937
Polish Geological Institute - National Research Institute, Branch of Marine Geology (PGI BMG)	Poland	326	0	326
Institute of Marine Research - Norwegian Marine Data Centre (NMD)	Norway	34578	34578	0

NIOZ Royal Netherlands Institute for Sea Research	Netherlands	3958	3944	14
Netherlands Institute for Ecology, Centre for Estuarine and Marine Ecology	Netherlands	12894	2145	10749
All-Russia Research Institute of Hydrometeorological Information - World Data Centre (RIHMI-WDC) National Oceanographic Data Centre (NODC)	Russian Federation	51885	51885	0
P.P.Shirshov Institute of Oceanology, RAS	Russian Federation	876	876	0
National Institute of Fisheries Research (INRH)	Morocco	552	0	552
Bulgarian National Oceanographic Data Centre(BGODC), Institute of Oceanology	Bulgaria	1209	1158	51
Iv.Javakhishvili Tbilisi State University, Centre of Relations with UNESCO Oceanological Research Centre and GeoDNA (UNESCO)	Georgia	527	527	0
Institute of Marine Sciences, Middle East Technical University	Turkey	7641	1304	6337
National Institute for Marine Research and Development "Grigore Antipa"	Romania	8042	3000	5042
Latvian Institute of Aquatic Ecology	Latvia	3592	3592	0
Institute of Oceanography and Fisheries	Croatia	2233	2233	0
International Ocean Institute - Malta Operational Centre (University Of Malta) / Physical Oceanography Unit	Malta	128	128	0
Cyprus Oceanography Center	Cyprus	580	580	0
Marine Systems Institute at Tallinn University of Technology	Estonia	17639	17639	0
State Oceanographic Institute (SOI)	Russian Federation	7188	0	7188
Marine Hydrophysical Institute	Ukraine	4652	2058	2594
Aarhus University, Department of Bioscience, Marine Ecology Roskilde	Denmark	193120	193120	0
International Council for the Exploration of the Sea (ICES)	Denmark	27761	27761	0
Karadeniz Technical University, Faculty of Marine Sciences	Turkey	246	29	217
Sinop University, Fisheries Faculty	Turkey	343	343	0

Dokuz Eylul University, Institute of Marine Science and Technology	Turkey	1603	0	1603
Istanbul University, Institute of Marine Science and Management	Turkey	339	171	168
Institute of Biology of the Southern Seas, NAS of Ukraine	Ukraine	998	998	0
Ukrainian Hydrometeorological Institute - Marine Branch	Ukraine	26089	26089	0
Russian State Hydrometeorological University, St-Petersburg	Russian Federation	172	172	0
National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences	Bulgaria	839	602	237
Israel Oceanographic and Limnological Research (IOLR)	Israel	3956	3623	333
BRGM / Office of Geological and Mining Resources	France	1087	0	1087
Finnish Environment Institute	Finland	11498	11498	0
Ukrainian scientific center of Ecology of Sea (UkrSCES)	Ukraine	5345	5345	0
Odessa National I.I.Mechnikov University	Ukraine	889	25	864
National Institute of Biology - NIBMarine Biology Station	Slovenia	7460	3569	3891
Institut National des Sciences et Technologies de la Mer – INSTM	Tunisia	860	21	839
Scientific - Research Firm "GAMMA"	Georgia	1194	1194	0
Rijkswaterstaat Water, Traffic and Environment	Netherlands	13197	13197	0
Institute of Geology and Geography of Nature Research Centre	Lithuania	212	212	0
Management Unit of North Sea and Scheldt Estuary Mathematical Models, Belgian Marine Data Centre	Belgium	9268	9268	0
Geological Survey of Estonia	Estonia	542	542	0
Finnish Meteorological Institute	Finland	7985	7985	0
Ankara University	Turkey	24	24	0
Danube Hydro-meteorological Observatory	Ukraine	44	0	44
Faculty of Geography and Earth Sciences, University of Latvia (LU)	Latvia	721	0	721

National Environmental Agency of the Ministry of Environment Protection and Natural Resources	Georgia	62	62	0
Institute of Marine Biology (IMBK)	Montenegro	644	597	47
ISPRA-Institute for Environmental Protection and Research	Italy	3761	3761	0
PANGAEA - Data Publisher for Earth & Environmental Science	Germany	4242	4242	0
Portuguese Institute of Ocean and Atmosphere	Portugal	919	57	862
Total		758232	636771	121461

These centres are government and research institutes. No industry.

