EMODnet
European Marine Observation and Data Network

# Marine litter data management
EMODnet and the PArtnership for China and Europe

Alessandra Giorgetti, Matteo Vinci, Maria Eugenia Molina Jack, OGS
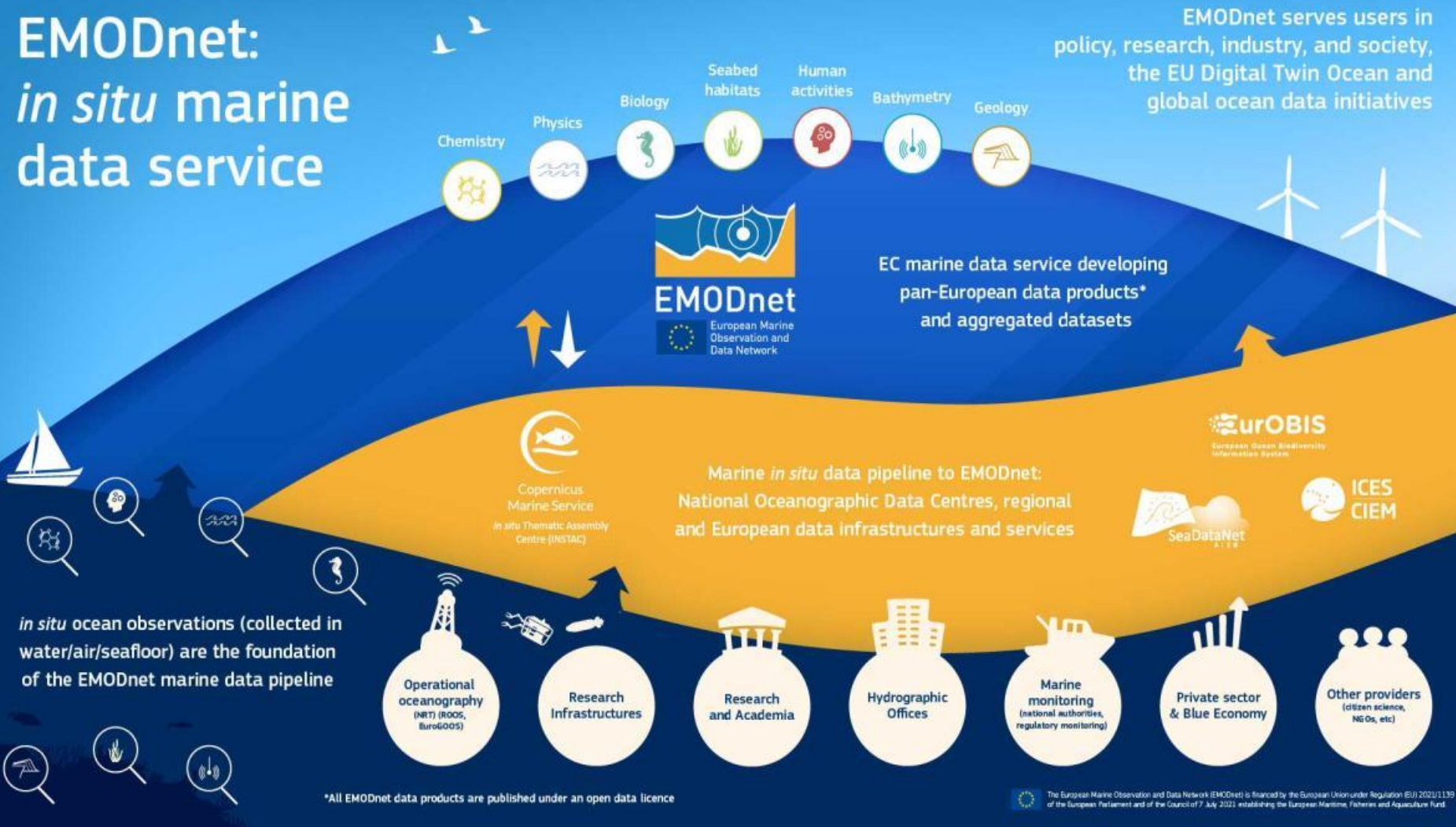**Jan-Bart Calewaert, Vicente Fernandez, EMODnet Secretariat**

International Workshop "Monitoring Assessment, and Prevention of Marine Litter on Seafloor"
9-11 October 2024

EMODnet: your gateway to *in situ* marine data in Europe and beyond
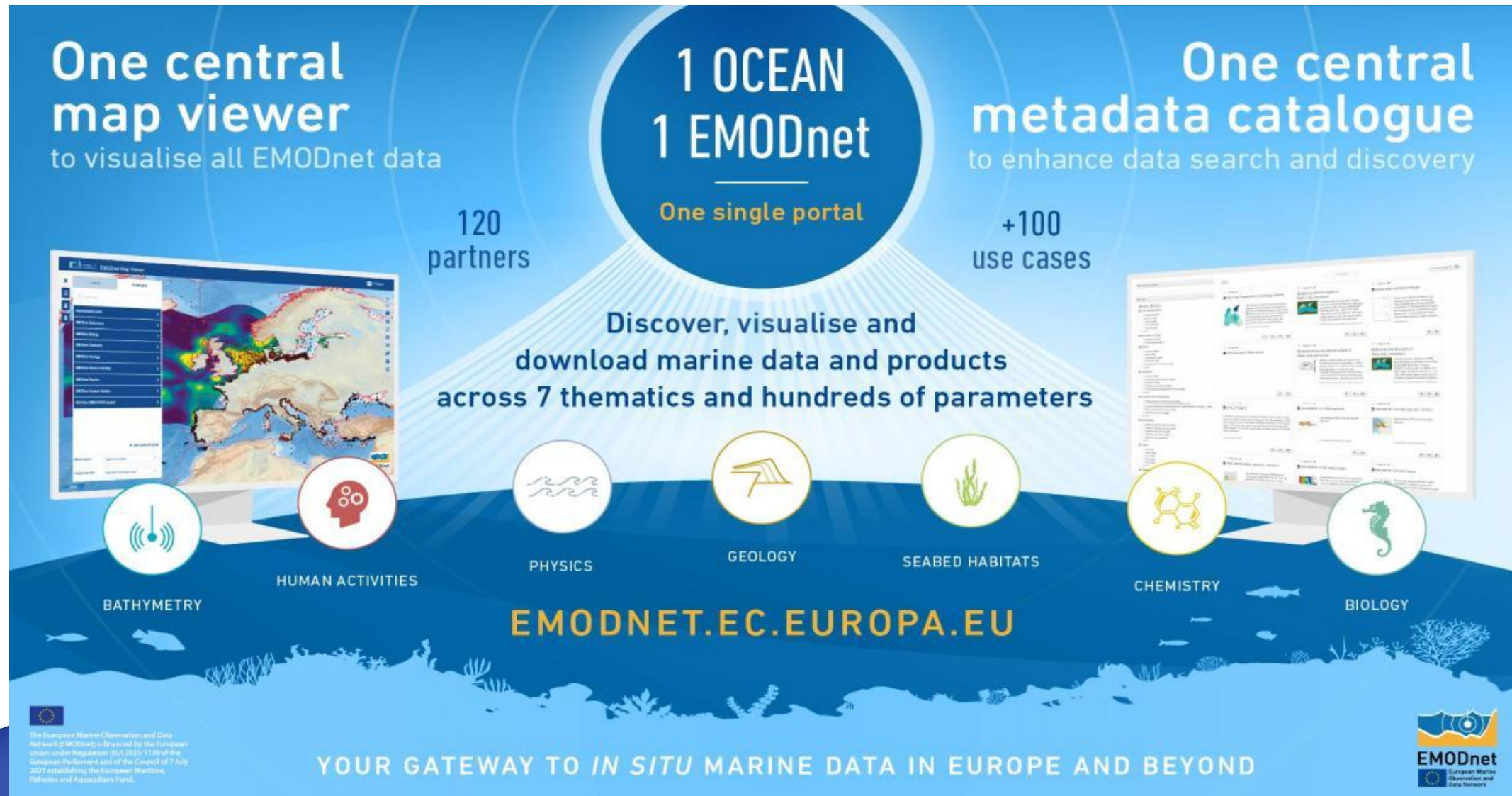## The European Marine Observation and Data Network
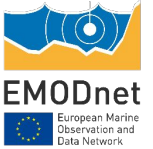
- Funded by Directorate-General for Maritime Affairs and Fisheries of the the European Commission (**EC DG MARE**)

- 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 Central Portal

Since Jan 2023, a single point of access to the most comprehensive collection of marine observations and products in Europe

