EMODnet
European Marine Observation and Data Network

Chemistry

# Structure and operational framework of the European Marine Observation and Data Network.


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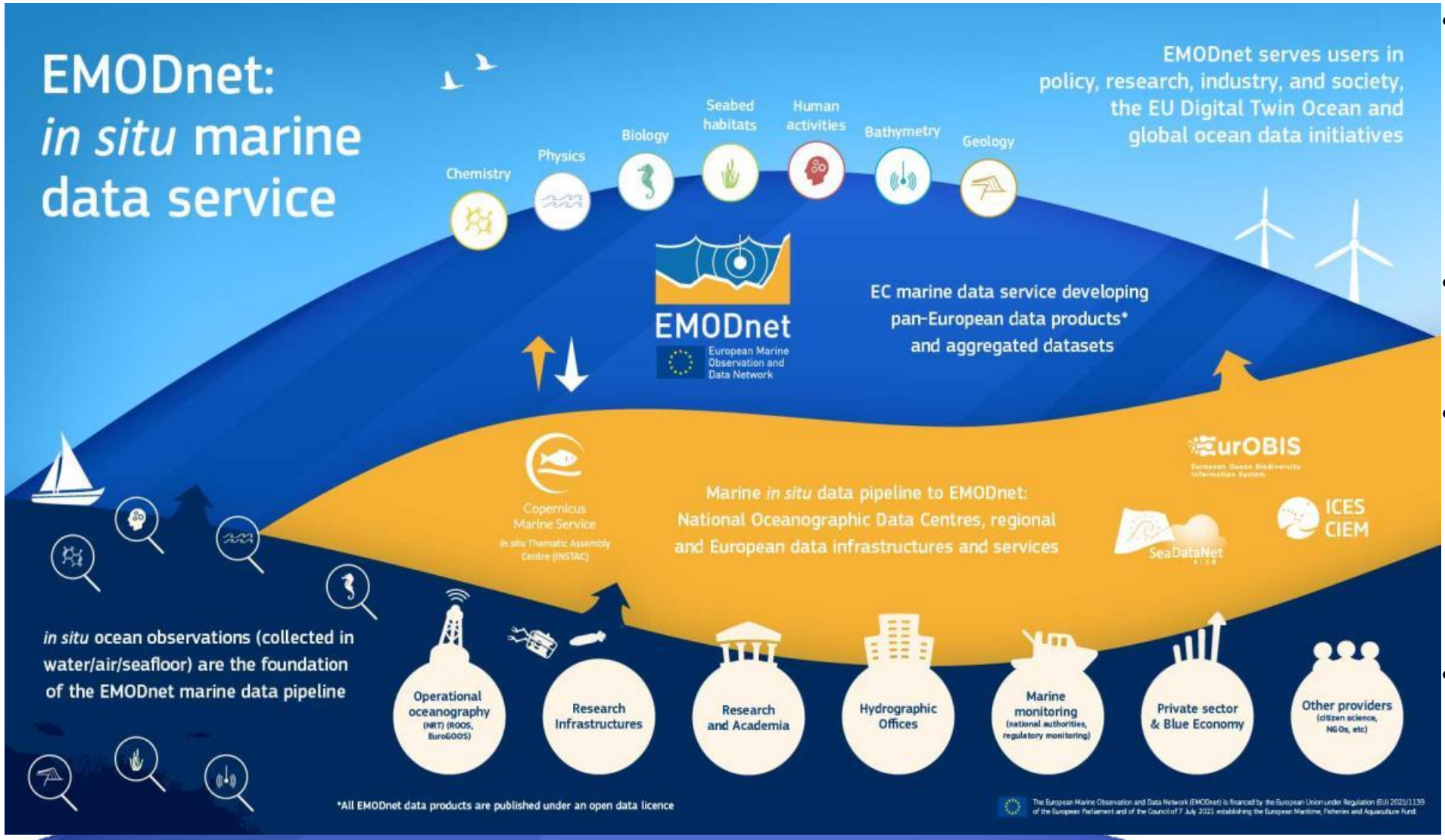
**Interregional Meeting on the architecture and development of NUTEC plastic database for marine microplastic monitoring"**
**14-17 July 2026, Vienna**