Difference between 1 July 2017 and 30 September 2017:

Data provider	Country	No of CDIs	No restrictions	Restrictions
British Oceanographic Data Centre	United Kingdom	2800	3585	-785
German Oceanographic Datacentre (NODC)	Germany	0	0	0
OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), Division of Oceanography	Italy	0	0	0
CNR, Institute of Marine Science U.O.S. of Pozzuolo di Lerici (SP)	Italy	0	0	0
CNR, Institute of Marine Science (ISMAR) - Ancona	Italy	103	49	54
CNR, Institute of Atmospheric Sciences and Climate (ISAC) (Rome)	Italy	299	299	0
Institute of Fishery Resources (IFR)	Bulgaria	0	0	0
Institute of Meteorology and Water Management National Research Institute, Maritime Branch in Gdynia (IMWM MB)	Poland	0	0	0
Hellenic Centre for Marine Research, Hellenic National Oceanographic Data Centre (HCMR/HNODC)	Greece	0	0	0
IEO/Spanish Oceanographic Institute	Spain	7	0	7
Marine Institute	Ireland	0	0	0
Flanders Marine Institute	Belgium	0	0	0
IFREMER / IDM / SISMER - Scientific Information Systems for the SEA	France	482	482	0
Swedish Meteorological and Hydrological Institute	Sweden	898	898	0
IHPT, Hydrographic Institute	Portugal	0	0	0
Polish Geological Institute - National Research Institute, Branch of Marine Geology (PGI BMG)	Poland	0	0	0
Institute of Marine Research - Norwegian Marine Data Centre (NMD)	Norway	0	0	0
NIOZ Royal Netherlands Institute for Sea Research	Netherlands	0	0	0
Netherlands Institute for Ecology, Centre for Estuarine and Marine Ecology	Netherlands	0	0	0
All-Russia Research Institute of Hydrometeorological Information - World	Russian Federation	411	411	0

Data Centre (RIHMI-WDC) National Oceanographic Data Centre (NODC)				
P.P.Shirshov Institute of Oceanology, RAS	Russian Federation	30	30	0
National Institute of Fisheries Research (INRH)	Morocco	0	0	0
Bulgarian National Oceanographic Data Centre(BGODC), Institute of Oceanology	Bulgaria	116	116	0
Iv.Javakhishvili Tbilisi State University, Centre of Relations with UNESCO Oceanological Research Centre and GeodNA (UNESCO)	Georgia	22	22	0
Institute of Marine Sciences, Middle East Technical University	Turkey	314	0	314
National Institute for Marine Research and Development "Grigore Antipa"	Romania	1191	0	1191
Latvian Institute of Aquatic Ecology	Latvia	133	133	0
Institute of Oceanography and Fisheries	Croatia	0	0	0
International Ocean Institute - Malta Operational Centre (University Of Malta) / Physical Oceanography Unit	Malta	0	0	0
Cyprus Oceanography Center	Cyprus	0	0	0
Marine Systems Institute at Tallinn University of Technology	Estonia	275	275	0
State Oceanographic Institute (SOI)	Russian Federation	0	0	0
Marine Hydrophysical Institute	Ukraine	0	0	0
Aarhus University, Department of Bioscience, Marine Ecology Roskilde	Denmark	7893	7893	0
International Council for the Exploration of the Sea (ICES)	Denmark	554	554	0
Karadeniz Technical University, Faculty of Marine Sciences	Turkey	0	0	0
Sinop University, Fisheries Faculty	Turkey	0	0	0
Dokuz Eylul University, Institute of Marine Science and Technology	Turkey	0	0	0
Istanbul University, Institute of Marine Science and Management	Turkey	0	0	0
Institute of Biology of the Southern Seas, NAS of Ukraine	Ukraine	0	0	0
Ukrainian Hydrometeorological Institute - Marine Branch	Ukraine	0	0	0

Russian State Hydrometeorological University, St-Petersburg	Russian Federation	0	0	0
National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences	Bulgaria	0	0	0
Israel Oceanographic and Limnological Research (IOLR)	Israel	0	0	0
BRGM / Office of Geological and Mining Resources	France	0	0	0
Finnish Environment Institute	Finland	620	620	0
Ukrainian scientific center of Ecology of Sea (UkrSCES)	Ukraine	278	278	0
Odessa National I.I.Mechnikov University	Ukraine	0	0	0
National Institute of Biology - NIBMarine Biology Station	Slovenia	28	157	-129
Institut National des Sciences et Technologies de la Mer – INSTM	Tunisia	-1	0	-1
Scientific - Research Firm "GAMMA"	Georgia	0	0	0
Rijkswaterstaat Water, Traffic and Environment	Netherlands	0	0	0
Institute of Geology and Geography of Nature Research Centre	Lithuania	0	0	0
Management Unit of North Sea and Scheldt Estuary Mathematical Models, Belgian Marine Data Centre	Belgium	0	0	0
Geological Survey of Estonia	Estonia	0	0	0
Finnish Meteorological Institute	Finland	0	0	0
Ankara University	Turkey	0	0	0
Danube Hydro-meteorological Observatory	Ukraine	0	0	0
Faculty of Geography and Earth Sciences, University of Latvia (LU)	Latvia	0	0	0
National Environmental Agency of the Ministry of Environment Protection and Natural Resources	Georgia	0	0	0
Institute of Marine Biology (IMBK)	Montenegro	0	0	0
ISPRA-Institute for Environmental Protection and Research	Italy	0	0	0
PANGAEA - Data Publisher for Earth & Environmental Science	Germany	0	0	0
Portuguese Institute of Ocean and Atmosphere	Portugal	0	0	0
		16453	15802	651

Indicator 3 - Organisations that have been approached to supply data with no result, including type of data sought and reason why it has not been supplied