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
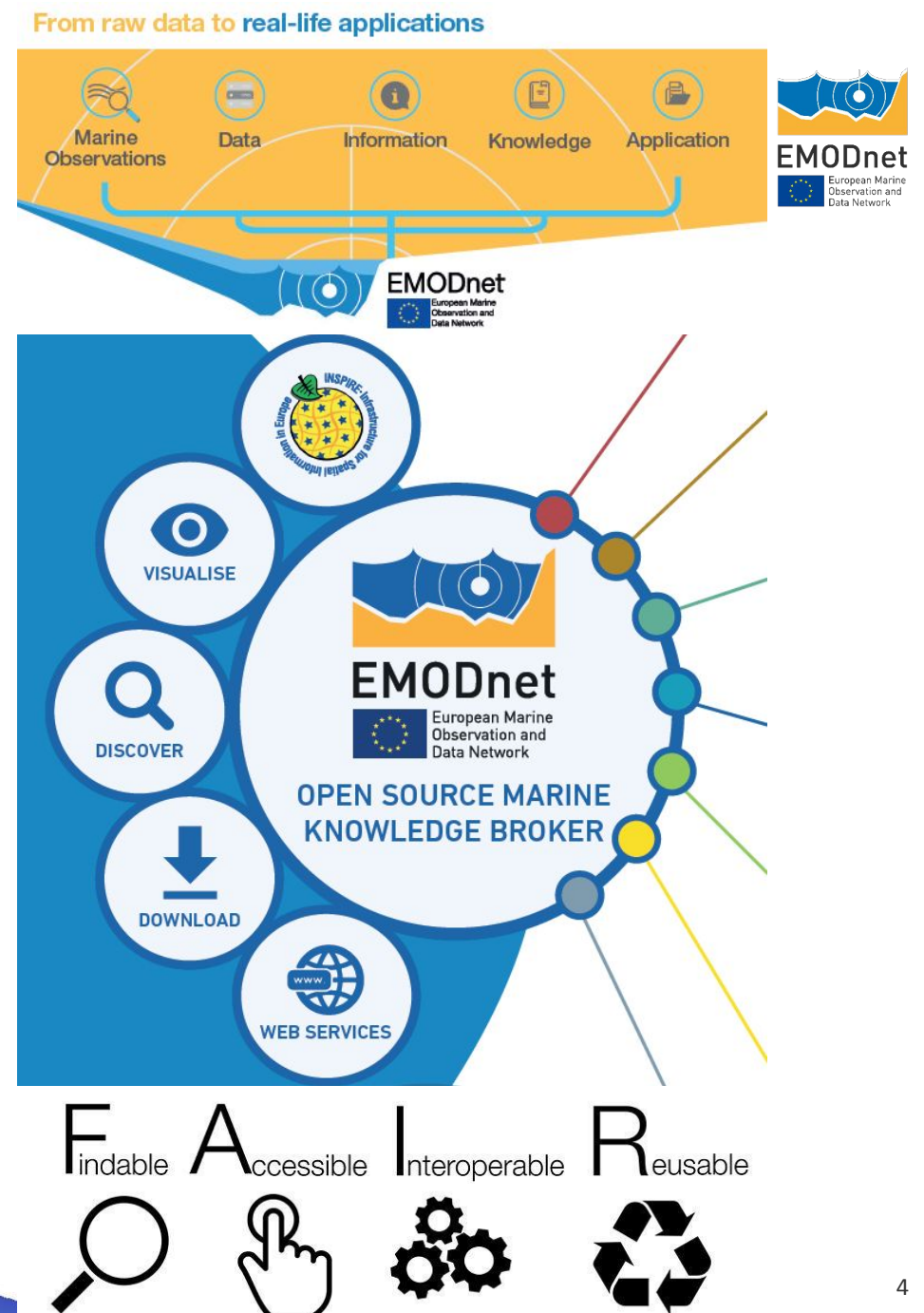
EMODnet – 7 thematic areas and networks

Bathymetry

Physics

Chemistry

Biology

Geology

Seabed Habitats

Human Activities

emodnet.ec.europa.eu
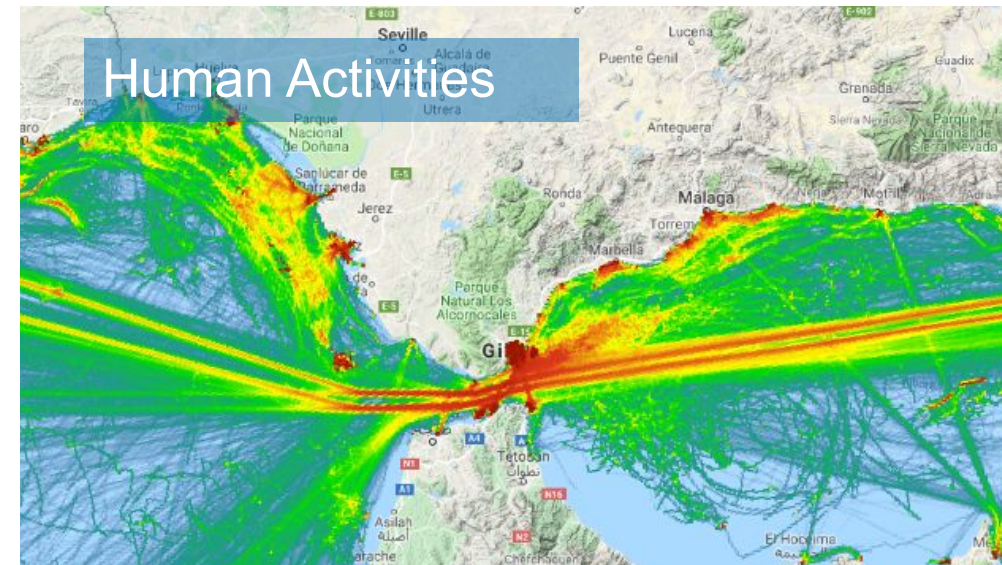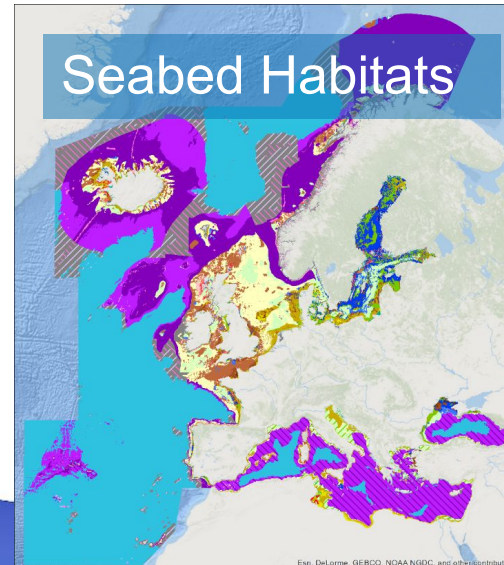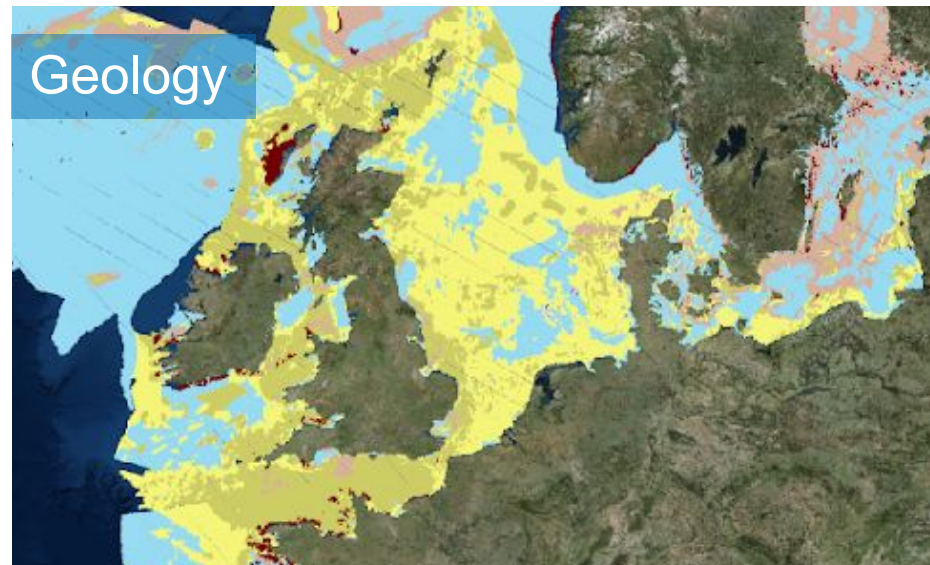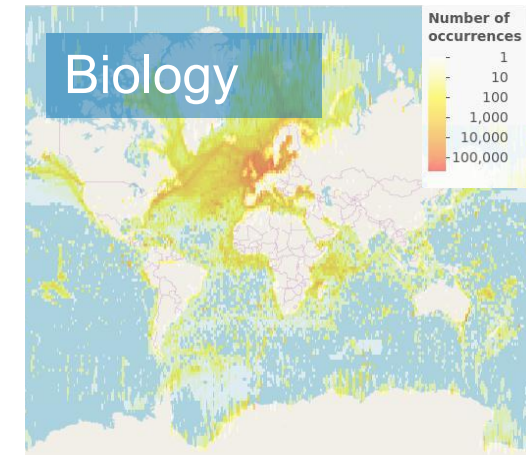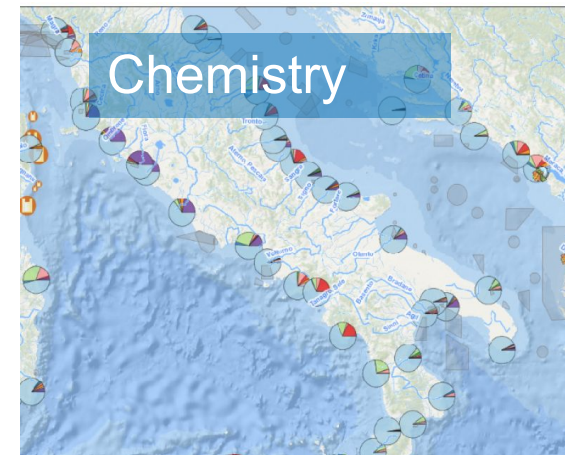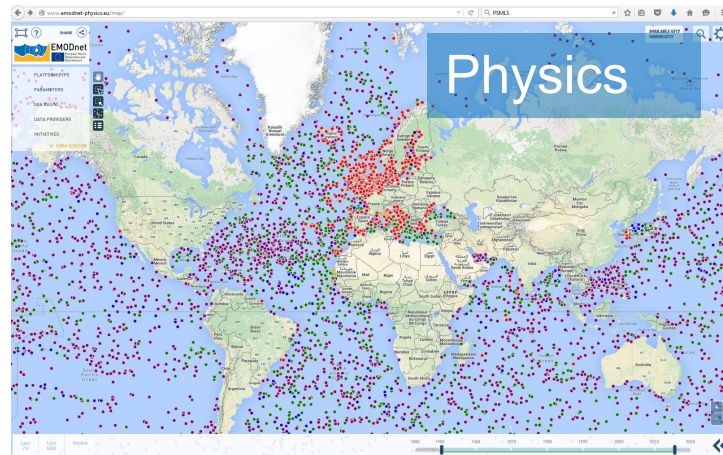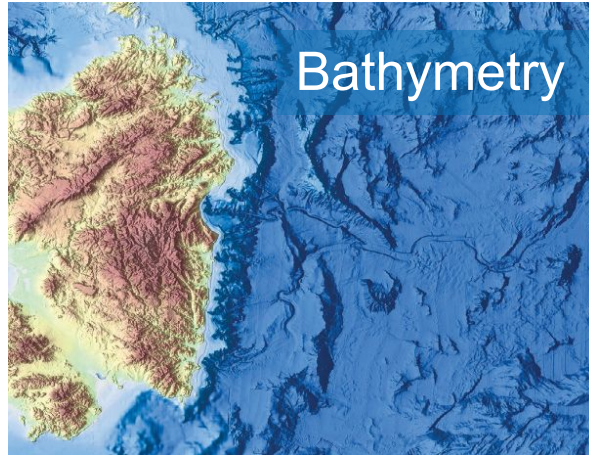
EMODnet Chemistry
Easy access to marine water quality data

