# EMODnet Thematic Lot n° 4 - Chemistry

## Proposal for gathering and managing data sets on marine micro-litter on a European scale

F. Galgani, A. Giorgetti, M. Vinci, M. Le Moigne, G. Moncoiffe, A. Brosich, E. Molina, M. Lipizer, N. Holdsworth, R. Schlitzer, G. Hanke, D. Schaap, A. Addamo

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# Background

As part of the 3$^{rd}$ phase of EMODnet Chemistry the scope of attention has been expanded with gathering data and developing access to data and data products for Marine Litter. This document gives background information about EMODnet, its synergy with SeaDataNet and achievements of EMODnet Chemistry so far. Thereafter it gives the scope of the EMODnet Chemistry 3 project and in particular a proposal for gathering and managing data sets on **micro-litter** by EMODnet Chemistry partners on a European scale.

The Technical Subgroup on Marine Litter (TSG ML) reviewed the proposal and provided feedback for refinement that were followed to update the present document.

## EMODnet

The European Marine Observation and Data Network (EMODnet) is a long term marine data initiative from EU DG MARE as part of the Marine Knowledge 2020 strategy. The EMODnet data infrastructure is developed since 2008 through a stepwise approach in three major phases. Currently EMODnet has started the 3rd phase of development and more than 160 organisations work together to assemble marine data from diverse sources and resources in order to make them more accessible and interoperable. Part of their work involves building gateways to national, regional or thematic repositories and creating products based on these data.

The EMODnet members are national and regional marine and oceanographic data repositories and data management experts from Europe. They have arrangements and infrastructures in place at national, international and European level for providing long term stewardship and access to marine and oceanographic data collected by research, monitoring and survey programmes from more than a thousand data originators from public, research and private sectors.

EMODnet provides access to European marine data across seven discipline-based themes: bathymetry, geology, physics, chemistry, biology, seabed habitats and human activities. For each of these themes, EMODnet has created a portal giving users access to standardised observations, data quality indicators and processed data products, such as basin-scale maps. These data products are free to access and use. The EMODnet development is a dynamic process so new data, products and functionality are added regularly while portals are continuously improved to make the service more fit for purpose and user friendly with the help of users and stakeholders.

## Synergy between EMODnet and  SeaDataNet

The first steps for developing a pan-European infrastructure for marine and ocean data management were undertaken with support of the EU DG RTD since early 2000, in a range of consecutive projects (Sea-Search, SeaDataNet, SeaDataNet II, and currently SeaDataCloud). Through these projects, a consortium of oceanographic data centers in Europe has been actively developing the SeaDataNet pan-European infrastructure for managing, indexing and providing access to ocean and marine data sets and data products, acquired from research cruises and other observational activities in European marine waters and global oceans.

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The core partners of SeaDataNet are National Oceanographic Data Centres (NODCs), and marine information services of major research institutes, from 35 coastal states bordering the European seas, complemented with IT experts, and a number of international organisations (IOC-IODE, ICES and EU JRC). SeaDataNet develops and maintains standards, tools and services for ocean and marine data management which are promoted widely and taken up by many projects and initiatives.

SeaDataNet works closely together with EuroGOOS and Copernicus Marine Environmental Monitoring Service (CMEMS) for operational oceanography, EurOBIS for marine biology, and several other leading marine data infrastructures in Europe. Moreover SeaDataNet promotes international adoption and interoperability with leading USA and Australia marine data infrastructures, through the IOC-IODE and ICES networks and the Ocean Data Interoperability Platform (ODIP) project.

From the start of EMODnet in 2008, a close cooperation and synergy was established between SeaDataNet and EMODnet and several EMODnet thematic portals have adopted and adapted SeaDataNet standards and services. This has given EMODnet instant momentum and driven wider uptake of SeaDataNet standards and services by a range of marine data centres.
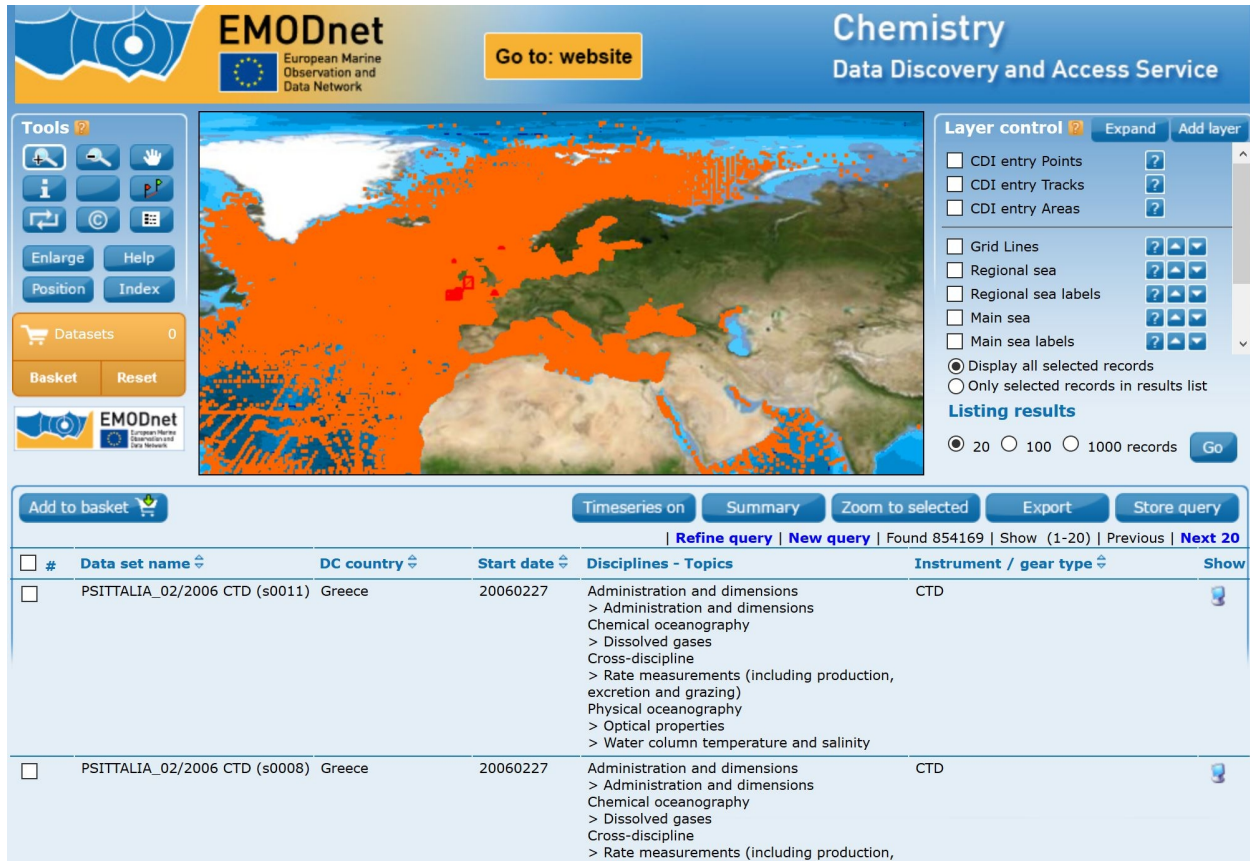
A core SeaDataNet service is the **Common Data Index (CDI) Data Discovery and Access service**. The CDI metadata model is based upon the ISO 19115 – 19139 metadata standards, supported by SeaDataNet Controlled Vocabularies, and INSPIRE compliant. The CDI service gives users a highly detailed insight in the availability and geographical spreading of measurement data sets that are acquired and managed by an increasing group of data providers. The CDI service has a central catalogue service, while access to the linked data sets is facilitated for users by a shopping basket mechanism. To populate the CDI service data centres have to prepare CDI metadata entries and convert their data local files to the SeaDataNet ODV standard format. This way all marine data sets can be delivered to users in a homogeneous way with syntax standards for metadata and data formats, and semantic standards for attributes such as parameters, platforms, sea regions, research vessels, etc. The ODV data files also include SeaDataNet quality flags as all engaged data centres perform QA-QC on incoming data as part of their regular process of curation and long term storage. At present more than 100 data centers from countries around the European seas are connected and more than 1.9 million CDI entries are included.

## EMODnet Chemistry achievements so far

The EMODnet Chemistry consortium started in 2008 and successfully worked on gathering data sets, and developing and providing access to harmonised data collections and spatially interpolated maps concerning measurements of concentration of chemicals in seawater, sediments and biota. A major challenge has been to manage the heterogeneity, complexity and large volume of the gathered datasets and to process these into harmonised data products for all European sea regions.

All partners gathered relevant marine chemistry data sets (with a focus on eutrophication and contaminants), collected by marine environmental monitoring activities and by scientific research activities, and populated these in the SeaDataNet Common Data Index (CDI) Data Discovery and Access service. At the beginning, in 2009, the CDI service contained already circa 250.000 CDI entries for chemistry data sets for European marine waters. Over the duration of the 2 consecutive EMODnet Chemistry projects and by concentrated efforts, this has increased to more than 700.000

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CDI entries by mid-2016. These are derived from 64 connected data centres, 311 originators and 32 countries, with data spanning from 1868 to 2016.