Nothing to report

Indicator 4 - Volume of each type of data and of each data product downloaded from the portal

Time period 1 July 2017 – 30 September 2017:

RSM => EMODNet Chemistry portal

No of CDI basket transactions: 18

No of CDIs requested: 35185

Different users: 7

Different data centres: 14

Time period 1 July 2017 – 30 September 2017:

RSM => Chemistry data sets ordered through SeaDataNet portal

No of CDI basket transactions: 98

No of CDIs requested: 38130

Different users: 33

Different data centres: 36

	Atlantic Sea	Baltic Sea	Black Sea	Mediterranean Sea	North Sea
water body ammonium	1053	342	484	391	849
water body chlorophyll-a	272	865	205	1016	72
water body dissolved oxygen	480	409	897	314	24
water body nitrate	0	38	321	1895	3692
water body nitrate plus nitrite	87	975	59	24	0
water body nitrite	0	0	0	55	0
water body ph	0	0	0	1259	0
water body phosphate	275	465	1392	666	331
water body silicate	0	316	712	0	19
water body total nitrogen	0	0	0	0	120
water body total phosphorus	0	0	0	12	41

DIVA maps visualization via the WMS server.

	Atlantic Sea	Baltic Sea	Black Sea	Mediterranean Sea
water body ammonium	7	0	0	3
water body chlorophyll-a	2	0	1	0
water body dissolved oxygen	2	1	4	0
water body ph	0	0	0	2
water body phosphate	1	0	0	0

Download of the DIVA products

Dynamic downloads using WPS via Oceanbrowser				
P35 description	P35label	Month	Year	Number of requests
Water body phosphate	EPC00007	Jul	2017	344
Water body nitrate plus nitrite	EPC00005	Jul	2017	0
Water body ammonium	EPC00009	Jul	2017	0
Water body silicate	EPC00008	Jul	2017	0
Water body nitrite	EPC00006	Jul	2017	74
Water body total phosphorus	EPC00135	Jul	2017	18
Water body total nitrogen	EPC00134	Jul	2017	20
Water body nitrate	EPC00004	Jul	2017	41
Water body phosphate	EPC00007	Aug	2017	249
Water body nitrate plus nitrite	EPC00005	Aug	2017	0
Water body ammonium	EPC00009	Aug	2017	0
Water body silicate	EPC00008	Aug	2017	0
Water body nitrite	EPC00006	Aug	2017	52
Water body total phosphorus	EPC00135	Aug	2017	0
Water body total nitrogen	EPC00134	Aug	2017	0
Water body nitrate	EPC00004	Aug	2017	0
Water body phosphate	EPC00007	Sep	2017	173
Water body nitrate plus nitrite	EPC00005	Sep	2017	0
Water body ammonium	EPC00009	Sep	2017	0
Water body silicate	EPC00008	Sep	2017	249
Water body nitrite	EPC00006	Sep	2017	0
Water body total phosphorus	EPC00135	Sep	2017	0
Water body total nitrogen	EPC00134	Sep	2017	0
Water body nitrate	EPC00004	Sep	2017	24

Indicator 5 - Organisations that have downloaded each data type

From CDI service:

name	organisation	country
Elena Kostopoulou	?	Greece
Laurent Coppola	CNRS	France
Lydie DENIS	ACRI-HE	France
Ms Leda Pecci	ENEA	Italy
Menashe ELIEZER	OGS	Italy
Mr Matteo VINCI	IN-OGS	Italy
Tiago Santos	Cefas	United Kingdom

From RSM => Chemistry data sets ordered through SeaDataNet portal

name	organisation	country
Mrs Liesbeth Lyssens	VLIZ	Belgium
Alexander Mikheev	RIHMI-WDC	Russian Federation
Mirco Scharfe	AWI	Germany
Mr Örjan Bäck	SMHI	Sweden
Mrs Vanessa TOSELLO	IFREMER	France
Sonja Wanke	Deltares	Netherlands
Mr Yevgen Ivchenko	UKRSCES	Ukraine
Jie Huang	Tsinghua University	China
Dr Asen Iakimov STEFANOV	IO/BAS	Bulgaria
Eduardo Ramirez	CSIC	Spain
Rob Thomas	Marine Institute	Ireland
Luka Snoj	TC Vode	Slovenia
Dr Taco DE BRUIN	NIOZ	Netherlands
Dr Friedrich Dr. NAST	BSH	Germany
Mr Boris PETELIN	NIB-MBS	Slovenia
Mrs Elena TEL	IEO	Spain
Aikaterini Kikaki	?	Greece
Alex Kraberg	AWI	Germany
Mrs Stéfane Gouzien	ALTRAN	France
Mr Marten Tacoma	NIOZ	Netherlands
Rita POIKANE	Latvian Institute of Aquatic Ecology	Latvia