- **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

PAN-EUROPEAN INFRASTRUCTURE FOR
OCEAN & MARINE DATA MANAGEMENT

EMODnet Chemistry data "Quality Control loop"
From data collection and standardisation to harmonisation and validation
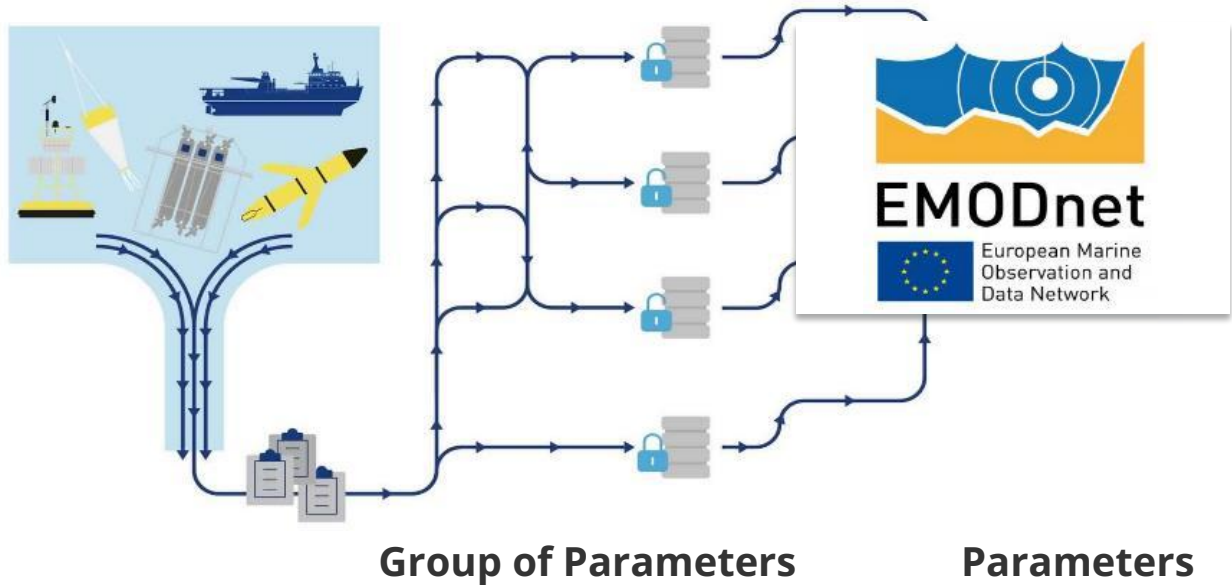
	Group of Parameters	Parameters
Marine Litter	Beach macrolitter, Seafloor macrolitter, Floating and sediment microlitter	Composition, Abundance, etc.
Eutrophication	Nutrients, dissolved gases, etc.	N, P, Si, O_2, Chl-a, etc.
Contaminants	Hydrocarbons, Heavy metals, Pesticides, etc.	Anthracene, Fluoranthene, Me, Cd, Pb, TBT, DDTs, etc.
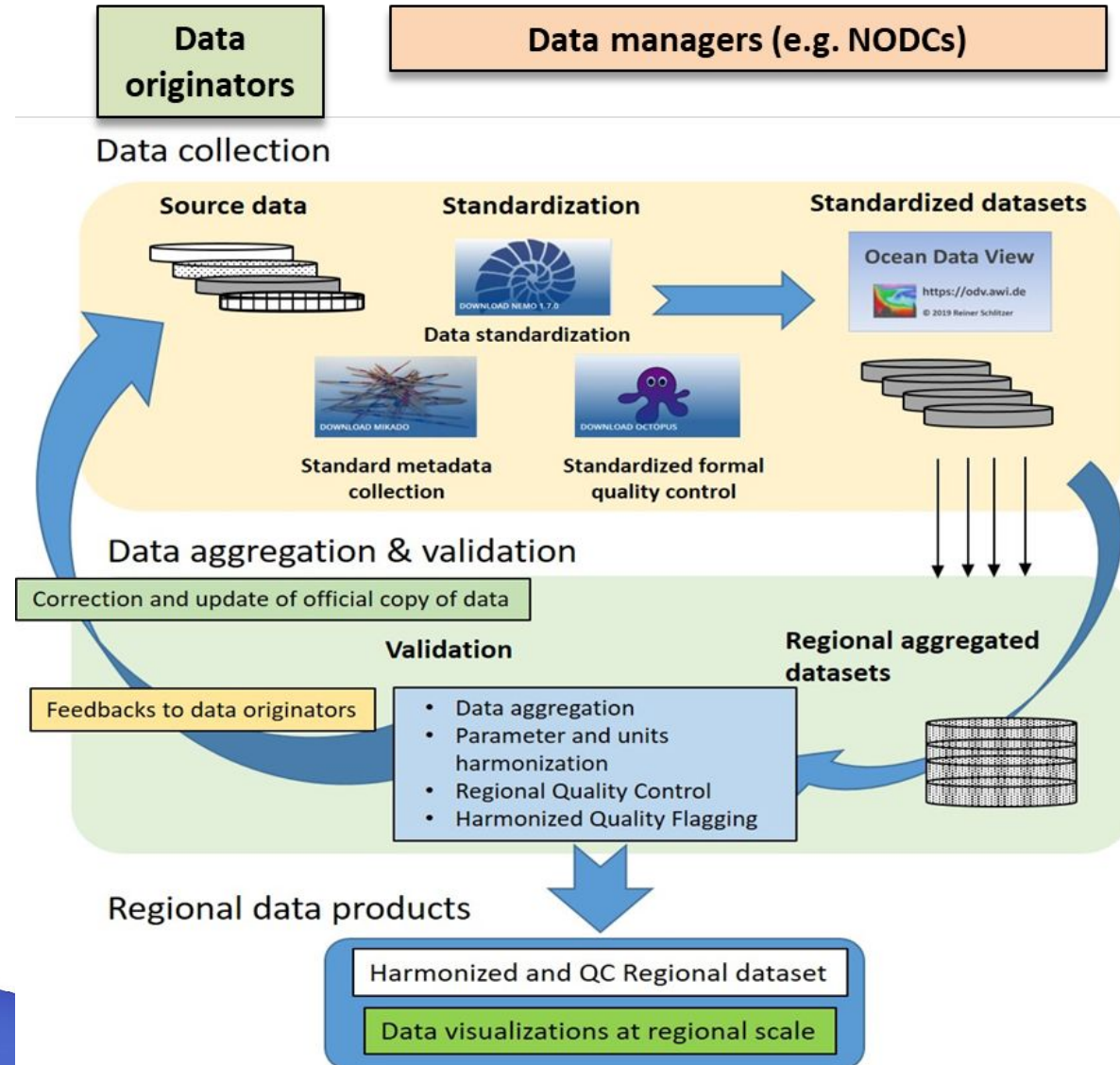
Marine litter data management
Consolidated workflows and data sources, agreed formats and guidelines

Inputs from consolidated communities and best practices, where available

Consolidated protocols (**OSPAR, UNEP, UNEP – Marlin, TG ML**)

Consolidated protocols (**ICES, MEDITS, DeFishGear**)