*Image 1: EMODnet Chemistry CDI Data Discovery and Access service – user interface*

Automated robot harvesting has been performed to deliver regional data collections for nutrients, oxygen, chlorophyll, and contaminants to regional coordinators. Using a common methodology, they have produced **harmonised, aggregated and validated regional data collections** for the 5 major European sea regions. As part of this process, a Data Validation loop has been introduced to identify and correct errors at their local sources. As a next step, **spatially interpolated regional map products** have been computed from the harmonised data collections. Depending on sufficient spatial and temporal data coverage for the regions, maps have been produced for: **Dissolved Oxygen, Nitrate, Phosphate, Nitrate_plus_Nitrite, Silicate, Ammonium, Total Nitrogen, Total Phosphorus, Chlorophyll - *a* and pH**.

Contaminant data (**antifoulants, heavy metals, hydrocarbons, pesticides and biocides, polychlorinated biphenyls, and radionuclides**) cover mainly coastal waters as part of national monitoring and are visualised as harmonised validated timeseries.

All data products (data collections and spatially interpolated maps) have been ingested in dedicated viewing services on the EMODnet Chemistry portal where users can browse and visualise observation densities and (animated) maps of temporal and spatial evolution (also in depth).

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Priority was given to those parameters that are relevant for Member States, Regional Sea Conventions, and EU for assessing the state of the European waters under the Marine Strategy Framework Directive. For that purpose, experts from Regional Sea Conventions, EU (DG MARE, DG Env and EEA) and a number of Member States were engaged in dedicated workshops organised by EMODnet Chemistry for tuning products and discussing their fitness for purpose.
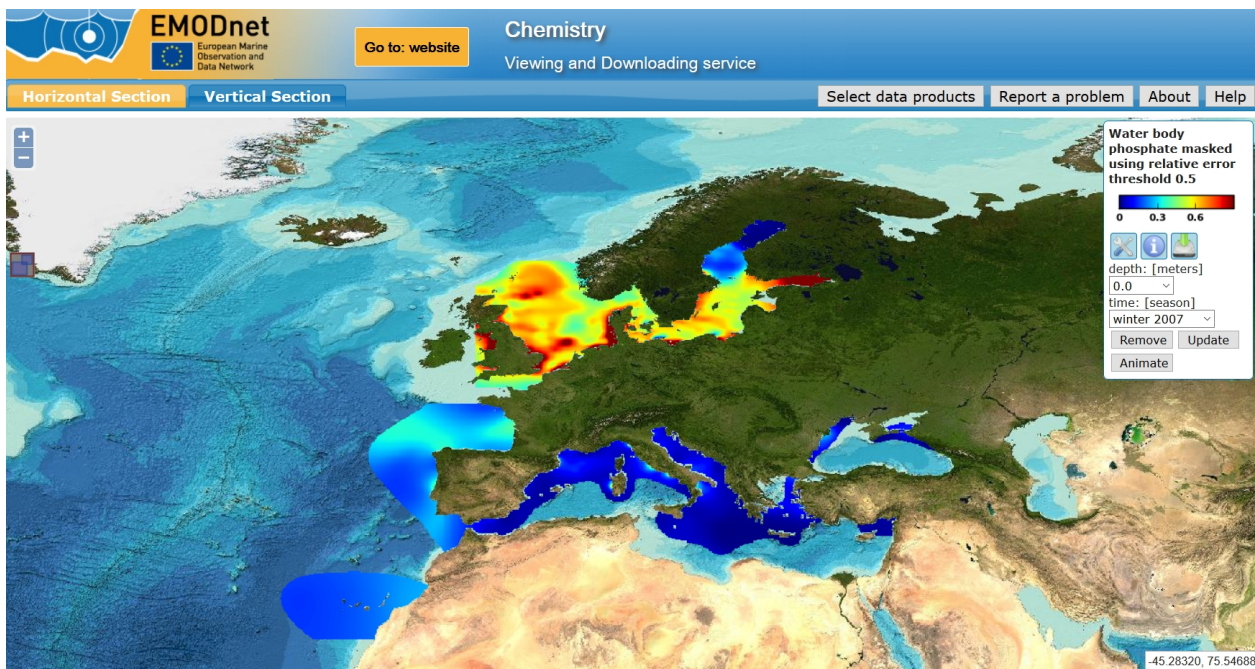


*Image 2: EMODnet Chemistry Products Viewing and Downloading service - Spatial distribution of phosphate concentration in the European basins in winter for the decade 2003-2012*

## EMODnet Chemistry 3 scope and approach

The EMODnet Chemistry 3 successor project has started early March 2017 and it will continue the earlier successful approach. The consortium has been expanded somewhat and brings together 45 participants from 27 countries (20 EU member states) along European seas, mostly national marine monitoring agencies and major marine research institutes (see Annex 3). They combine long standing expertise and experiences of collecting, processing, quality controlling and managing of marine chemistry data and data products together with expertise in distributed data infrastructure development and operation and provision of discovery, access and viewing services following INSPIRE implementation rules and international standards (ISO, OGC). In addition, many participants are actively involved in the MSFD implementation process. Furthermore, the consortium includes 3 international organisations, ICES – International Council for the Exploration of the Sea, BSCS - Black Sea Commission Secretariat, and UNEP/MAP - United Nation Environment Programme / Coordinating Unit for the Mediterranean Action Plan. The latter two organisations are representing the interests of the Regional Sea Conventions (RSCs) for the Black Sea (Bucharest Convention) and Mediterranean Sea (Barcelona Convention), while OSPAR and HELCOM RSCs are also contributing. RSCs together with EU and appointed national experts will

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join the dedicated '**Board of MSFD experts**' set up for giving advice and monitor development of products that are planned for MSFD indicators D5, D8, D9 and D10.

The earlier focus on gathering data and developing data products for the European sea basins concerning eutrophication and contaminants will be continued. This involves further population of the EMODnet Chemistry CDI Data Discovery and Access service as well as updating and refining of the data products (validated data collections, spatially interpolated maps and station time series) and their visualisations in a dialogue with the board of MSFD experts. Extra efforts will be dedicated to include quality information about QA/QC procedures applied for sampling and laboratory analysis and about origin of observations from monitoring or research, following earlier recommendations from MSFD stakeholders.

**Marine litter** has been added to the scope of chemical substances as requested from EMODnet Chemistry 3. It is an important subject on the international political agendas such as of G7 and G20. It is very relevant for the MSFD agenda and is managed under the descriptor D10. This aims to provide instruments to assess, monitor, set targets and finally reach a good environmental status (GES) with regard to marine litter. GES should be achieved only when "properties and quantities of marine litter do not cause harm to the coastal and marine environment".

EMODnet Chemistry 3 will focus on gathering data, generating data products on a European scale, and publishing the data and data products for the following marine litter categories:
- **Beach litter (nets, bottles etc.)**
- **Seafloor Litter (i.e. litter collected by fish trawl surveys)**
- **Micro-litter (micro plastics)**

For beach litter and seafloor litter there are already a number of ongoing initiatives, such as undertaken or planned by: Technical Support Group – Marine Litter (TSG ML), JRC Project on Marine Litter baselines, Regional Sea Conventions (OSPAR, HELCOM, UNEP/MAP, BSCS), ICES, MEDITS, EU research projects (DeFishGear, PERSEUS, EMBLAS, …) and possible others. Considering this existing European landscape and ongoing discussions with stakeholders, including the chair and vice-chair of TSG ML, EMODnet Chemistry opts for developing two European EMODnet internet databases, one for **beach litter**, modelled after the OSPAR-MCS approach, and one for **seafloor litter**, modelled after the ICES-DATRAS approach. These European databases should be primarily populated by harvesting from relevant regional systems, while central submission facilities should be operated for covering submissions by organisations in regions that fall outside existing systems. 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. TSG ML will be kept informed about progress of these deliberations.

For **micro-litter** the situation is different and there are not yet coordinated efforts at regional or European scale. Considering this situation EMODnet Chemistry proposes to adopt the data gathering and data management approach as generally applied for marine data, i.e. populating metadata and data in the CDI Data Discovery and Access service. This proposal is detailed in the following section.

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# Marine micro-litter

The amount, distribution and composition of micro particles establish baseline quantities, properties and potential impacts of these elements. Micro plastic is likely to be the most significant part of this. Micro particles of a range of common material types including glass, metal, plastic and paper litter are undoubtedly present in the environment but relative proportions of material types will be influenced by the physical conditions of the habitat sampled. For example, metal and glass micro-litter is not likely to be found at the sea surface.

When first described the term micro plastic was used to refer to truly microscopic particles in the region of 20 µm (micrometres 1 µm = $1 \times 10^{-6}$ m) diameter (Thompson et al. 2004). Afterwards, the definition has been broadened to include all particles < 5 mm (Arthur et al. 2009). (Guidance on Monitoring of Marine Litter in European Seas, Galgani et al, 2013).