# EMODnet: your gateway to *in situ* marine data in Europe and beyond

## The European Marine Observation and Data Network

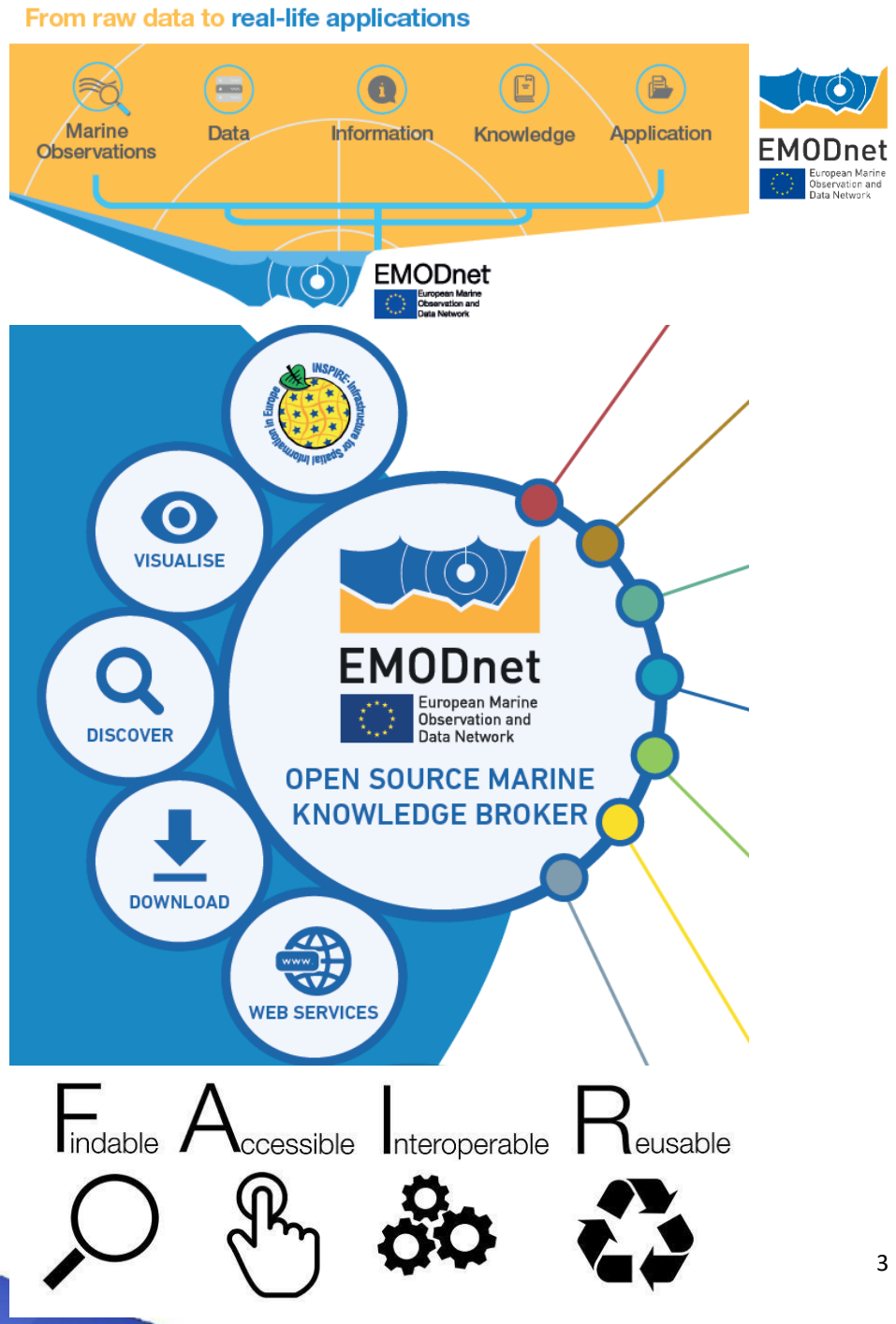



- Funded by Directorate-General for Maritime Affairs and Fisheries of the the European Commission (**EC DG MARE**)
- Initiated in **2009**, now with vision to 2035
- Implemented by a **network of > 120 organisations** working in synergy with national, regional and European marine data infrastructures
- Provides **easy and free access** to marine data, metadata and data products from 7 different domains

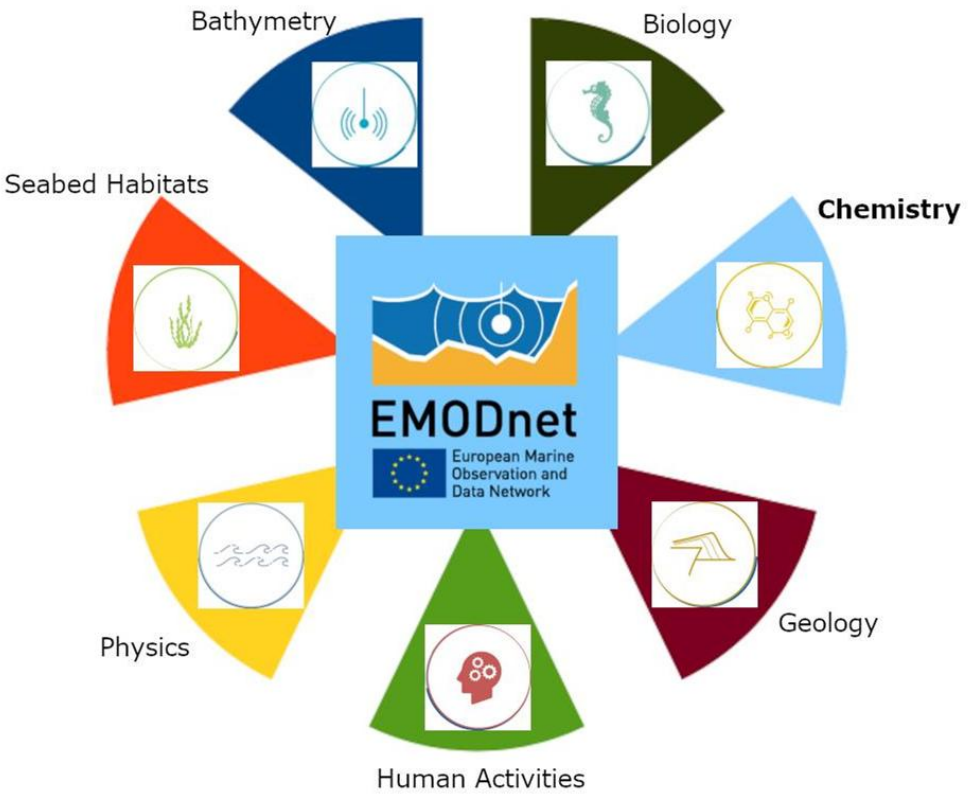
# EMODnet added value

EMODnet provides **pan-European data layers and data products** with **standardised and harmonised data and metadata** offered via **data services and web services**

- In accordance with the European spatial data standards INSPIRE and the FAIR data principles
- Aggregated, harmonised multi-parameter data collections
- Integrated data products
- Centralised map viewer service
- Central catalogue for data products
- Open and free downloads with CC BY 4.0 licence
- Web services, e.g. OGC WMS, WFS, CSW services, ERDDAP and other APIs