New ascii format (Litter ODV)
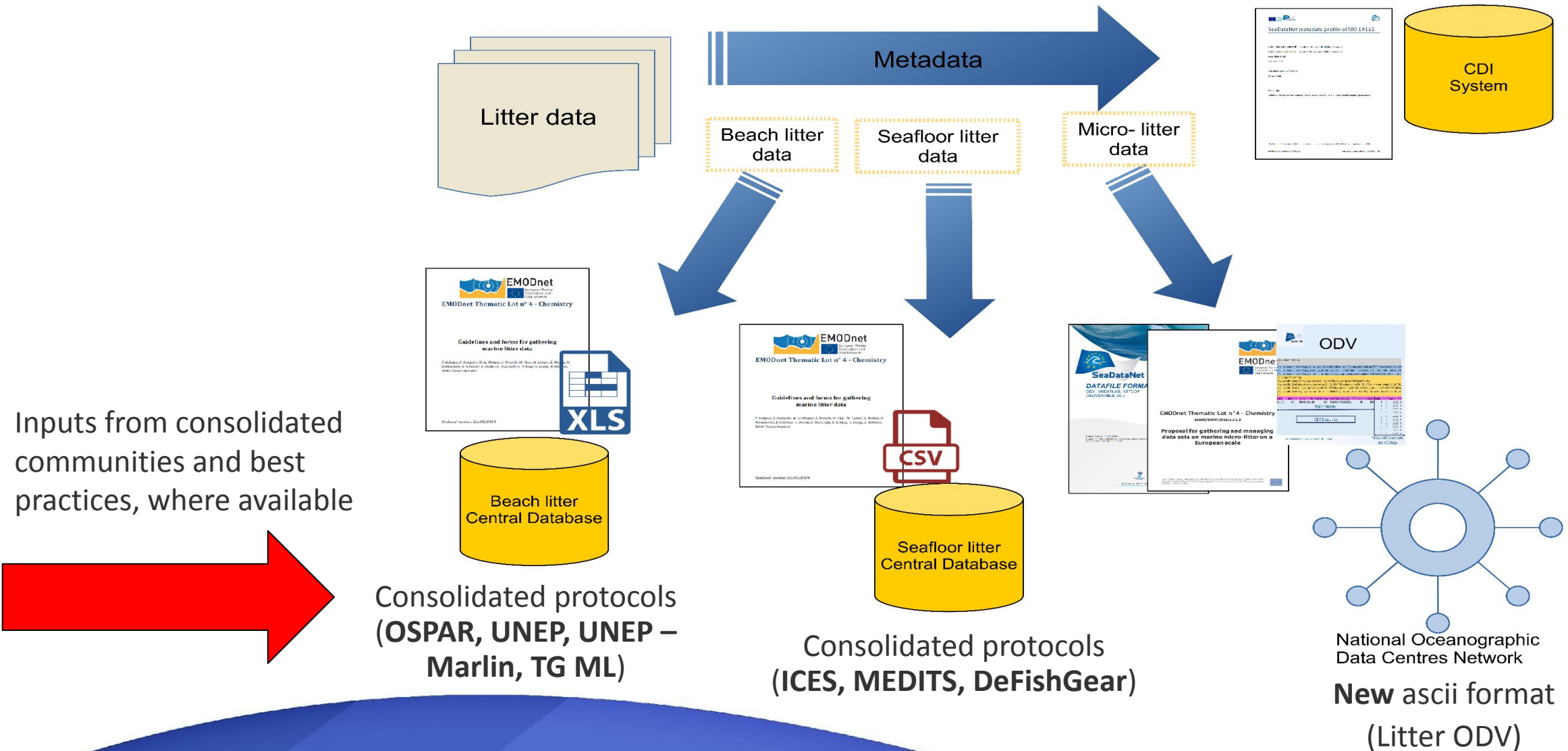
Loop for the quality of marine litter data
Quality checks before and after ingestion

beach and seafloor

microlitter (floating & sediment)
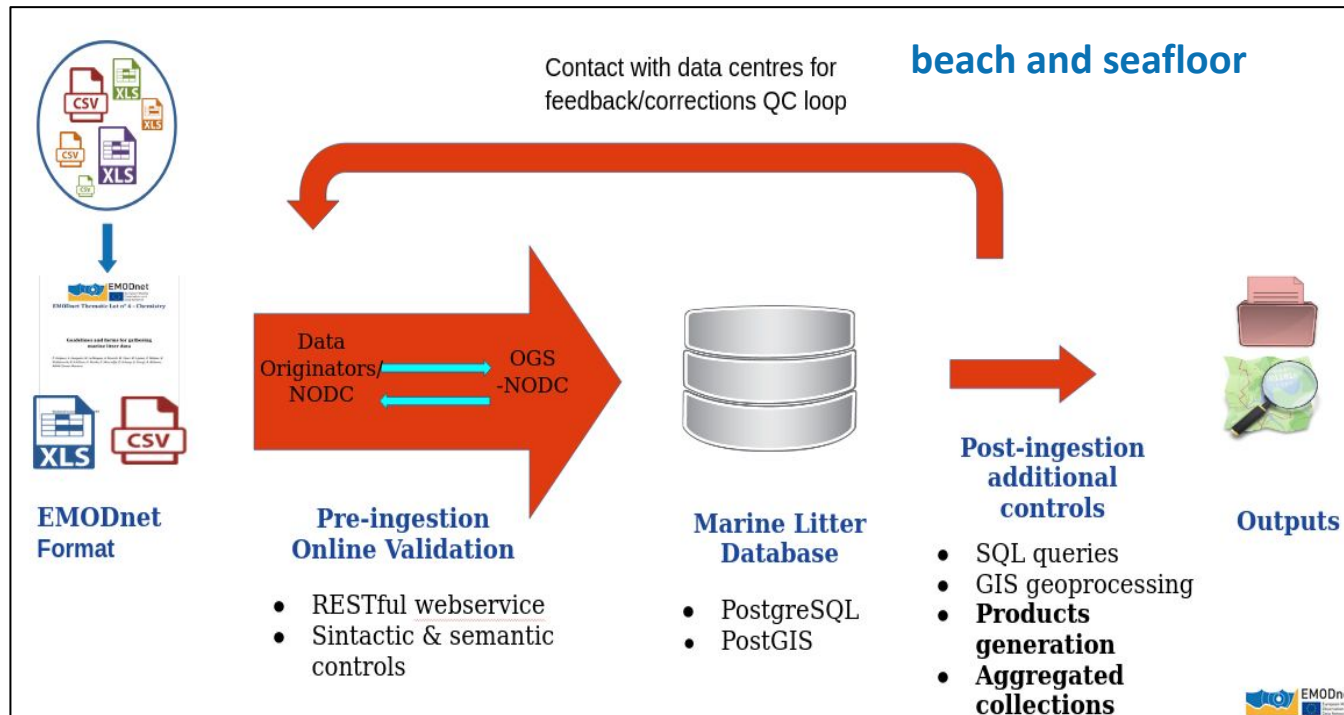
- **formatting** through **agreed guidelines**, formats and tools,
- strong **focus on pre-ingestion validation** (more efficient and safer) to streamline the workflow,
- continuous **updating** of validators,
- database **ingestion**,
- **post-ingestion** analysis and **additional QC**.
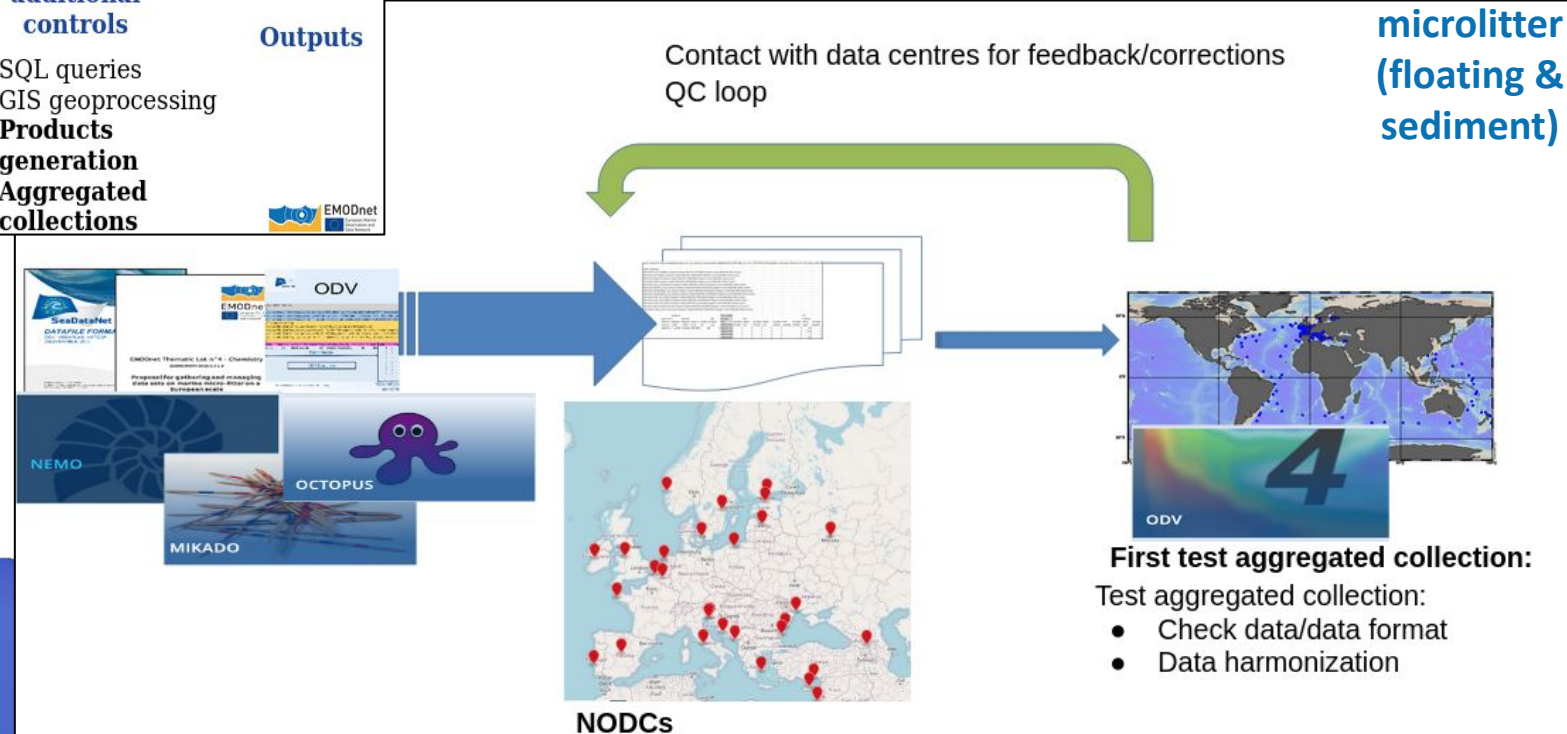
Data products help harmonization and post-ingestion quality controls