The Technical Sub Group on Marine Litter provides in the Guidance a summary table to describe the elements used to manage the micro-litter information.

| | | | CATEGORIES FOR MICROPARTICLES | |
|---|---|---|---|---|
| | | | **Material** | **Description** |
| **Size** | Record size of each item. Minimum resolution is to allocate in to bin sizes of 100 µm | | **Plastic** | Plastic fragments rounded |
| | | | | Plastic fragments subrounded |
| | | | | Plastic fragments subangular |
| **Type** | Plastic fragments, pellets, filaments, plastic films, foamed plastic, granules, and styrofoam | | | Plastic fragments angular |
| | | | | cylindrical pellets |
| | | | | disks pellets |
| **Shape** | For pellets: cylindrical, disks, flat, ovoid, spheruloids; For fragments: rounded, subrounded, subangular, angular; | | | flat pellets |
| | | | | ovoid pellets |
| | | | | spheruloids pellets |
| | | | | filaments |
| | For general- irregular, elongated, degraded, rough, and broken edges | | | plastic films |
| | | | | foamed plastic |
| **Colour** | Transparent, crystalline, white, clear-white-cream, red, orange, blue, opaque, black, grey, brown, green, pink, tan, yellow | | | granules |
| | | | | styrofoam |
| | | | **Other** | Other (glass, metal, tar) |

**Table 9:** Categories used to describe microplastics appearance

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# How to fit marine micro-litter data in the SeaDataNet CDI and ODV formats

Based upon a series of examples provided by Ifremer, CEFAS and the Italian Regional Environmental Agency, an exercise of analysis and potential mapping of micro-litter information to SeaDataNet CDI (**Common Data Index**) metadata format and to ODV (**Ocean Data View**) data format has been done. The SeaDataNet CDI metadata format provides an ISO19115 - ISO19139 based index (metadatabase) to individual data sets (such as samples, timeseries, profiles, trajectories, etc), using the SeaDataNet Common Vocabularies and the EDMO directory (European Directory of Marine Organisations). The CDI format is INSPIRE compliant. The SeaDataNet ODV ASCII data format can be used directly in the Ocean Data View (ODV), fundamental data analysis and visualisation software.

As a result of the initial analysis, EMODnet Chemistry concluded that it is possible to fit the micro plastics observation data sets in the SeaDataNet CDI/ODV formats. This implicates that EMODnet Chemistry and additional SeaDataNet data providers can be requested to gather and populate their already available micro plastics data in the CDI Data Discovery and Access service, this way building a European collection of metadata and data sets.

Annexes 1 and 2 give examples illustrating how micro-litter observations can be described in the CDI metadata format and ODV data format.

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# ANNEX 1: CDI example for marine micro-litter

| CDI-identifier | | | Example |
|---|---|---|---|
| CDI-Identifier | M | The CDI creator gives a local identifier, provided as urn:SDN:CDI:LOCAL:local identifier. The 'local identifier' must be identical to the identifier as in use locally by the Data Centre (= DATASET_ID). The CDI authority (MARIS web service) will store both the local identifier as a central CDI identifier. The local identifier will be used to recognise updates for CDI records, that already are present in the central CDI directory. | SDN:CDI::791_20141019_MLIT_SURF |
| EDMO_code | M | EDMO_CODE of the data centre distributing the data (the one connected to the CDI service) | SDN:EDMO::486 |
| **CDI FIELD** | | | |
| **ISO 19139 header xml header** | M | "Language used in the metadata, Mandatory value is 'eng' for English language. (fixed)<br>Charset : utf8 (fixed)<br>CDI deals with a 'dataset' description (fixed)<br>Common vocabulary list L23 used for HierarchyLevelName (only one entry) (fixed)<br>HierarchyLevelName: Common Data Index record (fixed)" | eng |
| **"METADATA CREATING ORGANISATION**<br>Phone<br>Fax<br>Address<br>  City<br>Zip Code<br> Country<br>Email<br>Web site" | M | "Data Centre, responsible for the CDI metadata creation: Use EDMO Code (only one entry)<br><br>All other information is retrieved from EDMO and not typed again (via EDMO web service or local copy); it is provided for ISO compliancy and human reading of the CDI XML. For missing info, tags are left out<br><br>Role = pointOfContact (fixed)" | SDN:EDMO::486 |
| **METADATA CREATION-DATE** | M | Date that the CDI metadata record was created; date in ISO 8601, format YYYY-MM-DD | 2018-01-26 |
| **Metadata Standard Name** | M | "ISO 19115/SeaDataNet profile" (fixed) | ISO 19115/SeaDataNet profile |
| **Metadata Standard Version** | M | "1.0" (fixed) | 1.0 |
| **MEASURING AREA TYPE** | M | Use of ISO codelist B.5.15: (value= "point", or "curve" or "surface"). See Vocab L02 (SeaDataNet Geospatial Feature Types) | curve |

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| | | | |
|---|---|---|---|
| "SPATIAL REPRESENTATION<br><br>HORIZONTAL RESOLUTION<br><br>VERTICAL RESOLUTION<br><br>TIME RESOLUTION" | O | "Number of dimensions = set to 1, 2 or 3<br><br>Name of the dimension: ""track"" (resolution) (fixed)<br>Value of the resolution (decimal number)<br>Unit of the resolution (use common vocabulary list P06), usually in meters<br><br>Name of the dimension: ""vertical"" (resolution) (fixed)<br><br>Value of the resolution (decimal number)<br>Unit of the resolution (use common vocabulary list P06), usually in meters<br><br>Name of the dimension: ""time"" (resolution) (fixed)<br><br>Value of the resolution (decimal number)<br>Unit of the resolution (use common vocabulary list P06)" | |
| DATUM OF COORDINATE SYSTEM | O | "Use Vocab L10, derived from European Petroleum Survey Group (EPSG)<br><gmd:Title> SeaDataNet geographic co-ordinate reference frames<br><gmd:AlternateTitle> L10<br><gmd:Date> revision date in ISO 8601 of the used version of the list<br><gmd:edition> used version of the list<br><gmd:identifier> URL of the SeaDataNet URNURL resolver for all vocabs and directories: http://www.seadatanet.org/urnurl/  SDN:L10<br><br><gmd:code>: <sdn:SDN_CRSCode codeSpace=""SeaDataNet"" codeListValue=""4326"" codeList=""http://vocab.nerc.ac.uk/isoCodelists/sdnCodelists/cdicsrCodeList.xml#SDN_CRSCode"">World Geodetic System 84</sdn:SDN_CRSCode>  (only one entry)" | |
| **Metadata Extension info** | M | This xml file contains machine readable information about the extensions included in the CDI profile; ISO19139 clients can take advantage of this information to correctly edit/visualize CDI metadata CSR profile Extension Information (XML) (fixed) | |
| **NAME/ALTERNATIVE NAME OF THE DATASET** | M | Free text : Name by which the dataset is locally known. If not present in the partner's database, then set default values in the mapping properties, like e.g. 'Not specified'. | Surface Micro-litter |
| **DATASET-ID** | M | Unique local ID for the dataset (= cdi_identifier) | 791_20141019_MLIT_SURF |
| **REVISION-DATE OF DATASET** | M | Date of last revision of the data set; date in ISO 8601, format YYYY-MM-DD | 2014-10-19 |
| **IDENTIFIER** | M | cdi_identifier | 791_20141019_MLIT_SURF |

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| | | | |
|---|---|---|---|
| **"ORIGINATORS OF THE DATASET**<br>Phone<br>Fax<br>Address<br>City<br>Zip Code<br>Country<br>Email<br>Web site" | M | "Originator(s) of the dataset: Use EDMO Code.<br><br>All other information is retrieved from EDMO and not typed again (via EDMO web service or local copy); it is provided for ISO compliancy and human reading of the CDI XML. For missing info, tags are left out.<br>(Multiple entries are possible by repeating the XML code block).<br><br>Role = originator (fixed)" | SDN:EDMO:791 |
| **ABSTRACT ON DATASET** | M | <= 4000 characters,  character set = utf8 and english language. Abstract describing the dataset. If not present in the partner's database, then set default values in the mapping properties, like e.g. 'Not specified'. | Micro-litter collected by LER/PAC during the PERSMED coastal cruise |
| **"ORGANISATION MANAGING THE DATASET**<br>Phone<br>Fax<br>Address<br>City<br>Zip Code<br>Country<br>Email<br>Web site | M | "Data center, managing the data set: Use EDMO Code."<br><br>All other information is retrieved from EDMO and not typed again (via EDMO web service or local copy); it is provided for ISO compliancy and human reading of the CDI XML. For missing info, tags are left out. (only one entry).<br><br>Role =custodian (fixed)" | SDN:EDMO:486 |
| RESOURCE MAINTENANCE | O | Provides information about the frequency of resource updates and the scope of those updates | |
| **INSPIRE reference** | M | """Oceanographic geographical features"" (fixed)<br>""theme"" (fixed)<br>""GEMET - INSPIRE themes, version 1.0"" (fixed)<br>""2008-06-01"" (fixed)<br>Date type = ""publication"" (fixed)" | Oceanographic geographical features |
| **PARAMETERS** | M | "Use common vocabulary list P02 (multiple entries are possible by repeating this tag)<br>Keyword = <sdn:SDN_ParameterDiscoveryCode codeSpace=...><br>Type = parameter<br><thesaurusName> <Title>  BODC Parameter Discovery Vocabulary<br><AlternateTitle>P02<br><Date> revision date in ISO 8601 of used version of the list<br><edition> used version of the list<br><code> URL of the SeaDataNet URNURL resolver for all vocabs and directories:<br>http://www.seadatanet.org/urnurl/SDN:P02 " | Keyword=<SDN:P02::UMLW> |