Denis Horvat	UM	Slovenia
Laurent Coppola	CNRS	France
Maria del Mar Chaves Montero	OGS	Italy
Roberta Russo	Parthenope University	Italy
Mrs VALERIE CARIOU	SHOM	France
Taeyoon Song	KODC	Korea, Republic of
luis polido de souza	Universidade do Vale do Itajaí (univali)	Brazil
Tsuyoshi Wakamatsu	NERSC	Norway
Julia Karagicheva	NIOZ	Netherlands
Mrs Luminita BUGA	NIMRD	Romania
Dr Branko CERMELJ	NATIONAL INSTITUTE OF BIOLOGY	Slovenia
arwen bargery	BODC	United Kingdom

Indicator 6 - Using user statistics to determine the main pages utilised and to identify preferred user navigations routes

Time period 1 July 2017 – 30 September 2017:

Chemistry main portal: <http://www.emodnet-chemistry.eu/>

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jul 2017	303	840	2051	6689	944.10 MB
Aug 2017	348	904	2122	7911	1.15 GB
Sep 2017	326	867	2205	9619	2.38 GB

Chemistry CDI data discovery and access service:

http://emodnet-Chemistry.maris2.nl/v_cdi_v3/search.asp

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jul-17	170	342	5,444	14,577	368.66 MB
Aug-17	314	540	6,345	12,783	253.91 MB
Sep-17	195	404	7,860	17,015	302.32 MB

Chemistry Products – Ocean Browser service: <http://oceanbrowser.net/emodnet/>

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jul 2017	143	315	23741	28885	7.93 GB
Aug 2017	99	248	31370	36583	827.22 MB
Sep 2017	164	414	31218	39446	77.69 GB

Sextant- Products metadata catalogue:

http://sextant.ifremer.fr/en/web/emodnet_chemistry/catalogue#/search?sortBy=popularity&from=1&to=20

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jul 2017	19	56	2319	2975	150.68 MB
Aug 2017	22	60	1393	1754	94.42 MB
Sep 2017	27	144	15639	18592	619.47 MB

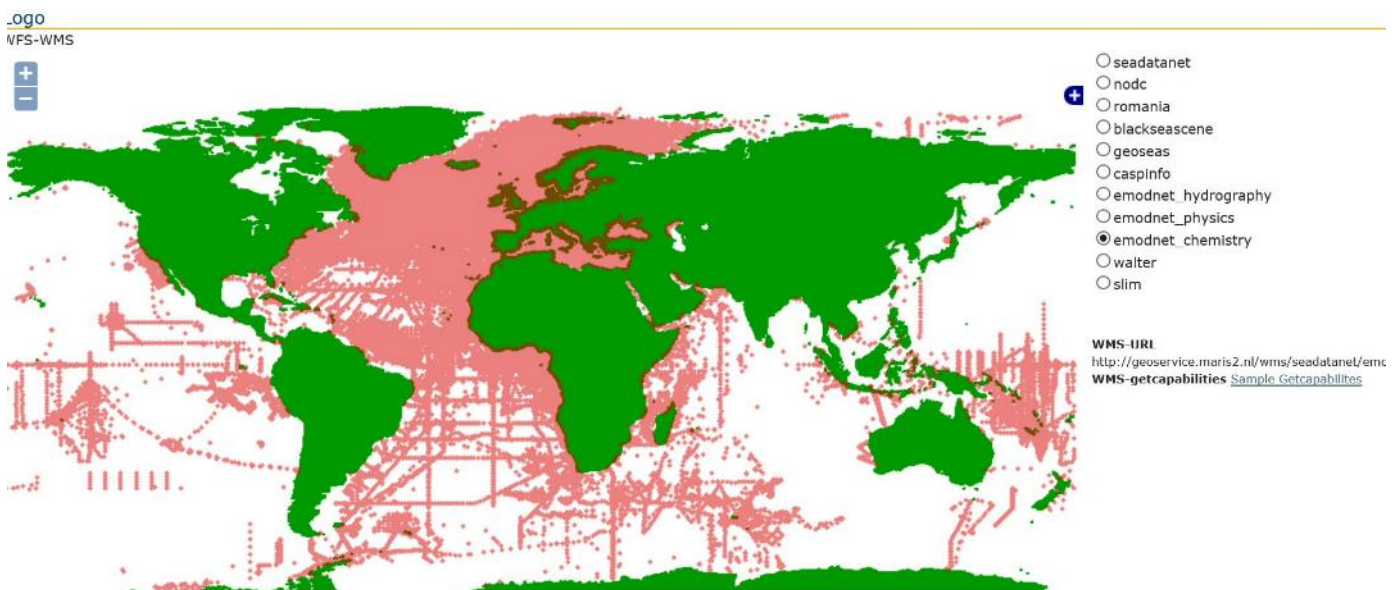
Indicator 7 - List of what the downloaded data has been used for (divided into categories e.g. Government planning, pollution assessment and (commercial) environmental assessment, etc.)