# EMODnet Chemistry



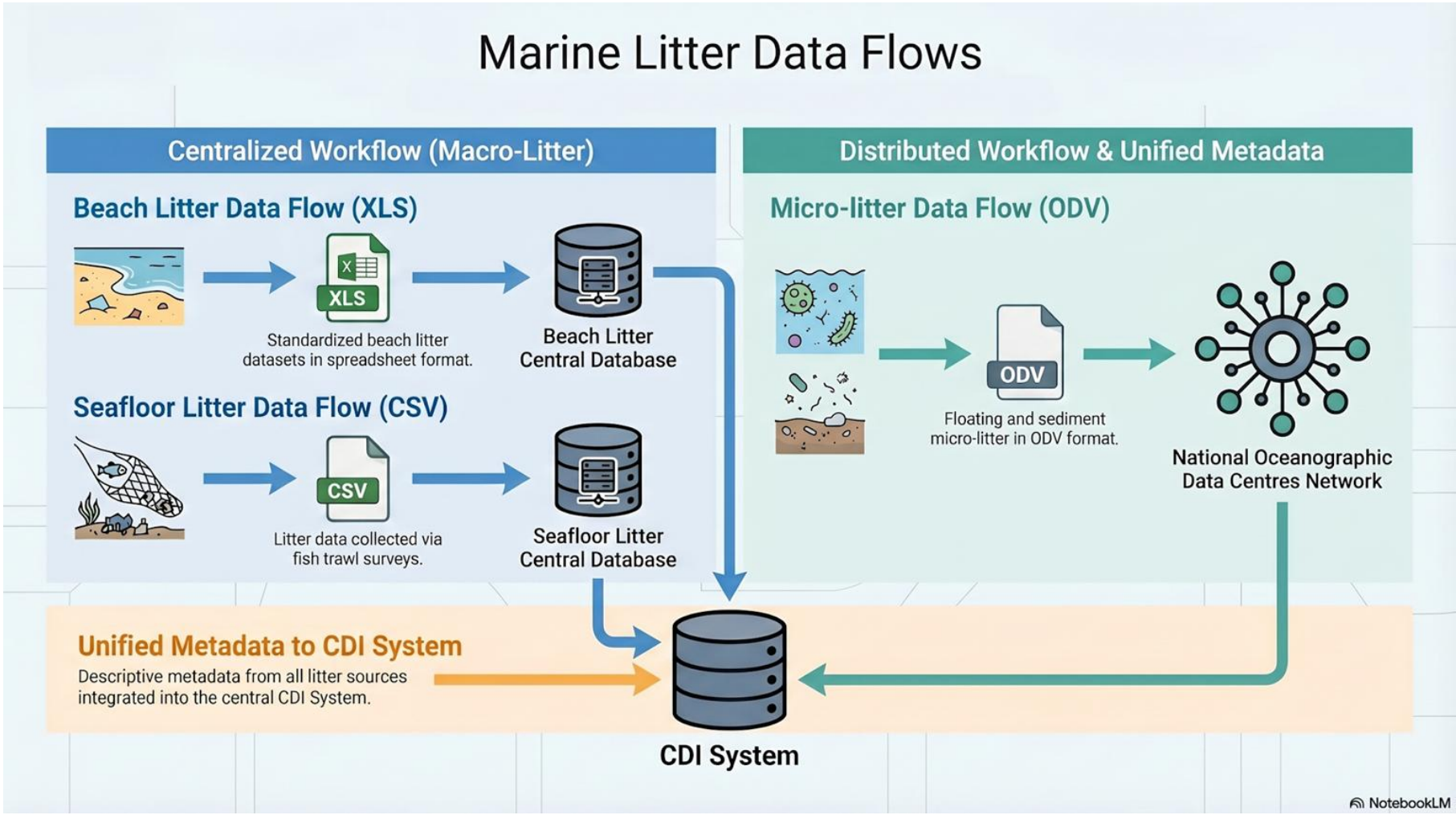

https://emodnet.ec.europa.eu/en/chemistry

| | Group of Parameters | Parameters |
|---|---|---|
| Marine Litter | Beach macrolitter, Seafloor macrolitter, Floating and sediment microlitter | Composition, Abundance, etc. |
| Eutrophication | Nutrients, dissolved gases, etc. | N, P, Si, $O_2$, Chl-a, etc. |
| Contaminants | Hydrocarbons, Heavy metals, Pesticides, etc. | Anthracene, Fluoranthene, Me, Cd, Pb, TBT, DDTs, etc. |

EMODnet
European Marine Observation and Data Network

- **European thematic network of 44 organisations** (national oceanographic data centres, environmental monitoring agencies, expert institutes, international organisation)
- **Coordinated by OGS (Italy)**
- Data contributed by **66 data centres**
- **500+ data originators**
- **32 countries** around European seas
- **Board of Experts** for interaction with EU JRC, EEA, DG Env and Regional Sea Conventions for feedback and refining data products and metadata
- **SeaDataNet** is used for managing and structuring metadata and data

# Marine litter data management




Beach litter consolidated protocols (**OSPAR, UNEP, UNEP – Marlin, TG ML**)

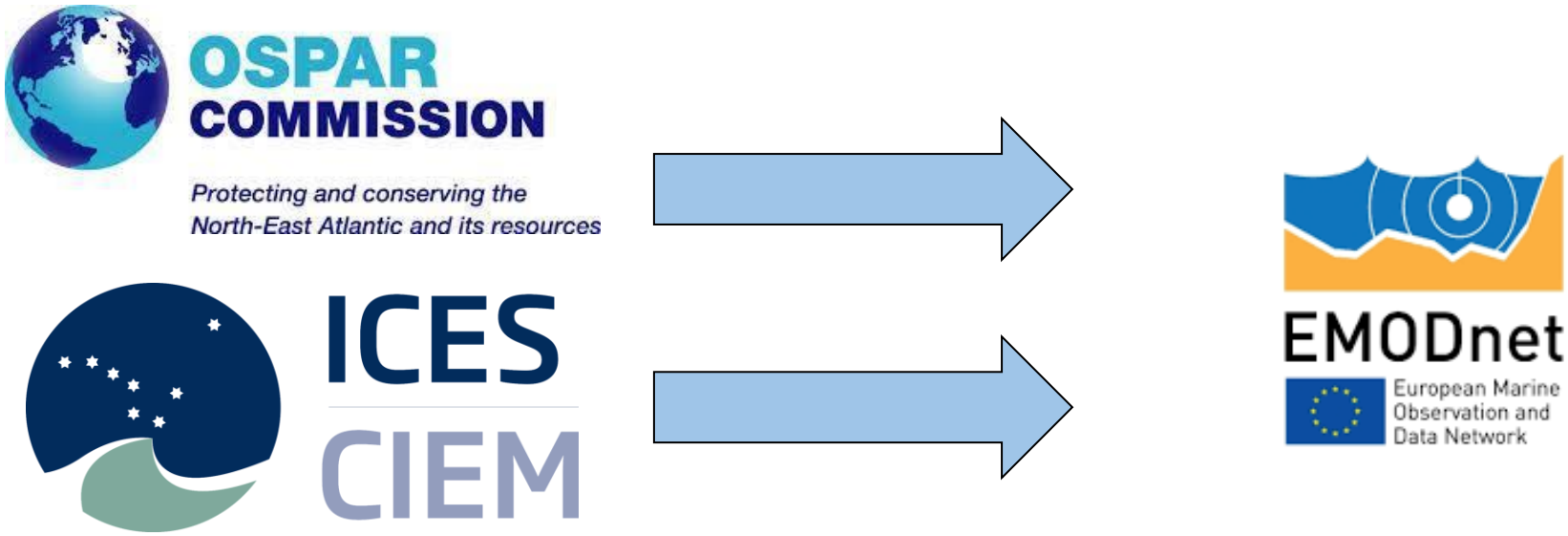
Seafloor trawling consolidated protocols (**ICES, MEDITS, DeFishGear**)

Microlitter ascii format (Litter ODV)

**Pillar/Lesson Learned: Agreed and harmonized formats and guidelines**, based on: **consolidated communities, their best practices** and protocols **when available**

# Marine litter data management

## Consolidated data workflows from recognised organisations into EMODnet




**OSPAR** (**beach litter**) and **ICES** (**seafloor litter from trawlings and micro-litter**) maintain the data collection in their communities and **periodically** there is an **alignment** between the data in their systems and EMODnet

This avoids **duplication** of **efforts**

# Micro-litter data formats

## Floating and sediment microlitter data

**Metadata description:**

Common Data Index

- xml profile
- who, where, when, what, …?)