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| | | | |
|---|---|---|---|
| INSTRUMENT and POSITIONING SYSTEM | O | "Use common vocabulary list L05 (multiple entries are possible by repeating this tag)<br>Keyword = <sdn:SDN_DeviceCategoryCode codeSpace=><br>Type = instrument<br><thesaurusName> <Title>  SeaDataNet device categories<br><AlternateTitle>L05<br><Date> revision date in ISO 8601 of used version of the list<br><edition> used version of the list<br><code> URL of the SeaDataNet URNURL resolver for all vocabs and directories:<br>http://www.seadatanet.org/urnurl/SDN:L05     " | Keyword=<SDN:L05::22> |
| **PLATFORM** | M | "Use common vocabulary list L06 (only one entry)<br>Keyword = <sdn:SDN_PlatformCategoryCode codeSpace=...><br>Type = platform_class<br><thesaurusName> <Title>  SeaDataNet Platform Classes<br><AlternateTitle>L06<br><Date> revision date in ISO 8601 of used version of the list<br><edition> used version of the list<br><code> URL of the SeaDataNet URNURL resolver for all vocabs and directories:<br>http://www.seadatanet.org/urnurl/SDN:L06          " | |
| "PROJECTS | O | Use of EDMERP directory (multiple entries are possible by repeating this tag)<br>Keyword = <sdn:SDN_EDMERPCode codeSpace=...><br>Type = project<br><thesaurusName> <Title>  European Directory of Marine Environmental Research Projects<br><AlternateTitle>EDMERP<br><Date> revision date in ISO 8601 of used version of the list<br><code> URL of the SeaDataNet URNURL resolver for all vocabs and directories:<br>http://www.seadatanet.org/urnurl/SDN:EDMERP | |
| **Use limitation** | M | limitation affecting the fitness for use of the resource or metadata | Not applicable |
| **DATASET ACCESS RESTRICTIONS** | M | "Use common vocabulary list L08<br>MD_RestrictionCode = ""otherRestrictions""<br>xlink : SDN:L08:version:entryKey (multiple entries are possible by repeating this tag) | SDN:L08: :MO |
| **STATION NAME and/or CRUISE NAME** | M | "Station and/or Cruise name are specified by:<br><AlternateTitle> alternative / short name<br><Date> start date of cruise / station observations<br>Station and Cruise info make use of the same XML coding (repeating the XML block).<br>For Station use: DS_InitiativeTypeCode = "operation" and DS_AssociationTypeCode = ""source"" from ISO lists B.5.7 and B.5.8 | "<title> EVHOE_2014<br><AlternateTitle>  791_20141019_MLIT_SURF$<br><Date> 2014-10-19T18:53:00" |

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| | | | |
|---|---|---|---|
| | | For Cruise use: DS_InitiativeTypeCode = "campaign" and DS_AssociationTypeCode = "largerworkcitation" from ISO lists B.5.7 and B.5.8" | |
| EDMED REFERENCE | O | "Use EDMED code<br>DS_InitiativeTypeCode = "campaign" (fixed)<br>DS_AssociationTypeCode = "largerworkcitation" (fixed)" | |
| CSR Reference | O | "Use CSR code<br>DS_InitiativeTypeCode = "campaign" (fixed)<br>DS_AssociationTypeCode = "largerworkcitation" (fixed)" | |
| SPATIAL RESOLUTION | O | Value of the Horizontal Resolution (decimal number)<br>Unit of the Resolution (use common vocabulary list P6) | |
| **Language used within the dataset** | M | "Language used in the dataset: ""eng"" for English (fixed) | eng |
| **Characterset** | M | Characterset used in the dataset: "utf8" (fixed) | utf8 |
| **Main theme of the dataset** | M | Use ISO list B.5.27 for describing the theme of the data set. Mandatory value: "oceans". (fixed) | oceans |
| **"GEOGRAPHICAL COVERAGE WEST"** | M | "Geographical coverage is described by one or more bounding boxes.<br>Use Geographical coordinates (Mercator projection).<br>For point observations only <westBoundLongitude> and <southBoundLatitude> are filled in. For tracks and areas the bounding boxes are filled as a rectangle covering the track or area of the measurement.<br>In those cases the uttermost latitude and longitudes of the bounding box are filled in, entering first the most left and lower point (<westBoundLongitude> and <southBoundLatitude>) and as second the most right and upper point (<eastBoundLongitude> and <northBoundLatitude>). Northern latitudes and eastern longitudes are entered as positive and southern latitudes and western longitude are entered as negative.<br><westBoundLongitude> = Longitude 1:Decimal degrees. –180.0000 > Maximum < +180.0000(decimal[4,4])<br>Individual tracks or polygon-shaped areas (non rectangular) may be described using a MultiCurve or a MultiSurface. Only one of the two may appear in a CDI record, occurence 0-1. If used, a MultiCurve contains 1-many LineStrings; a MultiSurface 1-many Polygons." | -3.84595 |
| EAST | O | <eastBoundLongitude> = Longitude 2:Decimal degrees. –180.0000 > Maximum < +180.0000(decimal [4,4]) | -1.31835 |
| **SOUTH** | M | <southBoundLatitude> = Latitude 1:Decimal degrees. –90.0000 > Maximum < +90.0000 (decimal [3,4]) | 43.40063 |
| NORTH | O | <northBoundLatitude> = Latitude 2:Decimal degrees. –90.0000 > Maximum < +90.0000 (decimal [3,4]) | 47.44720 |
| "TRACKS (Curves)<br>Description<br>Name<br>Coordinates" | O | "Each MultiCurve and LineString must contain an ID (gml:id) that is unique within the XML-document. This ID will not be visible to users.<br>Each LineString (track) may have a name and description.<br>Format of <gml:posList> is Longitude1 Latitude1 Longitude2 Latitude2 … (coordinates separated by spaces, | "<Description>Track 1<br><Name>Track 1<br><Coordinates>-2.85827 46.18228 -2.8904 46.17804<br><Description>Track 3 |

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| | | | |
|---|---|---|---|
| | | no commas). Eastern longitudes (from 0.0000 to 180.0000 (decimal [4.4]) and Northern latitudes (from 0.0000 to 90.0000 (decimal [3.4]) are entered as positive and Western longitudes (from 0.0000 to -180.0000 (decimal [4.4]) and Southern latitudes (from 0.0000 to -90.0000 (decimal [3.4]) are entered as negative. | \<Name\>Track 3 \<Coordinates\>-3.63214 46.04764 -3.66457 46.04999 \<Description\>Track 4 \<Name\>Track 4 \<Coordinates\>-2.14863 45.45566 -2.16653 45.46355 |
| "AREAS (Surfaces) Description Name Coordinates" | O | "Each MultiSurface and Polygon must contain an ID (gml:id) that is unique within the XML-document. This ID will not be visible to users.<br><br>Each Polygon (bounding polygon) may have a name and description.<br><br>Format of \<gml:posList\> is Longitude1 Latitude1 Longitude2 Latitude2 … (coordinates separated by spaces, no commas). Eastern longitudes (from 0.0000 to 180.0000 (decimal [4.4]) and Northern latitudes (from 0.0000 to 90.0000 (decimal [3.4]) are entered as positive and Western longitudes (from 0.0000 to -180.0000 (decimal [4.4]) and Southern latitudes (from 0.0000 to -90.0000 (decimal [3.4]) are entered as negative. The coordinate pairs should describe the polygon in a direction against the clock and the first coordinate  pair must be repeated as last coordinate pair! Only convex polygons are to be described, which is indicated by the tag \<gml:exterior\> . " | |
| **START DATE** (AND TIME) | M | Start and end date (and time) of the data set using ISO 8601, format YYYY-MM-DDThh:mm:ss | 2014-10-19T18:53:00 |
| **END DATE** (AND TIME) | M | Start and end date (and time) of the data set using ISO 8601, format YYYY-MM-DDThh:mm:ss | 2014-10-30T05:57:00 |
| **"MINIMUM DEPTH OF OBSERVATION MAXIMUM DEPTH OF OBSERVATION WATER DEPTH VERTICAL DATUM** | M | "Minimum and Maximum observation or data depth (use ""metres"" as unit). The minimum / maximum instrument depth is an acceptable approximation, if no further details are available. Depth in metres in respect to the specified vertical datum.  If not available (unknown), use  -9999.<br>For Vertical datum, Use Vocab L11" | 0 |
| ADDITIONAL DOCUMENTATION (PUBLICATION) | O | "Every CDI record can reference any number of publications. These publications must be referenced in the form of permanent URL. For the sake of homogeneity and stability, the publications included in the CDI must be stored and identified in a central catalogue of publications managed by MARIS, | |
| **"ORGANISATION DISTRIBUTING THE DATASET** Phone Fax Address City Zip Code | M | "Data center, distributing the data set: Use EDMO Code<br><br>All other information is retrieved from EDMO and not typed again (via EDMO web service or local copy); it is provided for ISO compliancy and human reading of the CDI XML. For missing info, tags are left out. (only one entry) | SDN:EDMO::486 |