Indicator 8 - List of web-services made available and user organisations connected through these web-services

CDI Data Discovery and Access service:

The CDI service has WMS and WFS services which are used primarily internally and by the OceanBrowser service for providing a layer of CDI entries and option for retrieving CDI metadata:

WMS and WFS service: http://geoservice.maris2.nl/wms/seadatanet/EMODnet_chemistry



Example of EMODnet Chemistry WMS layer for points

GetCapabilities:

http://geoservice.maris2.nl/wms/seadatanet/EMODnet_chemistry?service=WMS&request=GetCapabilities

Note: Getcapabilities indicates what is available. In CDI case it is both WMS and WFS. Implementing WFS is depending on the client and needs programming. We provide WFS request through WMS:

http://geoservice.maris2.nl/wms/seadatanet/EMODnet_chemistry/?LAYERS=points&QUERY_LAYERS=points&STYLES=&SERVICE=WMS&VERSION=1.1.1&REQUEST=GetFeatureInfo&BBOX=-

25.168107%2C39.506018%2C25.808455%2C64.994299&FEATURE_COUNT=10&HEIGHT=290&WIDTH=580&FORMAT=image%2Fpng&INFO_FORMAT=text%2Fhtml&SRS=EPSG%3A4326&X=296&Y=129

with BBox as LON,LAT,LON,LAT for the layer points.

Data product Viewing and Downloading service:

The analysed field generated by DIVA (Data-Interpolating Variational Analysis) can be visualised using the WMS protocol which supports the following requests:

- GetCapabilities

This request is used to provide all layers of the map server. To every parameter and to every region corresponds a different WMS layer. An example of such a request would be:

<http://ec.oceanbrowser.net/EMODnet/Python/web/wms?request=GetCapabilities&service=WMS&version=1.3.0>

- GetMap

This request allows to extract a horizontal section of the 4D NetCDF file at the specified depth and time ([Example URL](#)). Per default, the axis are not displayed on a map. This can be activated by setting the parameter DECORATED to true ([Example URL](#)).

The GetMap can also be used to extract a vertical section ([Example URL](#)). The path of the section is encoded in the SECTION parameter: the longitude and latitude are separated by a comma and the coordinates by the pipe-symbol (|). The x-axis corresponds to the distance in arc degrees along the section (the first point is the origin) and the y-axis in the depth in meters. The parameter RATIO defines the aspect ratio of the vertical section.

Images can be returned in raster (PNG) and vector image formats (SVG, EPS, PDF). They can also be saved as a KML file so that the current layer can be visualized in programs like Google Earth and combined with other information imported in such programs.

By providing multiple time instances, the web map server can also return animation in the WebM or MP4 format using this GetMap request ([Example URL](#)). As the animation are generated dynamically, it usually takes a couple of minutes to create them. The frame rate of the animation is controlled through the parameter rate.

- GetFeatureInfo

This request returns a simple XML file with the underlying value of the analysed field ([Example URL](#)).

However, the WMS standards (in version 1.1.1 and 1.3.0) is not completely adequate for ocean analyses. A WMS allows to represent a data set according a list of different styles. A legend is attributed to each style which for scalar is colorbar. The legend for a given style is represented by a link to an image.

A single legend is used for entire data set (for all depth layers and time instances in particular). However, the ocean is strongly stratified and unique legend does not provide sufficient contrast because the ocean properties at depth are often very different from the properties near the surface. The solution is to make the legend dynamic so that it can be adjusted based on a range of value at a specified depth and time

Dynamic Timeseries visualizations and requests for graphs:

Oceanbrowser uses three different services to enable end users to select, display and evaluate time series and profiles of data of a certain kind of parameter. Oceanbrowser uses the OGC web services WFS and WPS for this purpose. These three services are:

1. WFS get parameters request
2. WFS get locations and features
3. WPS get time series and plot in graph

Basic requests

OGC web services WFS consists of various requests, for WFS these are:

- GetCapabilities
- DescribeFeatureType
- GetFeature

<http://EMODnet02.cineca.it/geoserver/wfs?service=WFS&request=GetCapabilities> yields a capabilities document from the web feature service, or in other words all functionality provided by the services.

DescribeFeatureType describes all features described. In this case 2 services are available. The result of <http://EMODnet02.cineca.it/geoserver/wfs?service=WFS&request=DescribeFeatureType> is displayed in the figure below.

This information can be used to get a certain feature via the GetFeature statement. This GetFeature statement can be completed with a query to filter on geometry and all other available entities (columns in a database) of the type names available.