Beach litter

beach surveys locations

number of surveys

plastic bags distribution

Data Products Access
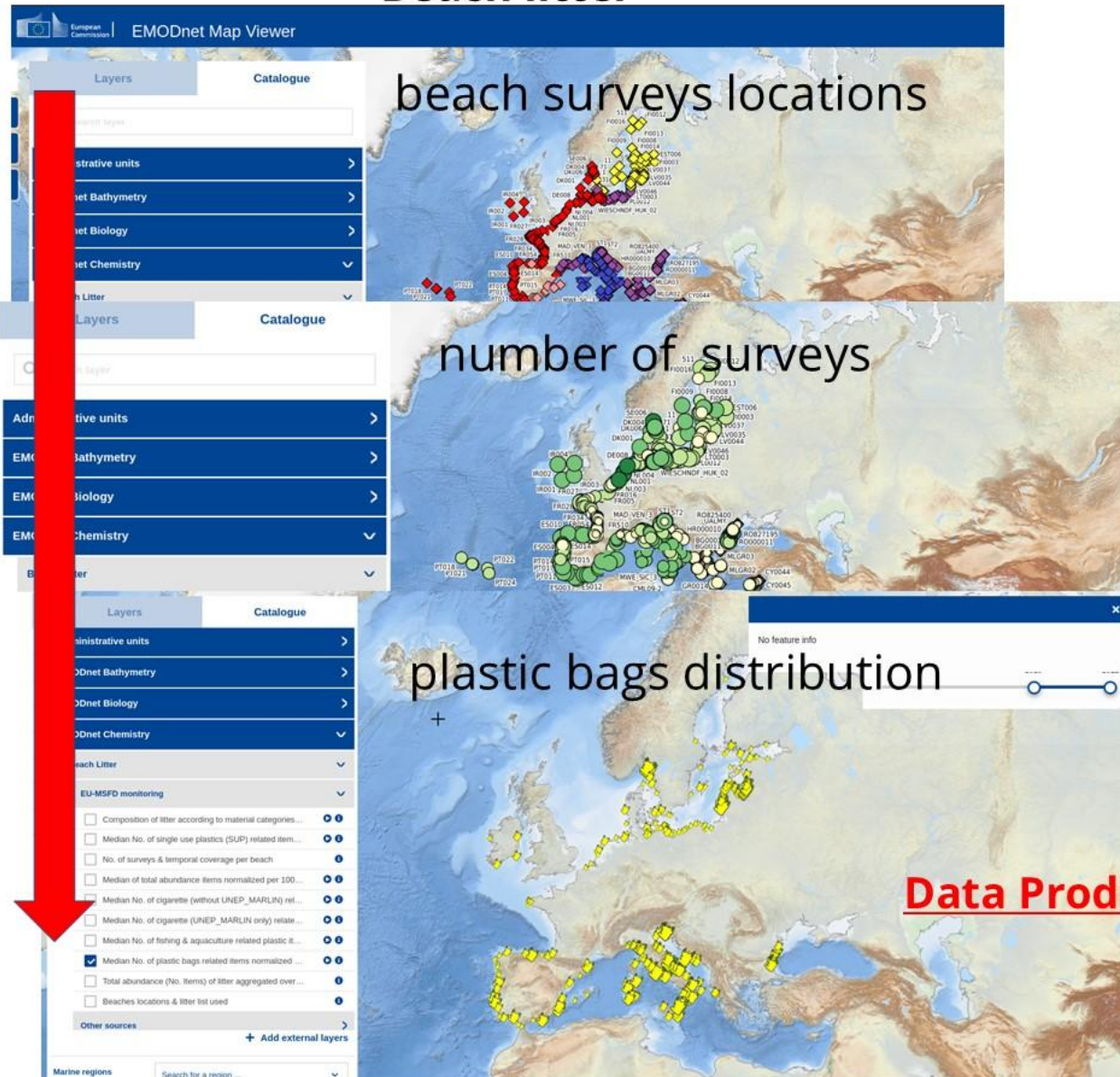
Seafloor trawlings litter
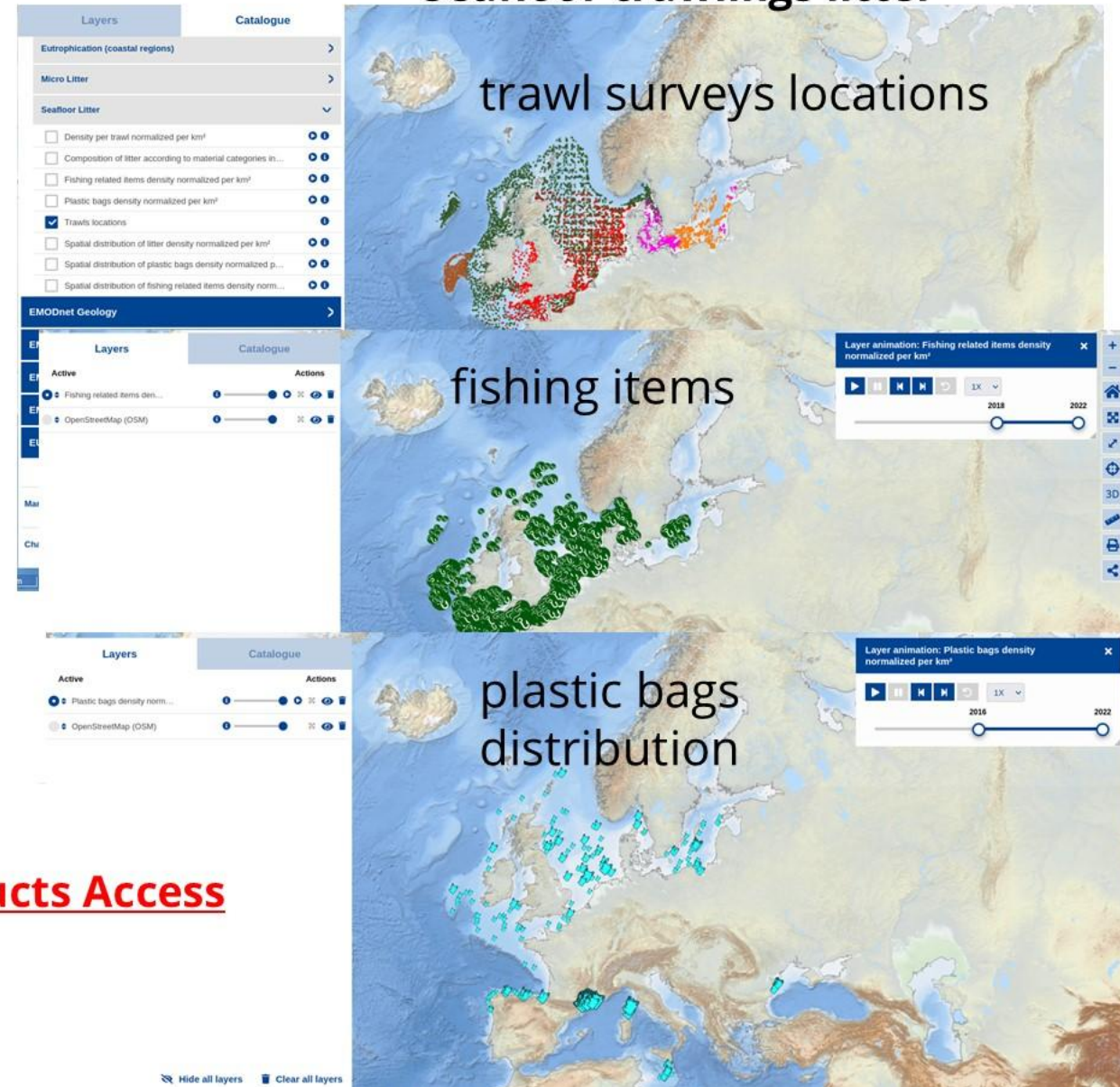
trawl surveys locations

fishing items

plastic bags distribution

Data on marine litter on the seafloor in EMODnet
Today's availability: composition and density of litter from trawling

Data on marine litter on the seafloor in EMODnet
Today's availability: composition and density of litter from trawling