**Data (litter-ODV)**

- Specific ODV format (ascii)
- Specific data formatting guidelines

→ **Mandatory**: crucial for monitoring and assessment purposes

→ **Optional**: useful to describe datasets but not fundamental

**Metadata and data** are both **described by lists of internationally agreed and regularly reviewed terms** managed in **Common Vocabularies** and **metadata directories**

# Micro-litter metadata

## Common Data Index: who, where, when, what, how

- ***Data originator*** **institution**
- Collator institution
- Project
- Parameters measured
- Instrument used
- Data policy
- Spatial and temporal coordinates

**DISCOVERY PARAMETER** ?

| | |
|---|---|
| Micro-litter in water bodies | (2680) |
| Micro-litter in sediments | (190) |

**DATA ORIGINATOR COUNTRY**

- Estonia
- Finland
- France
- Germany
- Greece
- Italy
- Latvia
- Montenegro
- Poland
- Slovenia
- Spain
- Sweden
- Switzerland
- Turkey

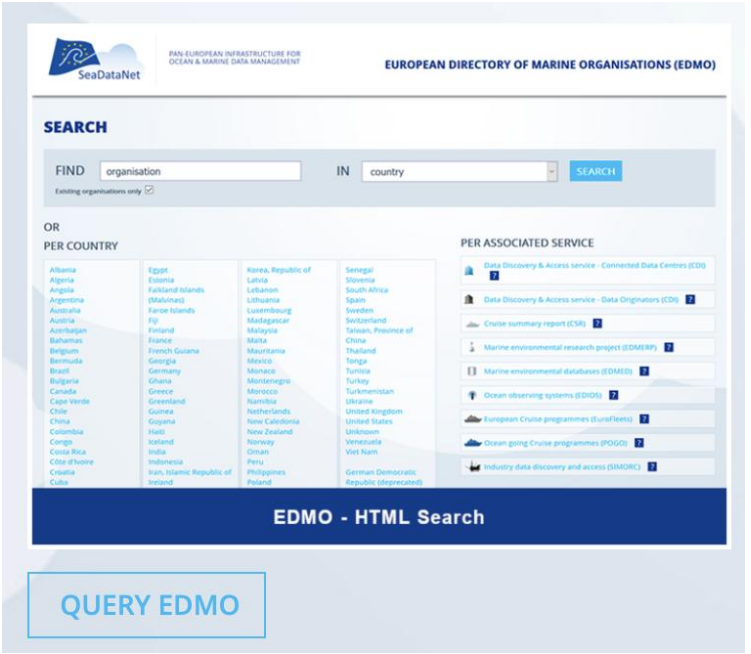
| Per Year | Datasets |
|---|---|
| 2025 | 73 |
| 2024 | 88 |
| 2023 | 330 |
| 2022 | 219 |
| 2021 | 161 |
| 2020 | 108 |
| 2019 | 489 |
| 2018 | 467 |
| 2017 | 370 |
| 2016 | 330 |
| 2015 | 174 |
| 2014 | 65 |
| 2013 | 25 |
| 2012 | 5 |
| 2011 | 4 |


**Data discovery and access system**

# EDMO catalog

## European Directory of Marine Organisations (EDMO)

- EDMO is a directory of research institutes, data holding centres, monitoring agencies, governmental and private organisations, engaged in oceanographic and marine research activities, data & information management and/or data acquisition activities.
- Currently, EDMO lists and describes more than 4.000 organisations.
- It is managed by SeaDataNet data infrastructure, with MARIS taking care of the technical side
- EDMO offers two interfaces, a regular HTML interface for "human users" and a SPARQL Endpoint for machine applications.
- The update of the catalog is managed by country, with a responsible data centre as intermediary. In the case of NUTEC initiative, OGS acts as intermediary curating the new entries requested by means of the specific form




# EDMO catalog

SeaDataNet

PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

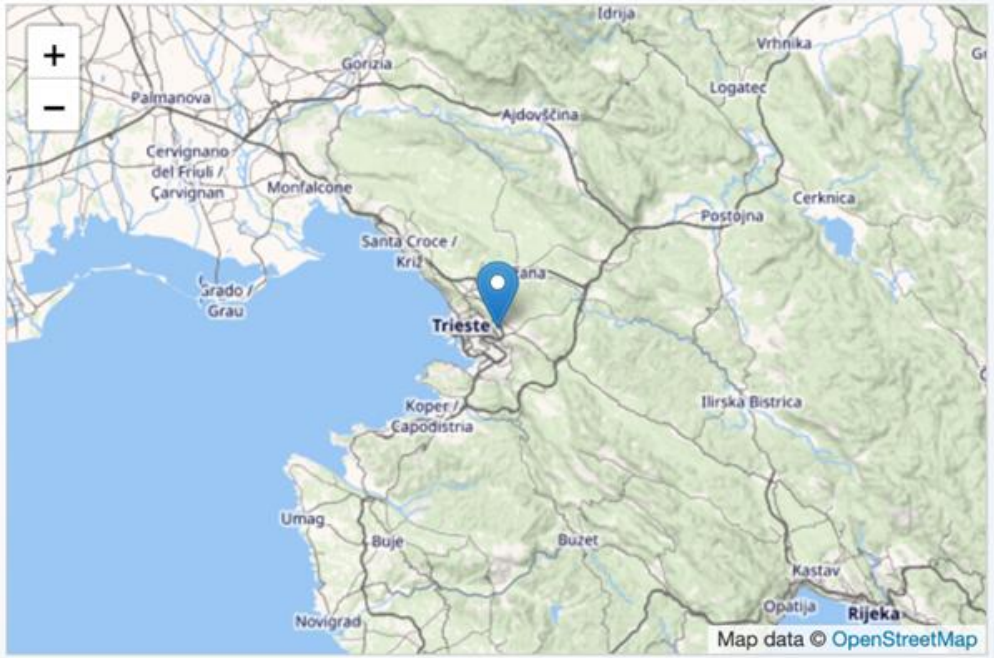
EUROPEAN DIRECTORY OF MARINE ORGANISATIONS (EDMO)

## ORGANISATION DETAILS

Show (3325 of 5867)

### DETAILS

| | |
|---|---|
| Name | **National Institute of Oceanography and Applied Geophysics - OGS, Division of Oceanography** (OGS) |
| Native name | Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS, Sezione di Oceanografia |
| Address | Borgo Grotta Gigante 42/c |
| Zipcode | 34010 |
| City | Sgonico (Trieste) |
| Country | Italy |
| Email | nodc@ogs.it |
| Centre Website | http://www.ogs.it |