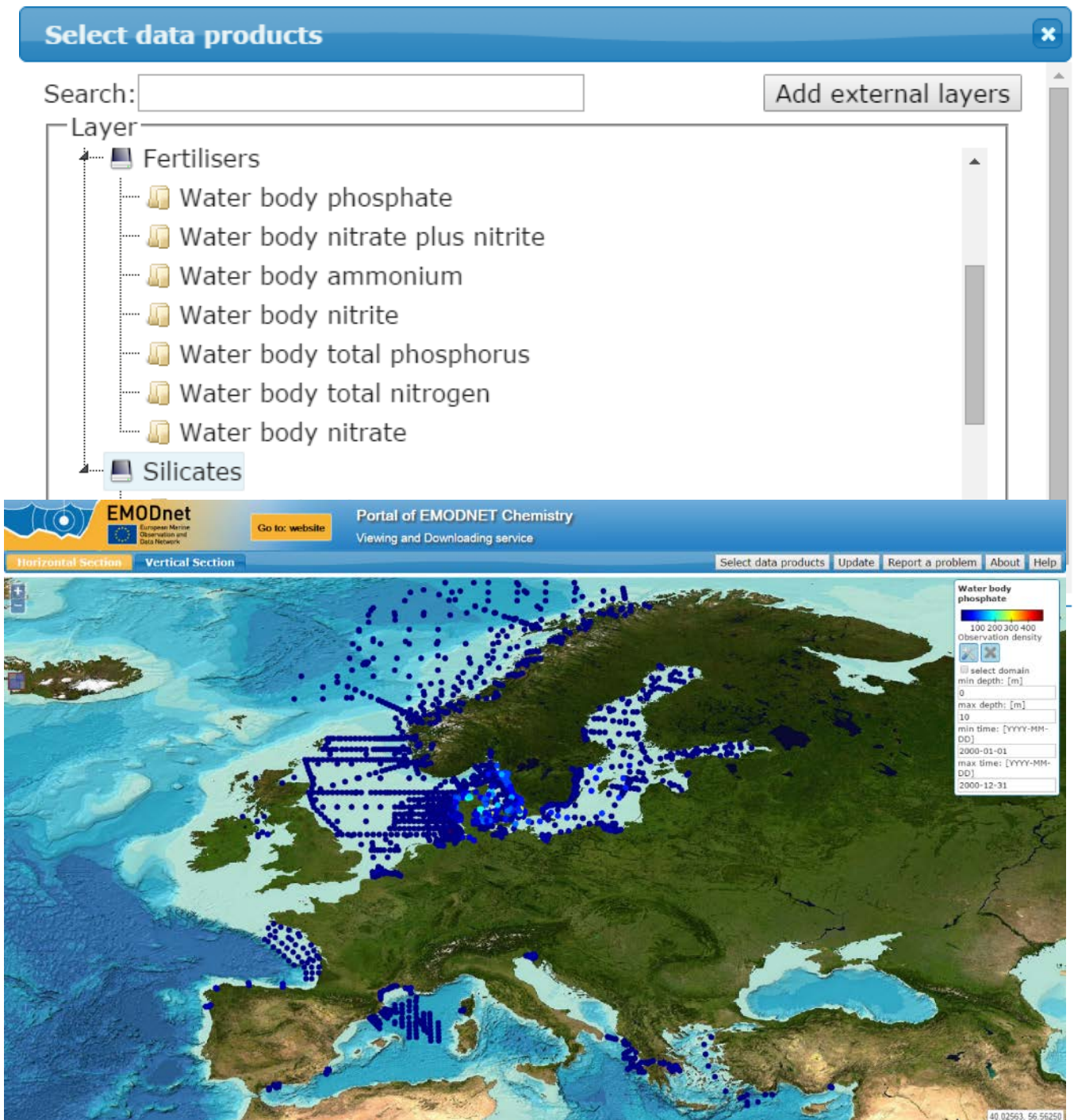
For instance

http://EMODnet02.cineca.it/geoserver/EMODnet/ows?service=WFS&version=1.0.0&request=GetFeature&typeName=EMODnet:p35_used&filter=<PropertyIsEqualTo><PropertyName>EMODnet:p35_id</PropertyName><Literal>EPC00005</Literal></PropertyIsEqualTo> gives the contents of P35_ID EPC00005

Above is used for the first 2 services used by OceanBrowser

1. Getting parameters

The first WFS is a very basic process that returns a table in xml with the list of available parameters. This table is used by OceanBrowser. and displayed as follows:



The screenshot displays the 'Select data products' window in OceanBrowser. At the top, there is a search bar and a button labeled 'Add external layers'. Below this, a list of layers is shown, including 'Fertilisers' and 'Silicates'. Under 'Fertilisers', several sub-layers are listed: 'Water body phosphate', 'Water body nitrate plus nitrite', 'Water body ammonium', 'Water body nitrite', 'Water body total phosphorus', 'Water body total nitrogen', and 'Water body nitrate'. The bottom part of the screenshot shows a map of Europe with a dense distribution of blue monitoring stations. A legend on the right for 'Water body phosphate' shows a color scale from 100 to 400 and includes options for domain, depth, and time.

OceanBrowser: distribution density of monitoring stations.

2. Get locations and features

The Add layer button lets Oceanbrowser constructs a GetFeature request on the second WFS (observed_cindex) layer made available as a service.

OceanBrowser extents the filter with Datetime and BoundingBox. Especially the boundingbox takes care of a limited amount of data transferred. For EMODnet the entire Water body phosphate locations for the link above is visualised through next image.

Image: OceanBrowser

3. Plot time series of certain location

This is done by the OGC WPS that Deltares created to be able to extract data directly from the database. WPS stands for Web Processing Service and acts as middle ware between client side software and server side software. In this case, WPS acts between OceanBrowser and a database with all observations. The above described WFS processes are used to extract information end-users are interested in. By selecting a location, data and metadata extracted from the database can be visualised in the form of a graph. WPS also makes use of:

- getCapabilities (what can you do for me, what processes are available)
- DescribeProcess (how does a process work)
- Execute (execute a process)

getCapabilities

Gives the list of processes available.