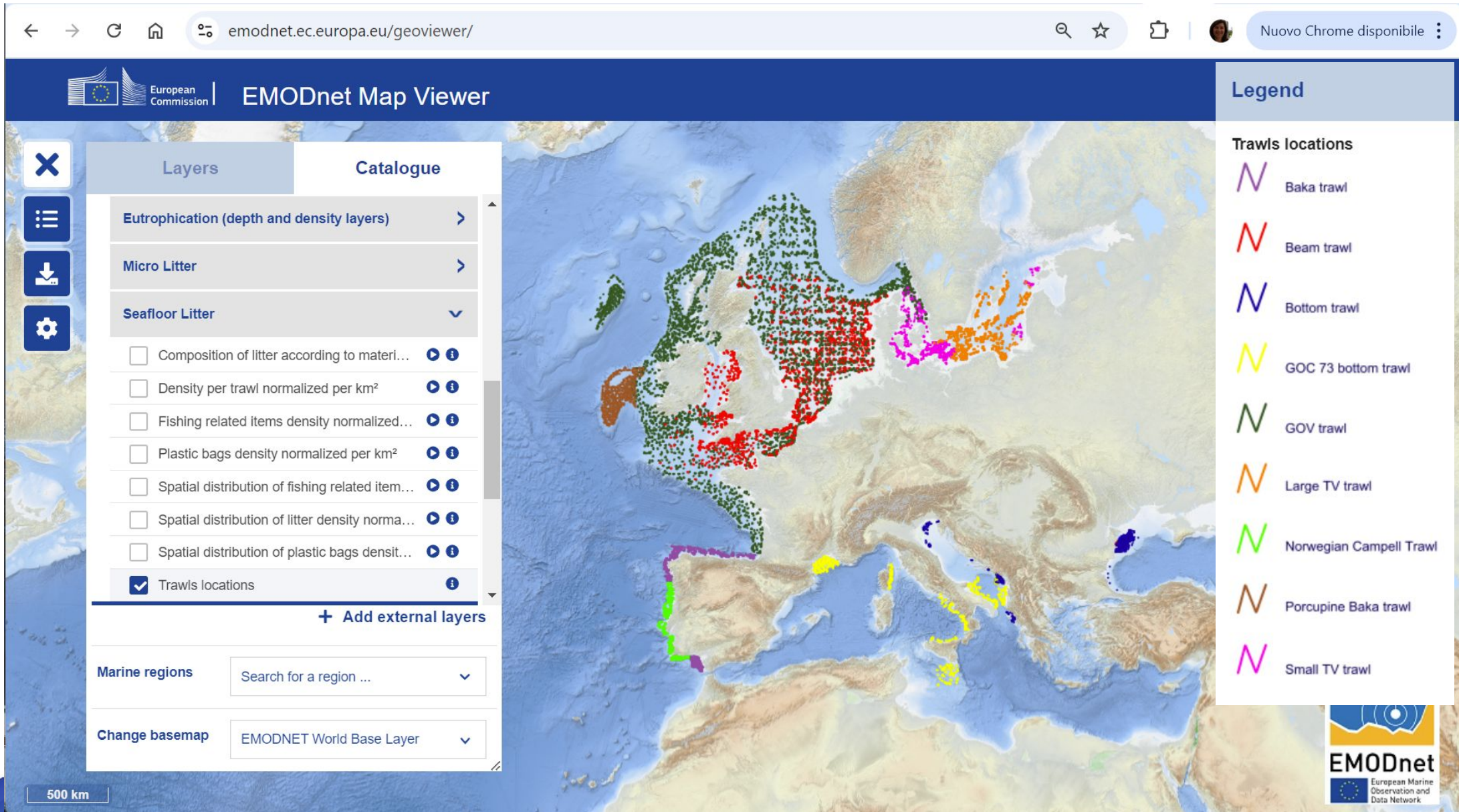| country	region/subregion	region name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
ES	Bay of Biscay and the Iberian Coast	North East Atlantic Ocean	0	0	182	197	200	115	112	195	200	213	212	128	219	174	
FR	Bay of Biscay and the Iberian Coast	North East Atlantic Ocean	0	0	57	76	86	86	80	26	79	79	82	77	0	0	
PT	Bay of Biscay and the Iberian Coast	North East Atlantic Ocean	87	83	0	92	82	91	88	0	0	0	0	0	0	0	
DE	Celtic Seas	North East Atlantic Ocean	0	0	0	0	0	0	1	3	0	0	0	1	0	0	
ES	Celtic Seas	North East Atlantic Ocean	0	0	79	80	79	80	81	80	80	79	81	80	87	0	
FR	Celtic Seas	North East Atlantic Ocean	0	0	45	63	69	74	98	0	103	95	92	72	0	0	
IE	Celtic Seas	North East Atlantic Ocean	0	0	171	176	170	46	172	149	153	160	127	157	152	0	
BE	Greater North Sea, incl. the Kattegat and the English Channel	North East Atlantic Ocean	0	55	57	58	20	0	0	54	91	89	89	97	91	0	
DE	Greater North Sea, incl. the Kattegat and the English Channel	North East Atlantic Ocean	0	72	54	50	38	75	121	116	88	68	116	129	57	22	
DK	Greater North Sea, incl. the Kattegat and the English Channel	North East Atlantic Ocean	0	59	60	147	145	160	100	93	166	116	146	152	119	106	
FR	Greater North Sea, incl. the Kattegat and the English Channel	North East Atlantic Ocean	0	0	75	66	81	168	142	133	149	137	127	118	50	0	
NL	Greater North Sea, incl. the Kattegat and the English Channel	North East Atlantic Ocean	0	0	72	126	125	107	124	183	205	208	187	199	192	179	
SE	Greater North Sea, incl. the Kattegat and the English Channel	North East Atlantic Ocean	0	0	93	91	93	93	91	93	92	90	85	99	86	92	
		sums:	87	269	945	1222	1188	1095	1210	1125	1406	1334	1344	1309	1053	573	14160

14.160 surveys

country	region/subregion	region name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
DE	Baltic	Baltic	0	0	51	104	115	107	118	108	112	100	108	103	110	53	
DK	Baltic	Baltic	0	138	144	141	89	112	96	93	149	117	164	176	130	96	
EE	Baltic	Baltic	0	0	0	0	0	7	9	9	10	6	8	7	6	4	
LT	Baltic	Baltic	0	0	0	0	0	4	10	11	8	6	0	0	0	0	
LV	Baltic	Baltic	0	0	0	0	0	14	42	48	56	30	37	43	46	43	
PL	Baltic	Baltic	0	0	0	0	0	32	95	136	119	130	107	119	120	113	
SE	Baltic	Baltic	0	0	82	75	74	78	78	80	65	68	68	72	74	79	
		sums:	0	138	277	320	278	354	448	485	519	457	492	520	486	388	5162

5.162 surveys

country	region/subregion	region name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
GR	Adriatic Sea	Mediterranean Sea	0	0	0	0	4	4	0	0	0	0	0	0	0	0	
HR	Adriatic Sea	Mediterranean Sea	0	0	0	0	0	12	0	0	0	0	0	0	0	0	
IT	Adriatic Sea	Mediterranean Sea	0	0	0	53	87	69	0	0	0	0	0	0	0	0	
SI	Adriatic Sea	Mediterranean Sea	0	0	0	0	2	3	0	0	0	0	0	0	0	0	
GR	Ionian Sea and the Central Mediterranean Sea	Mediterranean Sea	0	0	0	0	13	13	0	0	0	0	0	0	0	0	
MT	Ionian Sea and the Central Mediterranean Sea	Mediterranean Sea	0	0	35	37	15	22	19	29	0	0	0	0	0	0	
ES	Western Mediterranean Sea	Mediterranean Sea	0	0	0	0	0	326	224	227	217	224	106	234	285	0	
FR	Western Mediterranean Sea	Mediterranean Sea	0	0	89	88	88	88	87	90	88	93	36	89	96	0	
IT	Western Mediterranean Sea	Mediterranean Sea	0	0	0	66	69	70	0	0	0	0	0	0	0	0	
		sums:	0	0	124	244	278	607	330	346	305	317	142	323	381	0	3397

3.397 surveys

country	region/subregion	region name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
RO	Black Sea	Black Sea	0	16	24	22	30	20	9	68	23	57	55	48	0	0	
		sums:	0	16	24	22	30	20	9	68	23	57	55	47	0	0	371

371 surveys

12

Data on marine litter on the seafloor in EMODnet

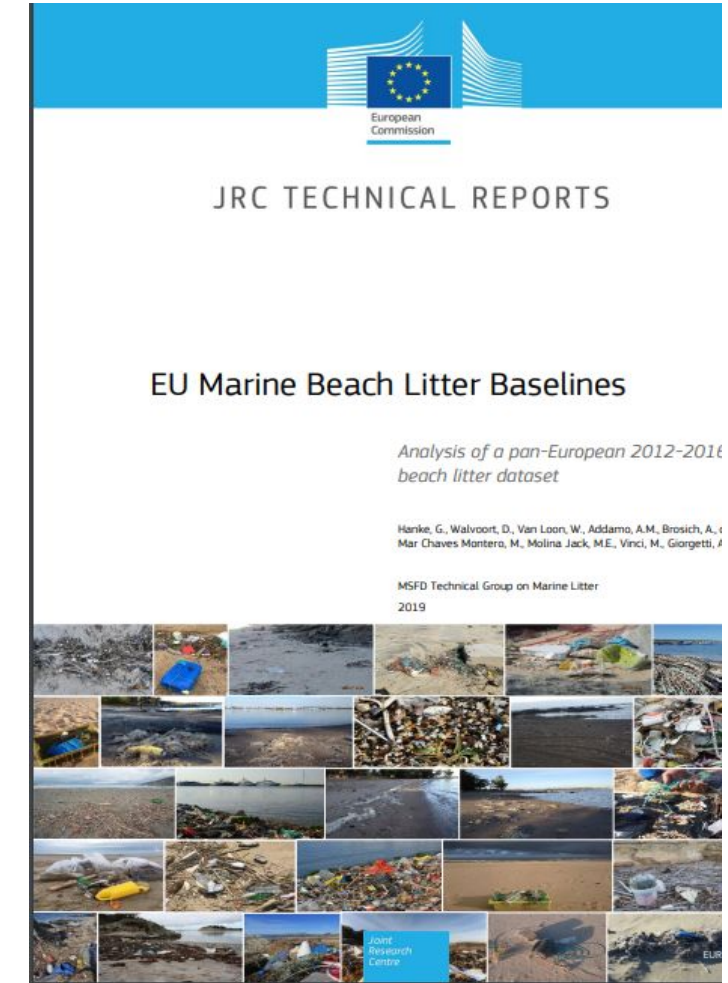## Future developments: composition and density of litter from images