GET DIRECTIONS

### ORGANISATION PROFILE

OGS

The Division of Oceanography, currently, has more than 60 researchers, technologists, technicians and administrative staff. The activities of the division range from scientific research to technological development and are addressed to experimental and theoretical oceanography, with particular reference to physical and biological oceanography, biogeochemistry, marine ecology and modeling of marine systems. Currently, the expertise of the staff is regrouped into four areas:
Physical Oceanography (Experimental, Autonomous Systems, Coastal)
Biogeochemistry
Marine Biology
Modeling of marine system
The Technological Development Unit (TECDEV), with Marine Metrology and Calibration Unit (CTMO) and mechanical workshop (OFFMEC), and the National Oceanographic Data Center (NODC, Centro Nazionale di Dati Oceanografici) operate within the Division of Oceanography. The NODC is part of the International Oceanographic Data Exchange (IODE) system of the UNESCO's Intergovernmental Oceanographic Commission (IOC). The NODC database currently contains more than 300 thousand vertical profiles of physical and biochemical variables, to which the

# Micro-litter data format

## Floating micro-litter

- **Mandatory data** (min-max depth, start coordinates, distance, net-opening, mesh-size, type, size & count)
- **Additional information**: end coordinates, weight, color, meteorological conditions...

| 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 microlitter | |
| MaximumObservationDepth [m] | MAXWDIST | mandatory in ODV microlitter | |
| SampleID:INDEXED_TEXT | SAMPID01 | mandatory in ODV microlitter | |
| SamplingEffort [Km or L] | LENTRACK/ VOLWBSMP | mandatory in ODV microlitter | 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 microlitter | 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 [micrometres] | MSHSIZE1 | mandatory in ODV microlitter | Mesh size of the filtering surface (e.g. manta or bongo net, filtering "cakes" of OceanPack RACE,...) in micrometres |
| Microlitter_Type:INDEXED_TEXT | MLITTYPW | mandatory in ODV microlitter | Type of the item (H01 SDN vocabulary) |
| Microlitter_Size:INDEXED_TEXT | MLITSIZW | mandatory in ODV microlitter | Size classes (H03 SDN vocabulary) |
| Microlitter_Count [Dimensionless] | MLITCNTW | mandatory in ODV microlitter | 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/optionnal | End date/time |
| EventEndLongitude [degrees_east] | ENDXXLON | additional/optionnal | End point coordinates. Either End Lat/Lon or SamplingEffort are mandatory. |
| EventEndLatitude [degrees_north] | ENDXXLAT | additional/optionnal | End point coordinates. Either End Lat/Lon or distance are mandatory. |
| Microlitter_Weight [g] | MLDWWD01 | additional/optionnal | Weight of the collected items, not mandatory Information in grams |
| Microlitter_Shape:INDEXED_TEXT | MLITSHPW | additional/optionnal | Shape of the item (H02 SDN vocabulary) |
| Microlitter_Color:INDEXED_TEXT | MLITCOLW | additional/optionnal | Colour classes (H04 SDN vocabulary) |
| Microlitter_Polymer_type:INDEXED_TEXT | MLITPOLW | additional/optionnal | Polymer type of the micro-litter (H05 SDN vacabulary) |
| WMO_Sea_State [Dimensionless] | WMOCSSXX | additional/optionnal | Sea conditions following the Douglas scale |
| Wind_direction [degT] | EWDAZZ01 | additional/optionnal | Direction relative to true north from which the wind is blowing |
| Wind_speed [m/s] | EWSBZZ01 | additional/optionnal | 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. |

# Micro-litter data format

## Micro-litter in sediment

- **Mandatory data:** sampling depth, sampling effort, type, size & count)
- **Additional information:** sediment characteristics, weight, color, transparency…

| Label/column header in datafile | Conceptid | Use | Comments |
|---|---|---|---|
| Cruise | | **metadata/mandatory (ODV Default)** | |
| Station | | **metadata/mandatory (ODV Default)** | |
| Type | | **metadata/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 | | **metadata/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] | | **metadata/mandatory (ODV Default)** | point coordinates. |
| Latitude [degrees_north] | | **metadata/mandatory (ODV Default)** | point coordinates. |
| LOCAL_CDI_ID | | **metadata/mandatory (ODV Default)** | |
| EDMO_code | | **metadata/mandatory (ODV Default)** | EDMO_CODE of the data centre distributing the data (the one connected to the CDI service) |
| Bot. Depth [m] | | **metadata/mandatory (ODV Default)** | Field empty if no data |
| COREDIST [m] | COREDIST | **primary variable/mandatory (ODV default)** | The depth of the sampling point below the seafloor |
| MINCDIST [m] | MINCDIST | **strongly reccommended** | The distance between the top of a core sample and the seabed. |
| MAXCDIST [m] | MAXCDIST | **strongly reccommended** | The distance between the base of a core sample and the seabed. For an unsegmented core with its top coincident with the bed this is equivalent to the core length. |
| SampleID:INDEXED_TEXT | SAMPID01 | **strongly recommended when available** | Sample identification |
| SamplingEffort [m² or kg…] | AREABEDS<br>NEWCXX02<br>PEWCXX02<br>VOLSEDSM | **mandatory** | The amount of sampled sediment. It can be the survey area in m², the wet weight (ww) of the sample in kg, the dry weight (dw) of sediment in kg or the volume in litres |
| Proportion_sand_size_particles [%] | SANDZZZZ | additional/optional | The proportion of sand-size particles in the sample |
| Proportion_clay_size_particles [%] | CLAYZZZZ | additional/optional | The proportion of clay-size particles in the sample |
| Proportion_organic_mater [%] | STTMLIBS | additional/optional | Concentration of total organic matter in the sample |
| Proportion_sylt_size_particles [%] | SYLTZZZZ | additional/optional | The proportion of sylt-size particles in the sample |
| Water_sample_content [%] | WCWTDRXX | additional/optional | Water content in the sample. Allows comparability between dw/ww samples |
| ML_Type:INDEXED_TEXT | MLITTYPS | **mandatory** | Type of microlitter (H01) |
| Microlitter_Count [Dimensionless] | MLITCNTS | **mandatory** | Number of items collected. It's the official mandate from MSFD to provide the count of collected microplastics |
| Microlitter_Weight [g] | MLDWSD01 | additional/optional | Weight of the collected items, not mandatory Information in grams |
| Microlitter_Size:INDEXED_TEXT | MLITSIZS | **mandatory** | Size classess (H03 SDN vocabulary) |
| Microlitter_Shape:INDEXED_TEXT | MLITSHPS | additional/optional | Shape of the item (H02 SDN vocabulary) |
| Microlitter_Color:INDEXED_TEXT | MLITCOLS | additional/optional | Colour classes (H04 SDN vocabulary) |
| Microlitter_Transparency:INDEXED_TEXT | MLITROPS | additional/optional | Transparency classes (H06 SDN vocabulary) |
| Microlitter_Polymer_type:INDEXED_TEXT | MLITPOLS | additional/optional | Polymer type of the micro-litter (H05 SDN vacabulary) |