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| | | | |
|---|---|---|---|
| Country<br> Email<br>Website | | Role =""distributor"" (fixed) | |
| **"Dataformat**<br>**Version"** | M | Name of the format used for the transferred data. Use of Vocabulary List L24 Version of the SeaDataNet dataformats in use (at present ODV = 0.3; MedATLAS = 2.0; (CF) NetCDF = 3.5) | "ODV 0.4" |
| Data size | O | | |
| **Distribution website** | M | Data website: url to the online resource. For the first, "default" binding, this points to the SeaDataNet Portal URL, that manages the data request and delivery process in communication with the partner sites: http://www.sdn-taskmanager.org/ | http://www.sdn-taskmanager.org/ |
| **Distribution protocol** | M | Protocol: protocol to be used to retrieve the data, according to http://www.opengeospatial.org/ogcUrnPolicy. For the first, "default" binding to the SDN portal, the value must be "HTTP-DOWNLOAD". | HTTP-DOWNLOAD |
| Database reference | O | Database reference: Description of the resource. For the first, "default" binding to the SDN portal, this is an identification of the database holding the dataset record at the CDI partner (optional). | |
| **Distribution Method** | M | Distribution Method : Use vocab L07, extension of ISO codelist B.5.3.. For the first binding to the SDN portal, the value should be "downloadRegistration". Note: Access is depending on the indicated Data access policy of this data set and the registered role of the user. For additional bindings, the value could be "URL", but other values from L07 are supported.. | downloadRegistration |
| "Data Quality Information<br>Scope<br>Report – Name<br>Report – Date<br>Report – Comment<br>Report - Status<br>Lineage" | O | "Quality information for the data specified by a data quality scope, describes how the dataset was tested for conformance to a published standard and whether the dataset passed the test<br><br>Scope = ""dataset"" (fixed)<br>-Name: name of the QC standards applied to the data<br>-Date: reference date of the cited QC standards (YYYY-MM-DD)<br>- Comment: comment or explanation about the QC evaluation and its result<br>- Status: indication of the conformance result (true/false)<br><br>Lineage/ Statement = ""The data centres apply standard data quality control procedures on all data that the centres manage. Ask the data centre for details"" (fixed)<br><br>For example, the data quality information could refer to the Manual of Quality Control Procedures for Validation of Oceangraphic Data, IOC Manuals and guides No. 26, published on 01/01/1993:<br>• Name = Manual of Quality Control Procedures for Validation of Oceanographic Data, IOC Manuals and guides No. 26<br>• Date = 01/01/1993<br>• Comment = See the referenced specification | |

| | | • Status = true<br><br>For compliancy with INSPIRE, the following reference must appear in the CDI XML file in Data Quality Information section (hard coded in MIKADO):<br>Name=""COMMISSION REGULATION (EC) No 1205/2008 of 3 December 2008 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards ""<br>Date=""2008-12-04""<br>Comment=""See the referenced specification""<br>Status=""True""" | |

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# ANNEX 2: How to fit marine micro-litter data in the SeaDataNet ODV data format

ODV is an ASCII format to handle profile, time series and trajectory data. The file is built with the following elements:

- Metadata columns
- Primary variable data columns (one column for the value plus one for the qualifying flag)
- Data columns — two columns per variable (value and flag)

A "bio-ODV like" template should be used to manage the litter information. This kind of ODV files is specifically built to be able to manage some parameters as rows instead of columns. The file will have the following features:

- A set of **ODV mandatory (ODV default)** fields like: cruise, station, type, position…(green fields)

- A set of **ODV additional fields** (Guidance on Monitoring of Marine Litter in European Seas 2013, CEFAS, IFREMER, ARPA FVG) to describe marine micro-litter:

  o **mandatory in ODV microlitter** : fields will be always present in ODV file and always filled (orange fields)
  o **additional/optional**: fields will be always present in ODV file but could be empty (light orange fields)

List of fields for the proposed micro-litter ODV file:

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| Label/column header in datafile | Conceptid | Use | Comments |
|---|---|---|---|
| Cruise | | mandatory (ODV Default) | |
| Station | | mandatory (ODV Default) | |
| Type | | mandatory (ODV Default) | The suggestion is to use type "B". From manual: 'B' for bottle profile data. For time series and trajectories set to 'B' for small (<250) row groups |
| YYYY-MM-DDThh:mm:ss.sss | | mandatory (ODV Default) | Start date/time. Format must be adapted to the date value (for example YYYY-MM-DDThh:mm is second are not available) |
| Longitude [degrees_east] | | mandatory (ODV Default) | start point coordinates. |
| Latitude [degrees_north] | | mandatory (ODV Default) | start point coordinates. |
| LOCAL_CDI_ID | | mandatory (ODV Default) | |
| EDMO_code | | mandatory (ODV Default) | EDMO_CODE of the data centre distributing the data (the one connected to the CDI service) |
| Bot. Depth [m] | | mandatory (ODV Default) | Field empty if no data |
| MinimumObservationDepth [m] | MINWDIST | mandatory in ODV micro-litter | |
| MaximumObservationDepth [m] | MAXWDIST | mandatory in ODV micro-litter | |
| SampleID:INDEXED_TEXT | SSAMID01 | mandatory in ODV micro-litter | |
| SamplingEffort [Km/L] | LENTRACK/VOLWBSMP | mandatory in ODV micro-litter | The amount of effort expended during an Event. (It can be the survey distance from the beginning point in kilometres or a filtered volume in litres |
| Net_opening [cm] | MTHWDTH1 | mandatory in ODV micro-litter | Net opening of the intruments used.This information is needed for the calculation of the covered surface in cm.(e.g. diameter of the Ocean Pack RACE filtering "cakes" or bongo/manta net opening ) |
| Mesh_size [µm] | MSHSIZE1 | mandatory in ODV micro-litter | Mesh size of the filtering surface (e.g. manta or bongo net, filtering "cakes" of OceanPack RACE,...) in µm |
| Micro-litter_Type:INDEXED_TEXT | MLITTYPW | mandatory in ODV micro-litter | Type of the item (H01 SDN vocabulary) |
| Micro-litter_Size:INDEXED_TEXT | MLITSIZW | mandatory in ODV micro-litter | Size classes (H03 SDN vocabulary) |
| Micro-litter_Count [#] | MLITCNTW | mandatory in ODV micro-litter | Number of items collected. It's the official mandate from MSFD to provide the count of collected microplastics |
| EventEndDateTime [YYYY-MM-DDThh:mm:ss.sss] | ENDX8601 | additional/optional | End date/time |
| EventEndLongitude [degrees_east] | ENDXXLON | additional/optional | End point coordinates. Either End Lat/Lon or SamplingEffort are mandatory. |
| EventEndLatitude [degrees_north] | ENDXXLAT | additional/optional | End point coordinates. Either End Lat/Lon or distance are mandatory. |
| Micro-litter_Weight [g] | MLDWWD01 | additional/optional | Weight of the collected items, not mandatory Information in grams |

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| Micro-litter_Shape:INDEXED_TEXT | MLITSHPW | additional/optional | Shape of the item (H02 SDN vocabulary) |
|---|---|---|---|
| Micro-litter_Color:INDEXED_TEXT | MLITCOLW | additional/optional | Colour classes (H04 SDN vocabulary) |
| Micro-litter_Polymer_type:INDEXED_TEXT | MLITPOLW | additional/optional | Polymer type of the micro-litter (H05 SDN vacabulary) |
| WMO_Sea_State [Dmnless] | WMOCSSXX | additional/optional | Sea conditions following the Douglas scale |
| Wind_direction [degT] | EWDAZZ01 | additional/optional | Direction relative to true north from which the wind is blowing |
| Wind_speed [m/s] | EWSBZZ01 | additional/optional | Sustained speed of the wind (distance moved per unit time by a parcel of air) parallel to the ground at a given place and time. |

*Vocabulary specifications*

New terms proposed*:*

For P02 vocabulary:

- Micro-litter in water bodies
- Micro-litter in the sediment

For P01 vocabulary:

- Type of micro-litter particles (H01)
- Count of micro-litter particles in sediment
- Count of micro-litter particles in water column
- Size class of micro-litter particles (H03)
- Shape of micro-litter particles (H02)
- Colour class of micro-litter particles (H04)
- Micro-litter polymer types (H05)
- Weight of  micro-litter particles in sediment
- Weight of  micro-litter particles in wtare column
- Width of sample collector
- Size of sample collector (mesh)

Needed to map to ODV header for:

- Micro-litter shape class (controlled vocabularies H02)
- Needed to map to ODV header for Micro-litter size classes (controlled vocabularies H03)
- Needed to map to ODV header for Micro-litter type (controlled vocabularies H01)
- Needed to map to ODV header for Micro-litter colour classes (controlled vocabularies H04)
- Needed to map to ODV header for Micro-litter polymer types (controlled vocabularies H05)

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*New terms*

*P02 Terms*

| TN | TITLE | SHORT_NAME | DEFINITION |
|---|---|---|---|
| UMLS | Micro-litter in sediments | Sed_Micro-litter | Parameters describing the abundance and nature of microscopic particles of man-made materials and in particular microplastics present in the sediment |
| UMLW | Micro-litter in water bodies | WC_Micro-litter | Parameters describing the abundance and nature of microscopic particles of man-made materials and in particular microplastics present in any body of fresh or salt water. |