- IMDOS concept: [Toward the Integrated Marine Debris Observing System](#)"

- Collection of litter composition and density **from images** (ROV, AUV, towed cameras,...): new database under development

- 2 workshops have been organised by JRC in May 2018 and September 2023

- Review of the current knowledge and data collection procedures (no standard)

- New data & metadata template has been shared

- New **data model** under finalisation

- Initial planning to have a working system within 2024

	field	content	mandatory (y/n)	comments
1				
2	Date		y	
3	Dive start point	(lat/lon)	y*1	start of the dive as the moment at which the ROV (or other cameras/vehicles)
4	Transects start point	(lat/lon)	y*1	start of the transect is defined as the moment at which the ROV is at the
5	Transects end point	(lat/lon)	y*1	start of the transect is defined as the moment at which the ROV is at the
6	Dive end point	(lat/lon)	y*1	start of the dive as the moment at which the ROV (or other cameras/vehicles)
7	transect length		y*1	
8	transect length	USBL position	y*1	USBL positioning error (https://www.ixblue.com/knowledge/what-is-a-usbl-
9	transect width		y*1	
10	transect width	standard devia	y*1	standard deviation
11	min_depth	metres	y*4	min measured depth of transect
12	max_depth	metres	y*4	max measured depth of transect
13	average depth	metres	y*4	if only transect average depth is available it should be provided
14	Substrate	vocab? list?	n	(EN ISO 14688-1 classification- Particle size fractions and categories of seabed
15	Eastness	n.	n	This variable is related to the substrate's orientation. It takes values betweeen
16	DTM	id of dtm or	n	(MDT in the database sent by Spanish colleagues): Raster grid of the
17	Northness	n.	n	This variable is related to the substrate's orientation. It takes values between
18	Reflectance (Backscatter	This	n	The correct term should be Backscatter data which is a measure of the
19	Roughness	index values:	n	This is a terrain complex index wich measure how wrinkled a surface is. There
20	Slope	angle/degree	n	This is the rate of change between one cell and its neighbours, calculated in
21	#BMT	new list or	n	This is a categoric variable used to classified the substrate in differente
22	Hot Spot	yes/no	y	
23	litter_presence	countable/un	y	
24	item Position	(lat/lon)	n	
25	item_depth	metres	n	
26	Litter items, which protocol/list/codes?		y	(TG-ML list or other lists)
27	Litter item code		y	
28	unit	sdn vocab	y*2	count or density or weight
29	Number of items		y*2	number of items or density (n/km or n/km2) or weight
30	Entaglements/interactions?	yes/no	n	
31	Entaglements/interactions?	type	n	how to express? Is there an official classification or list of terms?

EMODnet Chemistry interactions with expert groups and communities
The European MSFD Technical Group on Marine Litter and the European Environment Agency

- The MSFD Technical Group on Marine Litter identified EMODnet as the **European platform for marine litter data**
  - Contributes to the definition of guidelines for monitoring and reporting
  - Perform data collection through the network of NODCs interacting with EU Member States
  - Perform data standardization and quality control
  - Provides harmonized datasets for the assessment of baselines and trends in litter abundance distribution

- Baselines for beach litter were published in 2019, trends are on going

- Work towards a methodology to obtain quantitative and comparable data and metadata of **marine macrolitter from seafloor images**, to complement data from trawling worldwide

- **Finalising proposal** for the management of seafloor litter data from images

JRC TECHNICAL REPORTS

EU Marine Beach Litter Baselines

Analysis of a pan-European 2012-2016 beach litter dataset

Hanke, G., Walvoort, D., Van Loon, W., Addamo, A.M., Brosich, A., Mar Chaves Montero, M., Molina Jack, M.E., Vinci, M., Giorgetti, A.

MSFD Technical Group on Marine Litter
2019

EMODnet Chemistry interactions with expert groups and communities

Link with 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 Data Harmonization)

G20 **Actions against Marine Plastic Litter** lead by the Ministry of the Environment Japan (MOEJ):
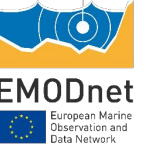- **Guidelines** for Harmonizing Ocean Surface Microplastic Monitoring Methods (May 2019)
- Developing an **Atlas of Ocean Microplastic** (AOMI)

Under the umbrella of the **Integrated Marine Debris Observing System** (IMDOS)
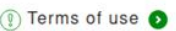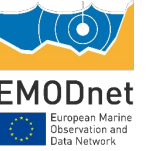
EMODPACE-CEMDnet (2020-2022)
Strengthening International Ocean Data through the European Union's Ocean Diplomacy with China

- **EMOD-PACE** (EMODnet PArtnership for China and Europe) & the China-EU Marine Data Network Partnership (**CEMDnet**) by the National Marine Data and Information Service (NMDIS) of China

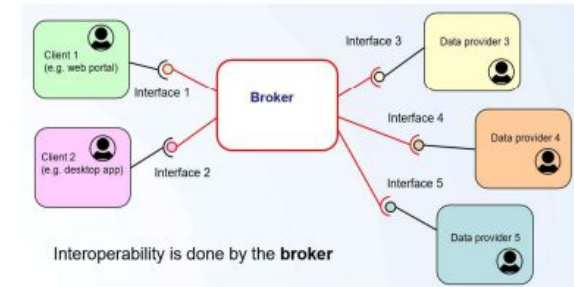中国—欧洲 **EMODnet伙伴关系** - 中国-**欧盟海洋数据网 络伙伴关系**

Principle of Brokerage service

Brokerage can be considered as building a 'bridge' between EU data services and NMDIS data services

A bridge requires 2 'bridgeheads' which should be 'web services'
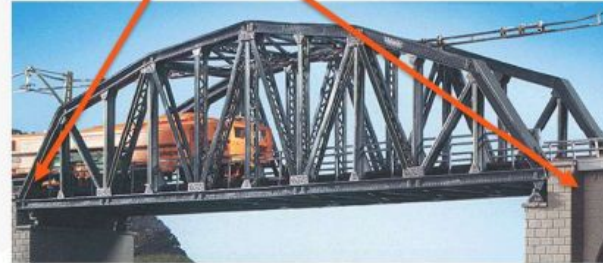
Use is made of **DAB Brokerage service**. Supports many protocols at metadata and data levels

Interoperability is done by the **broker**

- **Connecting people & organisations**
- **Cultivating cooperation**
- **Unlocking & Combining data**
- **Creating marine knowledge**

EMODPACE-CEMDnet (2020-2022)

Working areas

1 - Creation of **interoperable information system** linking EMODnet & NMDIS
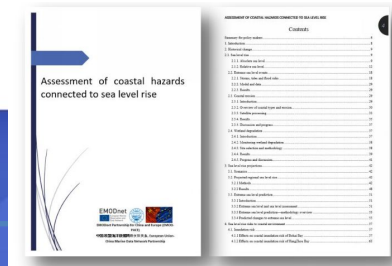
2 - Establishing **data interoperability** between EMODnet and NMDIS