# Micro-litter data format

03448169_ODV_V0.txt

```
//<sdn_reference xlink:href="https://cdi.seadatanet.org/report/edmo/713/MLS2021_125/v0/xml" xlink:role="isDescribedBy" xlink:type="SDN:L23::CDI" sdn:scope="713:MLS2021_125" />
//Reported microlitter type of microplastic items includes any shapes and types of microplastic fragments/particles e.g. pellets, films, foams etc., it does not include any kind of thread-like particles. Reported microlitter
type of filaments includes any kind of thread-like microplastic particles.

//
//SDN_parameter_mapping
//<subject>SDN:LOCAL:COREDIST</subject><object>SDN:P01::COREDIST</object><units>SDN:P06::ULCM</units>
//<subject>SDN:LOCAL:MINCDIST</subject><object>SDN:P01::MINCDIST</object><units>SDN:P06::ULCM</units>
//<subject>SDN:LOCAL:MAXCDIST</subject><object>SDN:P01::MAXCDIST</object><units>SDN:P06::ULCM</units>
//<subject>SDN:LOCAL:SampleID</subject><object>SDN:P01::SAMPID01</object><units>SDN:P06::XXXX</units>
//<subject>SDN:LOCAL:SamplingEffort</subject><object>SDN:P01::VOLSEDSM</object><units>SDN:P06::UGRM</units>
//<subject>SDN:LOCAL:Microlitter_Type</subject><object>SDN:P01::MLITTYPS</object><units>SDN:P06::XXXX</units><instrument>SDN:L22::TOOL1285</instrument>
//<subject>SDN:LOCAL:Microlitter_Count</subject><object>SDN:P01::MLITCNTS</object><units>SDN:P06::UUUU</units><instrument>SDN:L22::TOOL1285</instrument>
//<subject>SDN:LOCAL:Microlitter_Size</subject><object>SDN:P01::MLITSIZS</object><units>SDN:P06::XXXX</units><instrument>SDN:L22::TOOL1285</instrument>
//<subject>SDN:LOCAL:Microlitter_Color</subject><object>SDN:P01::MLITCOLS</object><units>SDN:P06::XXXX</units><instrument>SDN:L22::TOOL1285</instrument>
//
Cruise  Station Type    yyyy-mm-ddThh:mm:ss.sss Longitude [degrees_east]        Latitude [degrees_north]        LOCAL_CDI_ID    EDMO_code       Bot. Depth [m]  COREDIST [cm]   QV:SEADATANET   MINCDIST [cm]   QV:SEADATANET
MAXCDIST [cm]   QV:SEADATANET   SampleID:INDEXED_TEXT   QV:SEADATANET   SamplingEffort [g]      QV:SEADATANET   Microlitter_Type:INDEXED_TEXT   QV:SEADATANET   Microlitter_Count [Dimensionless]       QV:SEADATANET
Microlitter_Size:INDEXED_TEXT   QV:SEADATANET   Microlitter_Color:INDEXED_TEXT  QV:SEADATANET
2021_009        125     B       2021-09-01T00:00:00.000 23.3999 58.1978 MLS2021_125     713     25      5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic
items)  1       1       1       SDN:H03::H0300018 (100-299um)   1       SDN:H04::H0400001 (black/grey)  1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300018 (100-299um)   1       SDN:H04::H0400004 (white/cream) 1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300018 (100-299um)   1       SDN:H04::H0400002 (blue/green)  1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300018 (100-299um)   1       SDN:H04::H0400006 (orange/pink/red)     1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300018 (100-299um)   1       SDN:H04::H0400005 (yellow)      1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300018 (100-299um)   1       SDN:H04::H0400003 (brown/tan)   1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300018 (100-299um)   1       SDN:H04::H06AA001 (transparent/translucent)     1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300018 (100-299um)   1       SDN:H04::H0400008 (multicolour/gold/silver)     1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300005 (300um-1mm)   1       SDN:H04::H0400001 (black/grey)  1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300005 (300um-1mm)   1       SDN:H04::H0400004 (white/cream) 1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
SDN:H03::H0300005 (300um-1mm)   1       SDN:H04::H0400002 (blue/green)  1
                                                                                5       1       0       1       5       1       MPS202105       1       100     1       SDN:H01::H0100001 (microplastic items)  1       0       1
```

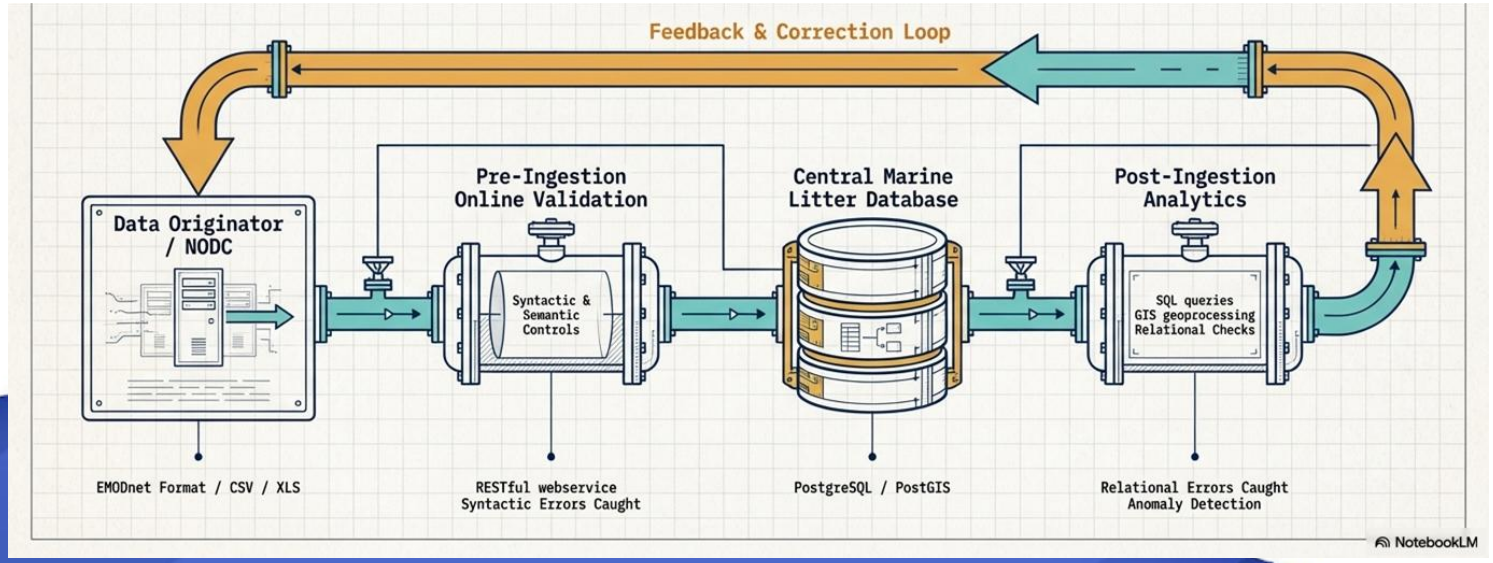
# Loop for the quality of marine litter data