*P01 Terms*

| TN | TITLE | SHORT_NAME | DEFINITION |
|---|---|---|---|
| MLITTYPS | Type class of micro-litter particles in the sediment by categorisation using EMODnet chemistry reporting protocol | Micro-litter_type_sediment | Text categorisation of the type of micro-litter particles observed in a sediment sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITTYPW | Type class of micro-litter particles in the water body by categorisation using EMODnet chemistry reporting protocol | Micro-litter_type_water | Text categorisation of the type of micro-litter particles observed in a water sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITCNTS | Count of micro-litter particles in the sediment by categorisation using EMODnet chemistry reporting protocol | Micro-litter_count_sediment | Number of items classified as micro-litter counted in a sediment sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITCNTW | Count of micro-litter particles in the water body by categorisation using EMODnet chemistry reporting protocol | Micro-litter_count_water | Number of items classified as micro-litter counted in a water sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITSIZS | Size class of micro-litter particles in the sediment by categorisation using EMODnet chemistry reporting protocol | Micro-litter_size_class_sediment | Text categorisation of the size class of micro-litter particles observed in a sediment sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITSIZW | Size class of micro-litter particles in the water body by categorisation using EMODnet chemistry reporting protocol | Micro-litter_size_class_water | Text categorisation of the size class of micro-litter particles observed in a water sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITSHPS | Shape class of micro-litter particles in the sediment by categorisation using EMODnet chemistry reporting protocol | Micro-litter_shape_class_sediment | Controlled vocabulary defining the terms that may be used for micro-litter polymer types in the EMODnet Chemistry data reporting system |
| MLITSHPW | Shape class of micro-litter | Micro-litter_shape_class_water | Text categorisation of the shape of |

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| | | | |
|---|---|---|---|
| | particles in the water body by categorisation using EMODnet chemistry reporting protocol | | micro-litter particles observed in a water sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITCOLS | Colour class of micro-litter particles in the sediment by categorisation using EMODnet chemistry reporting protocol | Micro-litter_colour_class_sediment | Text categorisation of the colour of micro-litter particles observed in a sediment sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITCOLW | Colour class of micro-litter particles in the water body by categorisation using EMODnet chemistry reporting protocol | Micro-litter_colour_class_water | Text categorisation of the colour of micro-litter particles observed in a water sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITPOLS | Polymer type of micro-litter particles in the sediment by categorisation using EMODnet chemistry reporting protocol | Micro-litter_polymer_type_sediment | Text categorisation of the type of plastic polymer of micro-litter particles observed in a sediment sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLITPOLW | Polymer type of micro-litter particles in the water body by categorisation using EMODnet chemistry reporting protocol | Micro-litter_polymer_type_water | Text categorisation of the type of plastic polymer of micro-litter particles observed in a water sample within categories defined in the EMODnet chemistry micro-litter reporting protocol |
| MLDWSD01 | Dry weight of micro-litter particles collected from the sediment by categorisation | Micro-litter_weight_sediment | The weight after drying of items classified as micro-litter counted in a sediment sample within |
| MLDWWD01 | Dry weight of micro-litter particles collected from the water body by categorisation using EMODnet chemistry reporting protocol | Micro-litter_weight_water | The weight after drying of items classified as micro-litter counted in a water sample within categories defined in the EMODnet chemistry micro-litter reporting protocol. |
| MSHSIZE1 | Size of sample collector (mesh) {mesh size} | Mesh_size | The average dimension of the holes in the mesh of a sample collecting device such as a plankton net or a trawl. |
| MTHWDTH1 | Width of sample collector (aperture) {mouth width} | mouth_width | The horizontal dimension of the mouth opening of a sample collecting device such as a plankton net or a trawl. |

*New vocabularies H0\**

| TN | TITLE | SHORT_NAME | DEFINITION |
|---|---|---|---|
| H01 | EMODnet micro-litter types | Micro-litter_type | Controlled vocabulary defining the terms that may be used for micro-litter types in the EMODnet Chemistry data reporting system. |
| H02 | EMODnet micro-litter shapes | Micro-litter_shape | Controlled vocabulary defining the terms that may be used for micro-litter shape in the EMODnet Chemistry data reporting system. |
| H03 | EMODnet micro-litter size classes | Micro-litter_size-class | Controlled vocabulary defining the terms that may be used for micro-litter size classes in the EMODnet Chemistry data reporting system. |

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| | | | |
|---|---|---|---|
| H04 | EMODnet micro-litter colour classes | Micro-litter_colour-class | Controlled vocabulary defining the terms that may be used for micro-litter colour classes in the EMODnet Chemistry data reporting system. |
| H05 | EMODnet micro-litter polymer type | Micro-litter_polymer_type | Controlled vocabulary defining the terms that may be used for micro-litter polymer types in the EMODNet Chemistry data reporting system. |
| C39 | World Meteorological Organisation sea states | WMO sea states | International sea state scale classifying the state of the sea (wind sea) based on visual observations; also referred to as the Douglas sea state scale. |

## *EMODnet Micro-litter type H01:*

| ConceptID | Preferred label | Alt label | Definition |
|---|---|---|---|
| H0100001 | Micro-plastic items | items | A generic term for any kind of micro-litter item made of any kind of plastic material. |
| H0100002 | Micro-plastic fragments | fragments | Irregularly-shaped plastic micro-litter particles with broken off edges that may be rounded or angular. |
| H0100003 | Micro-plastic pellets | pellets | Regularly-shaped plastic micro-litter particles. |
| H0100004 | Micro-plastic filaments | filaments | Slender thread-like plastic micro-litter particles. |
| H0100005 | Micro-plastic films | films | Micro-litter particles derived from plastic sheets or thin plastic films. |
| H0100006 | Micro-plastic styrofoam | styrofoam | Micro-litter particles of styrofoam. |
| H0100007 | non-plastic man-made micro-particles (e.g. glass, metal, tar) | non-plastic | A generic term for any kind of micro-litter item that is not made of plastic. |
| H0100008 | non-plastic filaments (natural fibres, rubber) | natural fibres/rubber | Filaments of non-plastic material such as natural fibres or rubber that are present in micro-litter samples. |

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**EMODnet Micro-litter shape H02:**

| ConceptID | Preferred label | Alt label | Definition |
|---|---|---|---|
| H0200001 | rounded | rounded | Micro-litter particles with rounded off edges (e.g. by erosion). |
| H0200002 | subrounded | subrounded | Micro-litter particles with partly rounded off edges. |
| H0200003 | subangular | subangular | Micro-litter particles with smooth angle edges. |
| H0200004 | angular | angular | Micro-litter particles with sharp angle edges. |
| H0200005 | flat | flat | Micro-litter particles with a broad level or regular surface that is wider than it is high. |
| H0200006 | cylindrical | cylindrical | Micro-litter particles with a regular cylinder-like shape. |
| H0200007 | discoid | discoid | Micro-litter particles with a regular disc-like shape. |
| H0200008 | ovoid | ovoid | Micro-litter particles with a regular oval-like shape. |
| H0200009 | spheroid | spheroid | Micro-litter particles with a regular sphere-like shape. |
| H0200010 | Other/unclassified | Other/unclassified | Micro-litter particles with an undertermined or unclassified shape. |

*EMODnet Micro-litter size-class H03:*

| ConceptID | Preferred label | Alt label | Definition |
|---|---|---|---|
| H0300001 | less than 20 microns | <20um | Micro-litter particles that pass through a 20 micrometre mesh screen. |
| H0300002 | 20 to 200 microns | 20-200um | Micro-litter particles that pass through a 200 micrometre mesh screen but are retained by a 20 micrometre mesh. |
| H0300003 | less than 200 microns | <200um | Micro-litter particles that pass through a 200 micrometre mesh screen. |
| H0300004 | 200 to 300 microns | 200-300um | Micro-litter particles that pass through a 300 micrometre mesh screen but are retained by a 200 micrometre mesh. |
| H0300005 | 300 microns to 1 millimetres | 300um-1mm | Micro-litter particles that pass through a 1 millimetre mesh screen but are retained by a 300 micrometre mesh. |
| H0300006 | 1 to 2 millimitres | 1-2mm | Micro-litter particles that pass through a 2 millimetre mesh screen but are retained by a 1 millimetre mesh (e.g. Manta net mesh size). |
| H0300007 | 2 to 5 millimetres | 2-5mm | Micro-litter particles that pass through a 5 millimetre mesh screen but are retained by a 2 millimetre mesh. |
| H0300008 | 1 to 5 millimetres | 1-5mm | Micro-litter particles that pass through a 5 millimetre mesh screen but are retained by a 1 millimetre mesh (e.g. Manta net mesh size); the size of the particles makes visual inspection possible. |
| H0300009 | 5 to 25 millimetres | 5 -25mm | Particles greater than the micro-litter upper size range of 5 millimetre and up to 25 millimetres that are counted alongside micro-litter particles. |
| H0300010 | 300 microns to 5 millimetres | 300um-5mm | Micro-litter particles that pass through a 5 millimetre mesh screen but are retained by a 300 micrometre mesh. |
| H0300011 | 100 to 500 microns | 100-500um | Micro-litter particles that pass through a 500 micrometre mesh screen but are retained by a 100 micrometre mesh. |

*EMODnet Micro-litter colour-class H04:*

| ConceptID | Preferred label | Alt label | Definition |
|---|---|---|---|
| H0400001 | BLACK/GREY | black+grey | Color class BLACK/GREY for describing micro-litter items. |