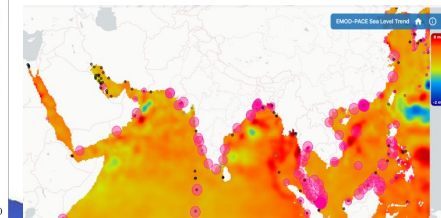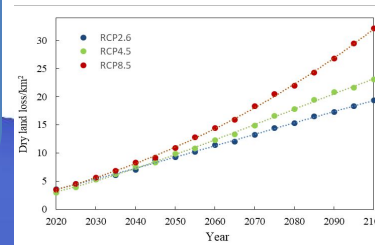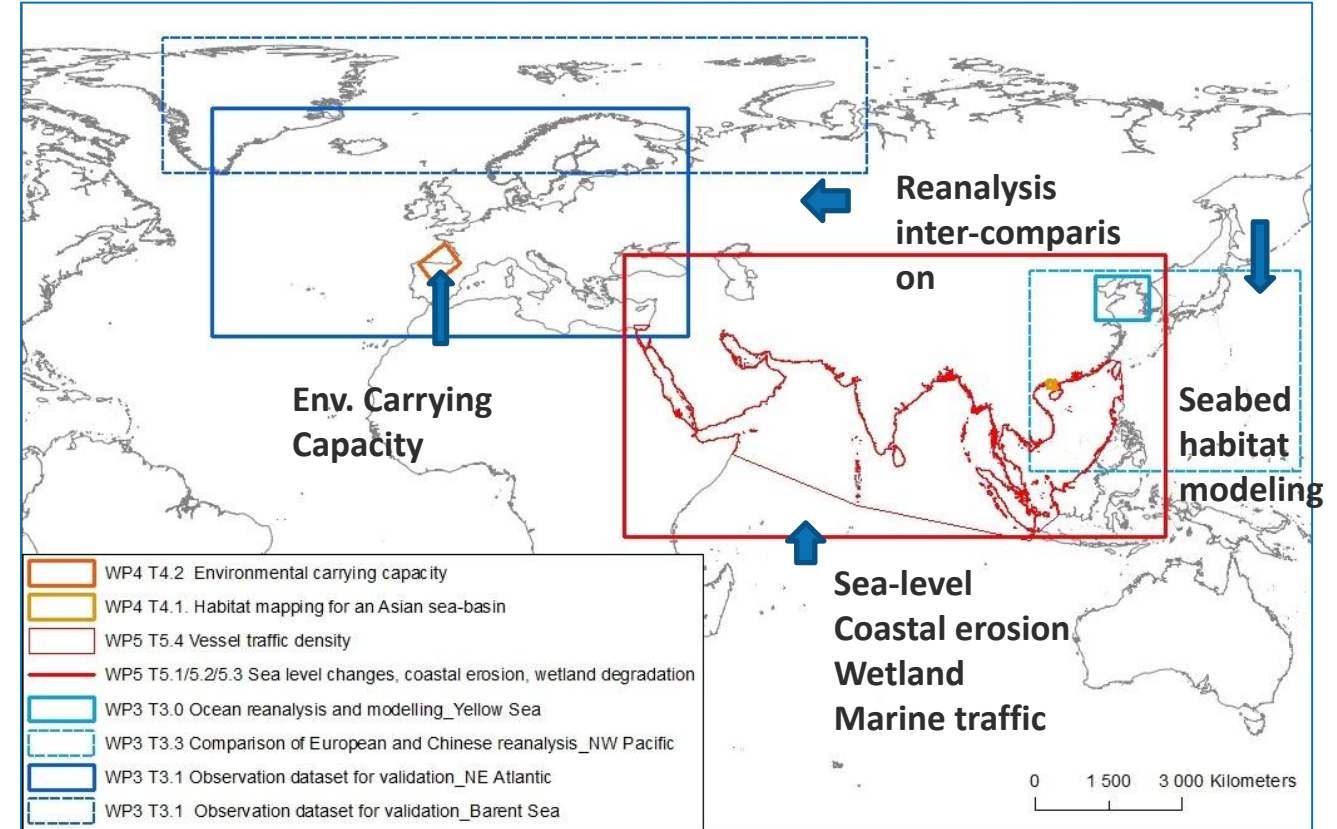**3** - Comparison of European & Chinese **models for regional sea reanalysis**

4 - Comparison of European and Chinese **models for seabed habitat and ecosystem vulnerability**

5 - **Coastal Adaptation**
- Relative sea level changes & Absolute sea level changes
- Coastal erosion
- Wetland degradation
- Vessel traffic density

Areas of Interests

Reanalysis inter-comparison

Env. Carrying Capacity

Seabed habitat modeling

Sea-level Coastal erosion Wetland Marine traffic

WP4 T4.2 Environmental carrying capacity
WP4 T4.1 Habitat mapping for an Asian sea-basin
WP5 T5.4 Vessel traffic density
WP5 T5.1/5.2/5.3 Sea level changes, coastal erosion, wetland degradation
WP3 T3.0 Ocean reanalysis and modelling_Yellow Sea
WP3 T3.3 Comparison of European and Chinese reanalysis_NW Pacific
WP3 T3.1 Observation dataset for validation_NE Atlantic
WP3 T3.1 Observation dataset for validation_Barent Sea

0   1 500   3 000 Kilometers

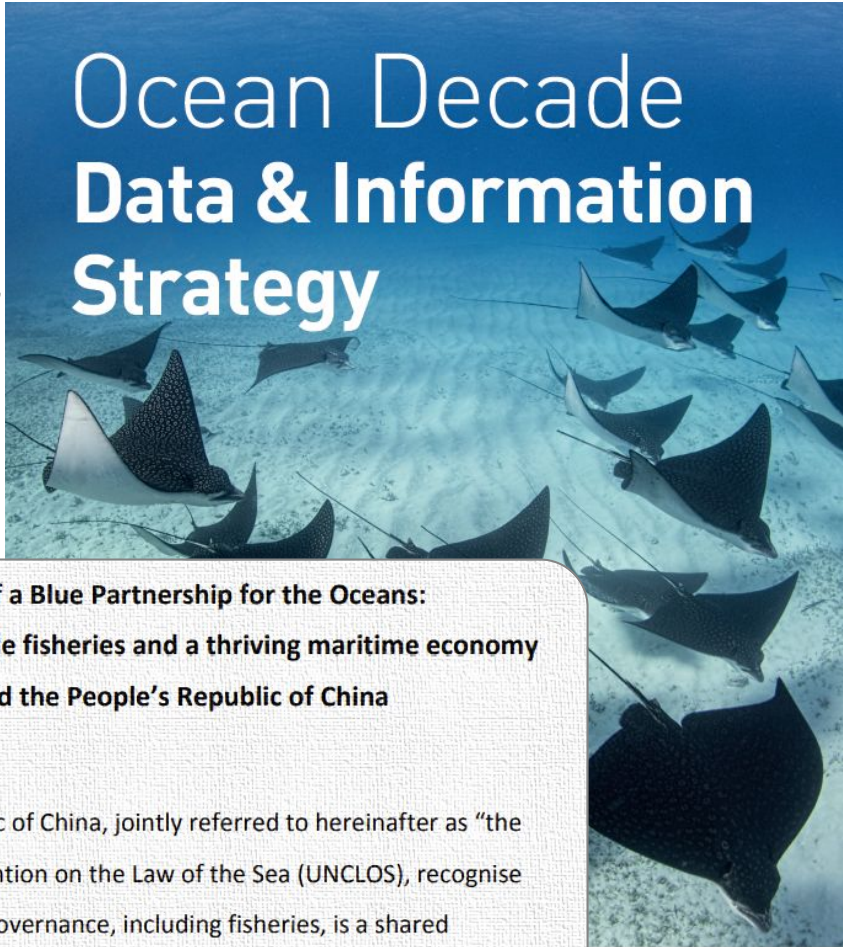# Achievements beyond the initial work plan

- **Common Work Plan & Joint Activities** allowed achievements which were not planned beforehand

- A **Memorandum of Understanding between EMODnet & NMDIS** providing a framework for Common Work Plans & Joint Activities during the EMODPACE-CEMDnet projects (2020-2022)

- **Connecting to other data services** in the wider area

  - 1 United Nations Ocean Decade Satellite Activity

  - 2 workshops with Regional network ODINWESTPAC and other stakeholders in Asia

- **280+ online meetings** (100+ internal) and interactions to ensure achieving project results

- **2 project promotional videos** (English and Chinese): Check the video to find out more https://www.youtube.com/watch?v=3ONwjZTI4uA
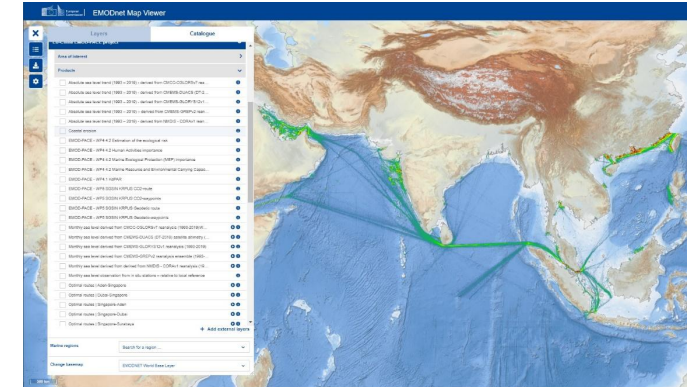
Final reflections

Potential subject areas of interest for future joint activities

- **Establishing a new collaboration** between partners from different regions **is challenging and takes time**

- **Demonstrates the potential** of collaboration between major global public marine data service providers

- EMOD-PACE is a concrete implementation of the "**Blue Partnership for the Ocean**" signed by the EU and China in 2018 & key step towards wider regional and global partnerships

- Fully **aligned** with the Decade's Data & Information Strategy

- **Paves the way** for further joint activities related to Marine plastics (both micro- and macroplastics): source mapping, establish basin-scale observational database, monitoring technology, …

Ocean Decade
Data & Information
Strategy

Declaration on the establishment of a Blue Partnership for the Oceans: towards better ocean governance, sustainable fisheries and a thriving maritime economy between the European Union and the People's Republic of China

The European Union (EU) and the People's Republic of China, jointly referred to hereinafter as "the two Sides", as Parties to the United Nations Convention on the Law of the Sea (UNCLOS), recognise that the ocean is a common good and that ocean governance, including fisheries, is a shared challenge and responsibility that calls for closer international cooperation and global action. They also acknowledge that they have an important role in setting an example to promote better global ocean governance, including fisheries, for sustainable development.
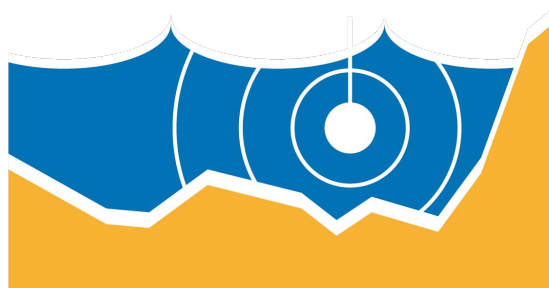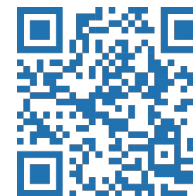
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