## Quality checks before and after ingestion

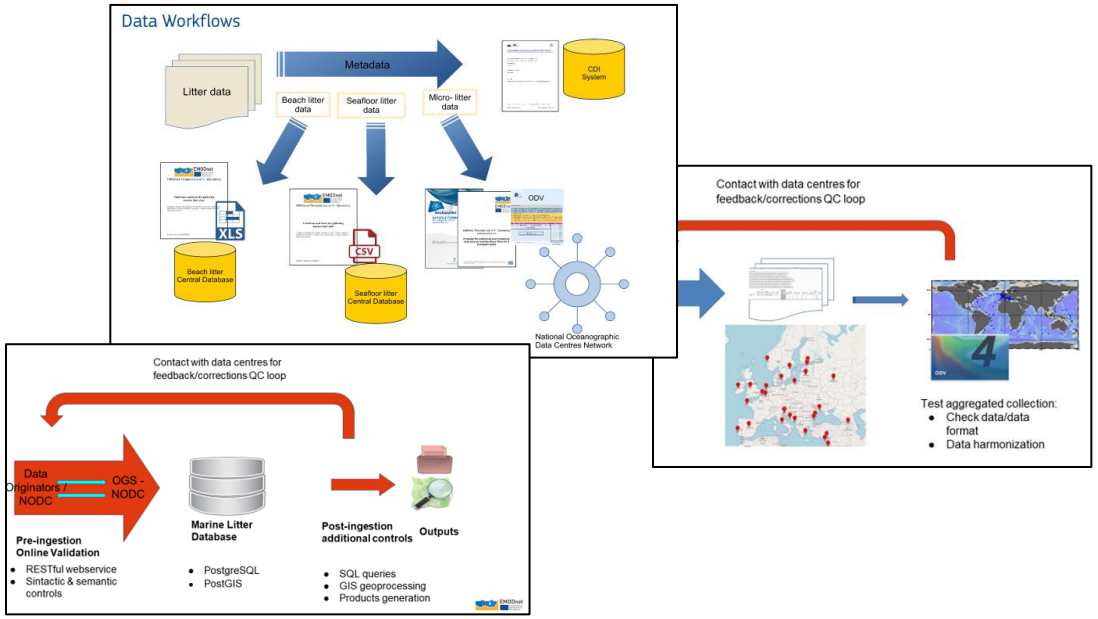
**Pillar/Lesson Learned:**

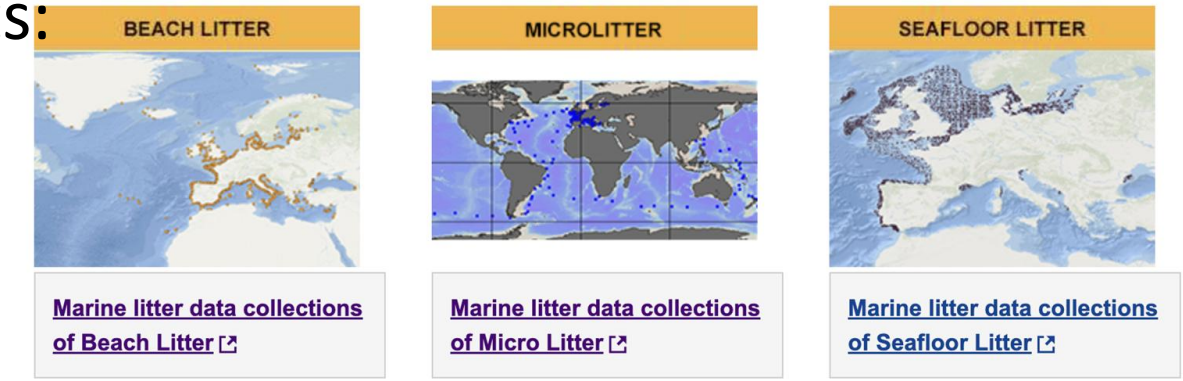
**data validation to ensure the best possible data quality and reliability over time**

- **pre-ingestion phase: streamlining** the data management workflow (**pre**- is **more efficient & safe** than **post**-)
- **Post-ingestion quality:**
  - Using SQL, Python, QGIS as languages and tools
  - Correction of errors, gaps or anomalies found (in agreement with data originators)
  - Improvement of data products following stakeholders feedback