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| H0400002 | | | Color class BLUE/GREEN for describing micro-litter |
|---|---|---|---|
| | BLUE/GREEN | blue+green | items. |
| H0400003 | | | Color class BROWN/TAN for describing micro-litter |
| | BROWN/TAN | brown+tan | items. |
| H0400004 | | | Color class WHITE/CREAM for describing micro-litter |
| | WHITE/CREAM | white+cream | items. |
| H0400005 | YELLOW | yellow | Color class YELLOW for describing micro-litter items. |
| H0400006 | | | Color class ORANGE/PINK/RED for describing micro- |
| | ORANGE/PINK/RED | orange+pink+red | litter items. |
| H0400007 | | | Color class TRANSPARENT  for describing micro-litter |
| | TRANSPARENT | transparent | items. |
| H0400008 | | | Color class MULTICOLOUR for describing micro-litter |
| | MULTICOLOUR | multicolour | items. |
| TBC | OPAQUE | opaque | Color class OPAQUE for describing micro-litter items. |

*EMODnet Micro-litter polymer types H05:*

| ConceptID | Preferred label | Alt label | Definition |
|---|---|---|---|
| H0500001 | polyethylene | PE | not available |
| H0500002 | polypropylene | PP | not available |
| H0500003 | polystyrene | PS | not available |
| H0500004 | polyamide (nylon) | PA | not available |
| H0500005 | polyester | PES | not available |
| H0500006 | acrylic | PAN | not available |
| H0500007 | polyoxymethylene | POM | not available |
| H0500008 | polyvinyl alcohol | PVAL | not available |
| H0500009 | polyvinylchloride | PVC | not available |
| H0500010 | polymethylacrylate | PMA | not available |
| H0500011 | polyethylene terephthalate | PET | not available |
| H0500012 | Alkyd | AK | not available |
| H0500013 | polyurethane | PU | not available |

*C39 Vocabulary: World Meteorological Organisation sea states*

| ConceptID | Preferred label | Definition |
|---|---|---|
| 0 | calm (glassy) | The surface of the water body is absolutely flat corresponding to a significant wave height of zero |
| 1 | calm (rippled) | The surface of the water body has undulations corresponding to a significant wave height of 0 - 0.10 metres |
| 2 | smooth | The surface of the water body has undulations corresponding to a significant wave height of 0.10 - 0.50 metres |
| 3 | slight | The surface of the water body has undulations corresponding to a significant wave height of 0.50 - 1.25 metres |
| 4 | moderate | The surface of the water body has undulations corresponding to a significant wave height of 1.25 - 2.50 metres |
| 5 | rough | The surface of the water body has undulations corresponding to a significant wave height of 2.50 - 4.00 metres |
| 6 | very rough | The surface of the water body has undulations corresponding to a significant wave height of 4.00 - 6.00 metres |
| 7 | high | The surface of the water body has undulations corresponding to a significant wave height of 6.00 - 9.00 metres |
| 8 | very high | The surface of the water body has undulations corresponding to a significant wave height of 9.00 - 14.00 metres |

| | | |
|---|---|---|
| 9 | phenomenal | The surface of the water body has undulations corresponding to a significant wave height in excess of 14.00 metres |

## *L22 Vocabulary: Seavox Device Catalogue*

| ConceptID | Preferred label | Alt label | Definition |
|---|---|---|---|
| NETT0176 | Bongo net | Bongo | A generic term for a plankton net designed with double circular (ring, hoop or drum) mouth pieces; with further specifications either unknown or described elsewhere in the supporting metadata. |
| NETT0177 | Manta net | Manta trawl | A generic term for a net system designed for sampling the surface of the ocean. Based on the original design by Brown and Cheng 1981, it has a single rectangular mouth piece and a pair of wings that ride the sea surface; further specifications are either unknown or described elsewhere in the supporting metadata. |
| TOOL1321 | SubCtech OceanPack RACE 5th generation {FerryBox} combined pCO2 analyser and underway system | OceanPack RACE 5 | A flow-through system packaged into a mobile manifold that is used for underway pC02 monitoring on sailing yachts. As standard, each unit is fitted with a dedicated LI-COR LI-840x pCO2 analyser that measures CO2 and H2O using a silicone flat membrane equilibrator and non-dispersive infrared detection (dual wavelength). The analyser is capable of auto-zeroing and automatic compensation of water vapour (H2O), pressure and temperature. The overall unit features a data logger, de-bubbler and water supply. It is capable of integrating auxiliary sensors (e.g. SST, SSS, D.O., algae). In addition, external devices can be included such as nutrient analysers, micro-plastics analysers, meteorological stations, GPS and Air-CO2 analysers. Data are internally stored and transmitted. Optional features include automatic cleaning and auto-calibration. Overall accuracy of the pCO2 analyser is < 1% with a resolution of 0.01 ppm CO2 and 0.001 ppt H2O. |

## *L05 vocabulary: SeaDataNet device categories*

| ConceptID | Preferred label | Alt label | Definition |
|---|---|---|---|
| 69 | neuston net | | A fine-meshed net designed to collect samples living within a few centimetres of the sea surface. Samples microzooplankton, mesozooplankton, nekton and microplastics |
| 22 | plancton nets | | A fine-meshed net designed to collect small size organisms, aggregates, or litter in the water column including for example microzooplankton, mesozooplankton, nekton, microplastic or other litter. |

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### A "micro-litter ODV" example:  Header

The Sdn_reference lines are not mandatory but highly recommended in order to give access to metadata of the Cruise, of the ship which collected the data and on the CDI itself

//<sdn_reference xlink:href="http://seadata.bsh.de/cgi-csr/XML/xmlDownload_V2.pl?edmo=EDMO_CODE&identifier=LOCAL_CSR_ID" xlink:role="isObservedBy" xlink:type="SDN:L23::CSR"/>

//<sdn_reference xlink:href="http://vocab.nerc.ac.uk/collection/C17/current/SHIP_CODE" xlink:role="isObservedBy" xlink:type="SDN:L23::NVS2CON"/>

//<sdn_reference xlink:href="http://seadatanet.maris2.nl/v_cdi_v3/print_xml.asp?edmo=EDMO_CODE&identifier=LOCAL_CDI_ID" xlink:role="isDescribedBy" xlink:type="SDN:L23::CDI" sdn:scope="EDMO_CODE:LOCAL_CDI_ID"/>

//SDN_parameter_mapping

//<subject>SDN:LOCAL:MinimumObservationDepth</subject><object>SDN:P01::MINWDIST</object><units>SDN:P06::ULAA</units>

//<subject>SDN:LOCAL:MaximumObservationDepth</subject><object>SDN:P01::MAXWDIST</object><units>SDN:P06::ULAA</units>

//<subject>SDN:LOCAL:SampleID</subject><object>SDN:P01::SAMPID01</object><units>SDN:P06::UUUU</units>

//<subject>SDN:LOCAL:SamplingEffort</subject><object>SDN:P01::LENTRACK</object><units>SDN:P06::ULAA</units>

//<subject>SDN:LOCAL:EventEndDateTime</subject><object>SDN:P01::ENDX8601</object><units>SDN:P06::TISO</units>

//<subject>SDN:LOCAL:EventEndLongitude</subject><object>SDN:P01::ENDXXLON</object><units>SDN:P06::DEGE</units>

//<subject>SDN:LOCAL:EventEndLatitude</subject><object>SDN:P01::ENDXXLAT</object><units>SDN:P06::DEGN</units>

//<subject>SDN:LOCAL:Net_opening</subject><object>SDN:P01::MTHWDTH1</object><units>SDN:P06::ULCM</units>

//<subject>SDN:LOCAL:Mesh_size</subject><object>SDN:P01::MSHSIZE1</object><units>SDN:P06::UMIC</units>

//<subject>SDN:LOCAL:Micro-litter_Type</subject><object>SDN:P01::MLITTYPW</object><units>SDN:P06::UUUU</units>SDN:P06::UUUU</units><instrument>SDN:L22::NETT0177 (or NETT0176 or …)</instrument>

//<subject>SDN:LOCAL:Micro-litter_Size</subject><object>SDN:P01::MLITSIZW</object><units>SDN:P06::UUUU</units>SDN:P06::UUUU</units><instrument>SDN:L22::NETT0177 (or NETT0176 or …)</instrument>

//<subject>SDN:LOCAL:Micro-litter_Count</subject><object>SDN:P01::MLITCNTW</object><units>SDN:P06::UUUU</units>SDN:P06::UUUU</units><instrument>SDN:L22::NETT0177 (or NETT0176 or …)</instrument>

//<subject>SDN:LOCAL:Micro-litter_Weight</subject><object>SDN:P01::MLDWWD01</object><units>SDN:P06::UGRM</units>SDN:P06::UUUU</units><instrument>SDN:L22::NETT0177 (or NETT0176 or …)</instrument>

//<subject>SDN:LOCAL:Micro-litter_Shape</subject><object>SDN:P01::MLITSHPW</object><units>SDN:P06::UUUU</units>SDN:P06::UUUU</units><instrument>SDN:L22::NETT0177 (or NETT0176 or …)</instrument>

//<subject>SDN:LOCAL:Micro-litter_Color</subject><object>SDN:P01::MLITCOLW</object><units>SDN:P06::UUUU</units>SDN:P06::UUUU</units><instrument>SDN:L22::NETT0177 (or NETT0176 or …)</instrument>

//<subject>SDN:LOCAL:Micro-litter_Polymer_type</subject><object>SDN:P01::MLITPOLW</object><units>SDN:P06::UUUU</units>SDN:P06::UUUU</units><instrument>SDN:L22::NETT0177 (or NETT0176 or …)</instrument>