<http://EMODnet02.cineca.it/wps?service=wps&version=1.0.0&request=getCapabilities> returns the list of processes.

DescribeProcess

This describes the available processes of the WPS, including the inputs required, their allowable formats, and the outputs that can be produced.

http://EMODnet02.cineca.it/wps?service=wps&version=1.0.0&request=describeProcess&identifier=bbox_plot_timeseries

ExecuteProcess

The execute process is build-up on the user choice which can be found on the right hand side of the OceanBrowser portal. OceanBrowser constructs the entire HTML including the ExecuteProcess statement which triggers the WPS.

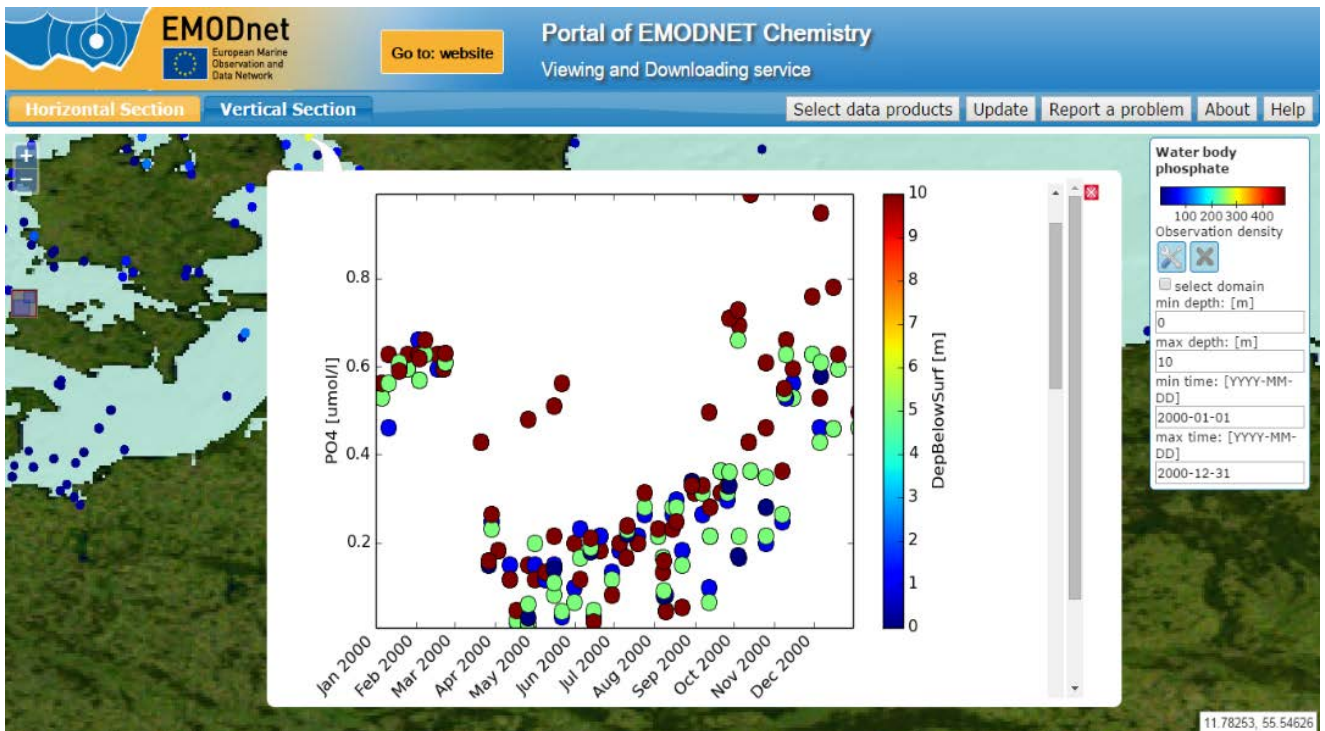


Figure 59. Ocean Browser: time series.

[http://ec.oceanbrowser.net/EMODnet/proxy?url=http://EMODnet02.cineca.it/wps?DataInputs=\[z=ADEPZZ01;zlim1=10;bbox=11.8750340184,11.9848973101,57.6323448275,57.742208087;starttime=2000-01-01T00:00:00Z;endtime=2001-01-01T00:00:00Z;parameter=EPC00007;zlim0=0;log10=0;markersize=12.0;alpha=1\]&service=wps&request=Execute&Identifier=bbox_plot_timeseries&version=1.0.0](http://ec.oceanbrowser.net/EMODnet/proxy?url=http://EMODnet02.cineca.it/wps?DataInputs=[z=ADEPZZ01;zlim1=10;bbox=11.8750340184,11.9848973101,57.6323448275,57.742208087;starttime=2000-01-01T00:00:00Z;endtime=2001-01-01T00:00:00Z;parameter=EPC00007;zlim0=0;log10=0;markersize=12.0;alpha=1]&service=wps&request=Execute&Identifier=bbox_plot_timeseries&version=1.0.0)

Eventually, end-users would like to gain insight in observation distribution for a certain location. OceanBrowser executes the process like the above example and retrieves a timeseries like the next picture.