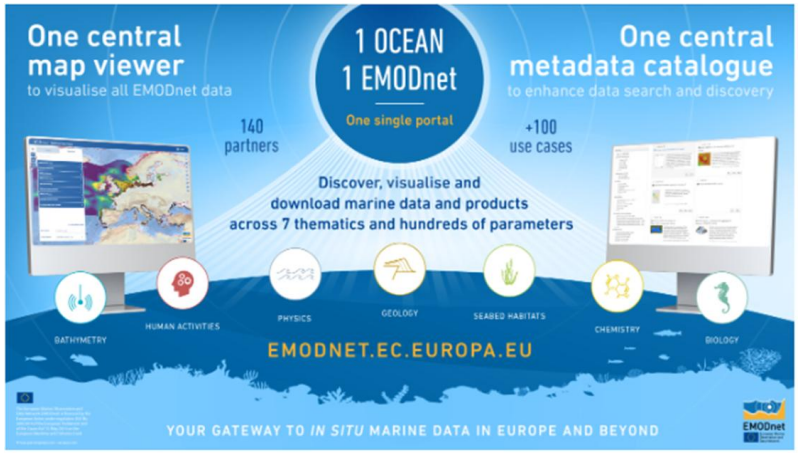


# The data curation workflow and its results:

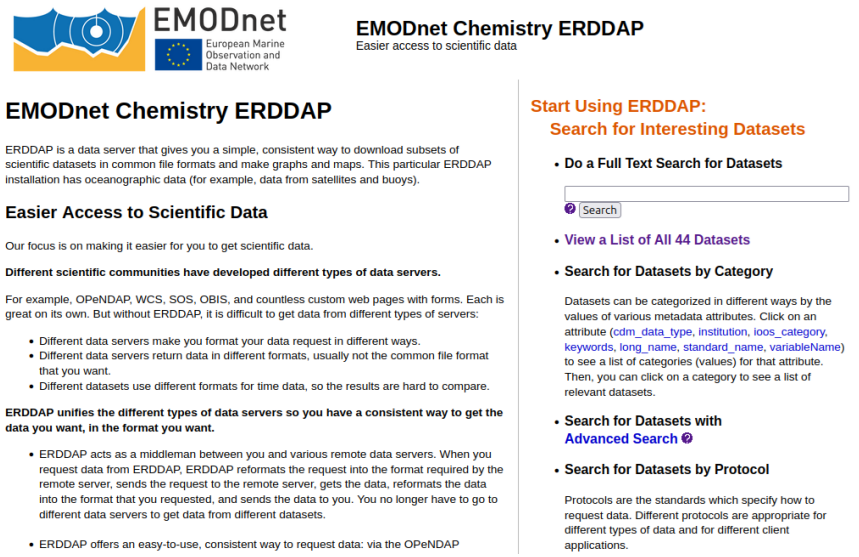



- Data products:
- Harmonized and validated datasets



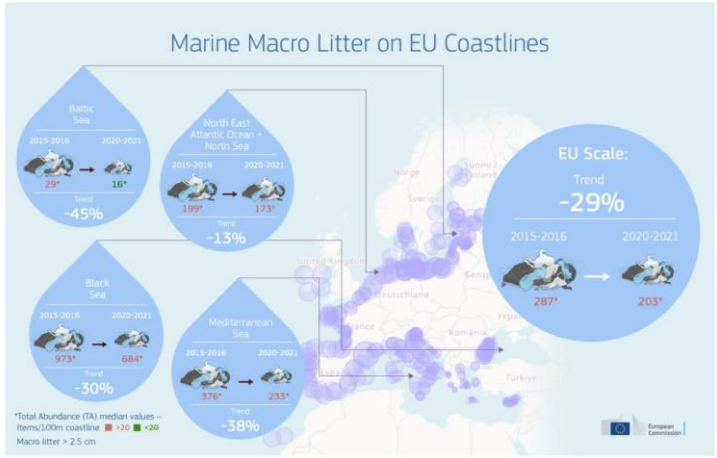

https://emodnet.ec.europa.eu/



# Interactions and feedback from expert groups

## The European MSFD Technical Group on Marine Litter

- The MSFD Technical Group on Marine Litter identified EMODnet as the **European platform for marine litter data**
- **National Oceanographic Data Centres** supporting EU Member States in data standardization and quality control
- **Harmonized datasets** for the **assessment** of litter abundance, **baselines**, **trends** and distribution:
  - Baselines: beach litter published in 2019, ongoing work for seafloor and micro-litter
  - Trends: published for beach litter
- Work towards a methodology to obtain quantitative and comparable data and metadata of **marine macrolitter from seafloor images and observations**, to complement data from trawling worldwide :
  - Development of data management system


European Coastline Macro Litter Trends 2015 - 2021

# Interactions and feedback from expert groups (Global initiatives)

**Global Partnership on Plastic Pollution and Marine Litter** (GPML):

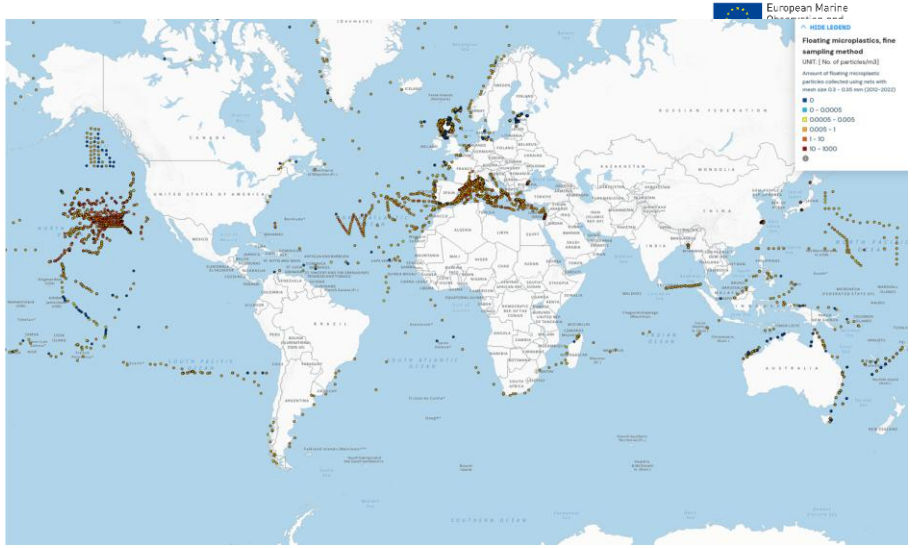
- Data and products sharing (Digital Platform)
- Revision/alignment of glossary and ontologies/vocabularies (Community of Practice on Plastic Monitoring and Assessment Harmonization)

G20 **Actions against Marine Plastic Litter** lead by the Ministry of the Environment Japan (MOEJ):

- **Guidelines** for Harmonizing Ocean Surface Microplastic Monitoring Methods (May 2019)
- Developing an **Atlas of Ocean Microplastic** (AOMI)

Under the umbrella of the **Integrated Marine Debris Observing System** (IMDOS)

Relevant dialogs to **promote/facilitate** different levels of **harmonization** to allow **usage and compatibility** on the **global scale**




# EMODnet Associated Partners

- Organisations who wish to join the EMODnet partnership and contribute to its objectives
- Flexible arrangement to allow more organisations to join EMODnet in a straightforward and transparent way.
- It enables formally recognised as a partner of the EMOD-network without receiving funding, without the need to be a contractual partner in one of the projects and without the need to adhere to associated contractual obligations;
- Interested parties to contribute to and fully benefit from the network's broad range of tools and activities.


## EMODnet Ingestion Service

- To identify and reach out to organisations who are managing marine datasets and who are not yet connected and contributing to the existing European marine data management infrastructures
- To motivate and **support** those **potential data providers** to contribute to EMODnet
- To **facilitate** the **inclusion** and **harmonisation** of those **marine datasets**, with standardised and complete metadata, in the EMODnet data, data services and products.

EMODnet

European Marine Observation and Data Network

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