<br />

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//\<subject>SDN:LOCAL:WMO_Sea_States\</subject>\<object>SDN:P01::WMOCSSXX\</object>\<units>SDN:P06::UUUU\</units>

//\<subject>SDN:LOCAL:Wind_direction\</subject>\<object>SDN:P01::EWDAZZ01\</object>\<units>SDN:P06::UABB\</units>

//\<subject>SDN:LOCAL:Wind_speed\</subject>\<object>SDN:P01::EWSBZZ01\</object>\<units>SDN:P06::UVAA\</units>

//

## A "micro-litter ODV" example:  ODV default (mandatory) fields

| Cruise | Station | Type | YYYY-MM-DDThh:mm:ss | Longitude [degrees_east] | Latitude [degrees_north] | LOCAL_CDI_ID | EDMO_code | Bot. Depth [m] |
|---|---|---|---|---|---|---|---|---|
| EVHOE_2014 | 1 | B | 2014-10-19T18:53:00 | -2.85827 | 46.18228 | 791_20141019_MLIT_SURF | 486 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| EVHOE_2014 | 3 | B | 2014-10-20T18:16:00 | -3.63214 | 46.04764 | 791_20141019_MLIT_SURF | 486 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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## A "micro litter ODV" example:  ODV additional fields

| MinimumObservationDepth [m] | QV:SEADATANET | MaximumObservationDepth [m] | QV:SEADATANET | SampleID:INDEXED_TEXT | QV:SEADATANET | EventEndDateTime [YYYY-MM-DDThh:mm:ss] | QV:SEADATANET | EventEndLongitude [degrees_east] | QV:SEADATANET | EventEndLatitude [degrees_north] | QV:SEADATANET | Sampling Effort [km] | QV:SEADATANET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 0.5 | 1 | 1 | 1 | 2014-10-19T19:21:00 | 1 | -2.8904 | 1 | 46.17804 | 1 | 2.522824233 | 1 |
| 0 | 1 | 0.5 | 1 | 1 | 1 | 2014-10-19T19:21:00 | 1 | -2.8904 | 1 | 46.17804 | 1 | 2.522824233 | 1 |
| 0 | 1 | 0.5 | 1 | 1 | 1 | 2014-10-19T19:21:00 | 1 | -2.8904 | 1 | 46.17804 | 1 | 2.522824233 | 1 |
| 0 | 1 | 0.5 | 1 | 1 | 1 | 2014-10-19T19:21:00 | 1 | -2.8904 | 1 | 46.17804 | 1 | 2.522824233 | 1 |
| 0 | 1 | 0.5 | 1 | 1 | 1 | 2014-10-19T19:21:00 | 1 | -2.8904 | 1 | 46.17804 | 1 | 2.522824233 | 1 |
| 0 | 1 | 0.5 | 1 | 3 | 1 | 2014-10-20T18:38:00 | 1 | -3.66457 | 1 | 46.04999 | 1 | 2.521169862 | 1 |
| 0 | 1 | 0.5 | 1 | 3 | 1 | 2014-10-20T18:38:00 | 1 | -3.66457 | 1 | 46.04999 | 1 | 2.521169862 | 1 |
| 0 | 1 | 0.5 | 1 | 3 | 1 | 2014-10-20T18:38:00 | 1 | -3.66457 | 1 | 46.04999 | 1 | 2.521169862 | 1 |

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| Net_opening [cm] | QV:SEADATANET | Mesh_size [µm] | QV:SEADATANET | Micro-litter_Type:INDEXED_TEXT | QV:SEADATANET | Micro-litter_Size:INDEXED_TEXT | QV:SEADATANET | Micro-litter_Count [#] | QV:SEADATANET | Micro-litter_Weight [g] | QV:SEADATANET |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 60 | 1 | 300 | 1 | SDN:H01::H0100001 (items) | 1 | SDN:H03::H0300008 (1-5mm) | 1 | 12 | 1 | 0.0101 | 1 |
| 60 | 1 | 300 | 1 | SDN:H01::H0100001 (items) | 1 | SDN:H03::H0300009 (5mm-25mm) | 1 | 79 | 1 | 0.06672 | 1 |
| 60 | 1 | 300 | 1 | SDN:H01::H0100001 (items) | 1 | SDN:H03::H0300006 (1-2mm) | 1 | 1 | 1 | | 9 |
| 60 | 1 | 300 | 1 | SDN:H01::H0100001 (items) | 1 | SDN:H03::H0300007 (2-5mm) | 1 | 3 | 1 | | 9 |
| 60 | 1 | 300 | 1 | SDN:H01::H0100001 (items) | 1 | SDN:H03::H0300005 (300um-1mm) | 1 | 8 | 1 | | 9 |
| 60 | 1 | 300 | 1 | SDN:H01::H0100001 (items) | 1 | SDN:H03::H0300008 (1-5mm) | 1 | 13 | 1 | 0.0028 | 1 |
| 60 | 1 | 300 | 1 | SDN:H01::H0100001 (items) | 1 | SDN:H03::H0300009 (5mm-25mm) | 1 | 0 | 1 | 0 | 1 |
| 60 | 1 | 300 | 1 | SDN:H01::H0100001 (items) | 1 | SDN:H03::H0300006 (1-2mm) | 1 | 2 | 1 | | 9 |

*Highlighted in red on the table the "additional mandatory" fields

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# ANNEX 3: Composition of EMODnet Chemistry 3 consortium

| Participant Number * | Participant organisation name | Used short name | Country |
|---|---|---|---|
| 1 (project coordinator) | Istituto Nazionale di Oceanografia e di Geofisica Sperimentale | OGS | Italy |
| 2 (technical coordinator) | Mariene Informatie Service 'MARIS' BV | MARIS | Netherlands |
| 3 | Institut Français de Recherche pour l'Exploitation de la Mer | IFREMER | France |
| 4 | Institute of Marine Research | IMR | Norway |
| 5 | Aarhus University – Danish Centre for Environment and Energy | AU-DCE | Denmark |
| 6 | Flanders Marine Institute | VLIZ | Belgium |
| 7 | Royal Belgian Institute of Natural Sciences | RBINS | Belgium |
| 8 | NIOZ Royal Netherlands Institute for Sea Research | NIOZ | Netherlands |
| 9 | Sveriges Meteorologiska och Hydrologiska Institut | SMHI | Sweden |
| 10 | Hellenic Centre for Marine Research | HCMR | Greece |
| 11 | Institute of Oceanology Bulgarian Academy of Science | IO-BAS | Bulgaria |
| 12 | National Institute for Marine Research and Development "Grigore Antipa" | NIMRD | Romania |
| 13 | International Council for the Exploration of the Sea | ICES | International |
| 14 | Alfred Wegener Institute for Polar and Marine Research | AWI | Germany |
| 15 | University of Liege - GeoHydrodynamics and Environment Research | ULg | Belgium |
| 16 | Instituto Español de Oceanografía | IEO | Spain |
| 17 | Istituto Superiore per la Protezione e la Ricerca Ambientale | ISPRA | Italy |
| 18 | Marine Institute | MI | Ireland |
| 19 | Consiglio Nazionale delle Ricerche | CNR | Italy |
| 20 | Instituto Hidrografico | IHPT | Portugal |
| 21 | Institute of Oceanography and Fisheries | IOF | Croatia |
| 22 | Latvijas HidroEkologijas Instituts | LHEI | Latvia |
| 23 | Tallinna Tehnikaulikool | TUT | Estonia |
| 24 | Finnish Meteorological Institute | FMI | Finland |
| 25 | Nacionalni Institut za Biologijo | NIB | Slovenia |
| 26 | Israel Oceanographic and Limnological Research | IOLR | Israel |
| 27 | Finnish Environment Institute | SYKE | Finland |
| 28 | NERC British Oceanographic Data Centre | NERC-BODC | United Kingdom |

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| 29 | ORION - Joint research and development centre | ORION | Cyprus |
|---|---|---|---|
| 30 | Institute of Marine Biology | IMBK | Montenegro |
| 31 | All Russian Research Institute of Hydro-meteorological Information – WDC | RIHMI-WDC | Russian Federation |
| 32 | Iv. Javakhishvili Tbilisi State University | TSU-DNA | Georgia |
| 33 | Ukrainian Scientific Center of Ecology of the Sea | UkrSCES | Ukraine |
| 34 | State Oceanographic Institute | SOI | Russian Federation |
| 35 | Istanbul University, Institute of Marine Sciences & Management | IU-IMSM | Turkey |
| 36 | National Environmental Agency of the Ministry of Environmental Protection | NEA | Georgia |
| 37 | Institute of Marine Sciences, Middle East Technical University | IMS-METU | Turkey |
| 38 | Black Sea Commission Secretariate | BSCS | International |
| 39 | United Nation Environment Programme / Coordinating Unit for the Mediterranean Action Plan | UNEP/MAP | International |
| 40 | Rijkswaterstaat | RWS | The Netherlands |
| 41 | Deltares | Deltares | The Netherlands |
| 42 | P.P. Shirshov Institute of Oceanology Russian Academy of Science | SIO-RAS | Russian Federation |
| 43 | Marine Hydro-physical Institute | MHI | Russian Federation |
| 44 | A. O. Kovalevsky Institute of Marine Biological Research of RAS | IMBR | Russian Federation |
| 45 | Ukrainian Hydrometeorological Institute - Marine Branch | UHI-MB | Ukraine |