For the same observation, different flavours can be given (from OceanBrowser). The following is a profile call, triggered from the OceanBrowser:

[http://ec.oceanbrowser.net/EMODnet/proxy?url=http://EMODnet02.cineca.it/wps?DataInputs=\[z=ADEPZZ01;zlim1=10;bbox=11.8750340184,11.9848973101,57.6323448275,57.742208087;starttime=2000-01-01T00:00:00Z;endtime=2001-01-01T00:00:00Z;parameter=EPC00007;zlim0=0;log10=0;markersize=12.0;alpha=1\]&service=wps&request=Execute&Identifier=bbox_plot_profile&version=1.0.0](http://ec.oceanbrowser.net/EMODnet/proxy?url=http://EMODnet02.cineca.it/wps?DataInputs=[z=ADEPZZ01;zlim1=10;bbox=11.8750340184,11.9848973101,57.6323448275,57.742208087;starttime=2000-01-01T00:00:00Z;endtime=2001-01-01T00:00:00Z;parameter=EPC00007;zlim0=0;log10=0;markersize=12.0;alpha=1]&service=wps&request=Execute&Identifier=bbox_plot_profile&version=1.0.0)

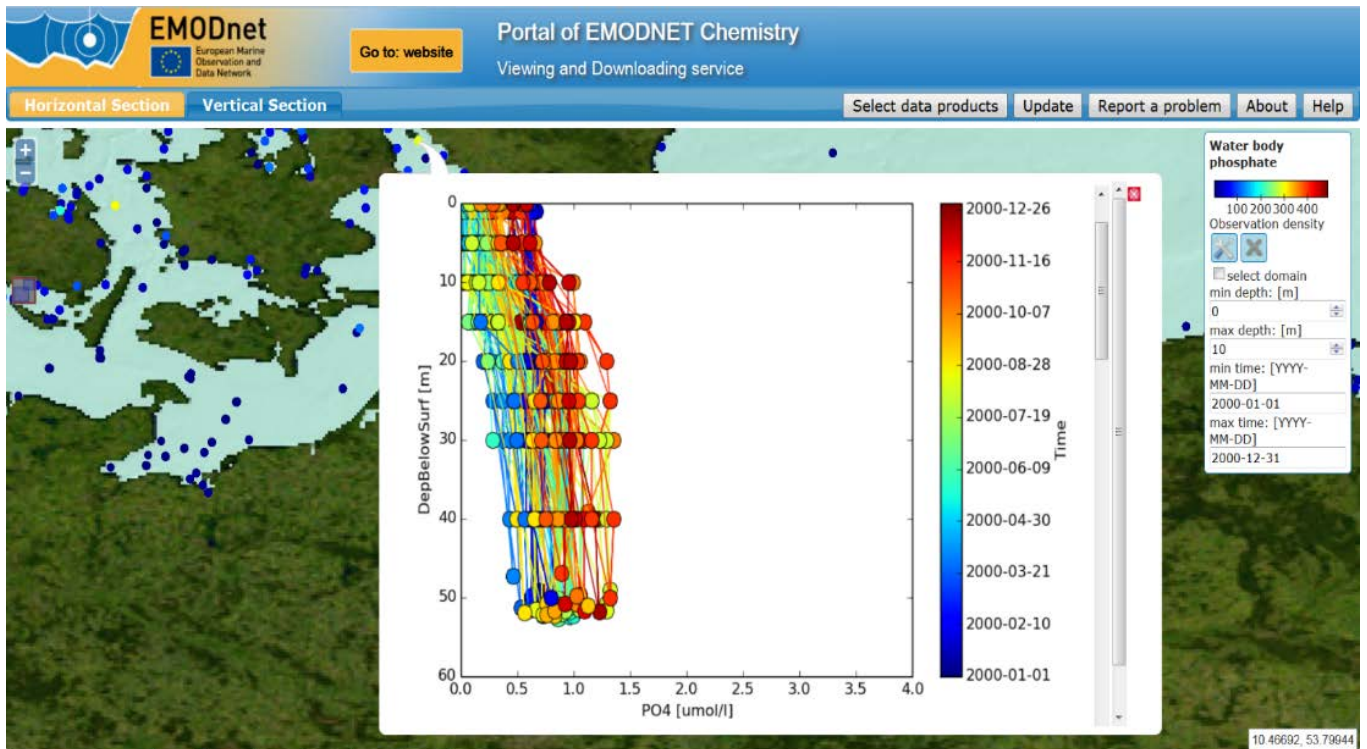


Figure 60. Ocean Browser: temporal profiles.

The output is:

Together with a picture, a list of EDMO codes, LOCAL_CDI's and links to the data shopping of the used observation is provided. For instance, this is a part of the list generated in OceanBrowser for the profile above:

- 🔗 EDMO code: 729 - local CDI: [Vand 111095](#)
- 🔗 EDMO code: 729 - local CDI: [Vand 111096](#)
 - 🔗 EDMO code: 729 - local CDI: [Vand 111097](#)
 - ...
 - 🔗 EDMO code: 729 - local CDI: [Vand 111121](#)
 - ...

Annex X

List in annex if you wish to provide any additional information