

# EMODnet Chemistry: Open and trusted data, products, and services for understanding the evolution of marine water quality

Ocean Best Practices Workshop  
October 2023

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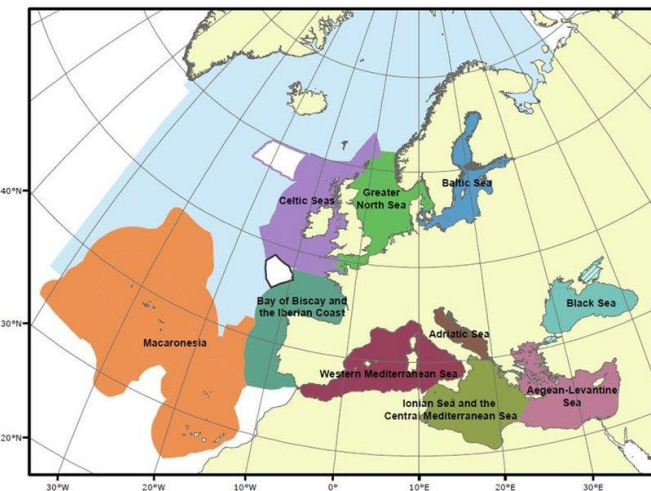
**EMODnet**



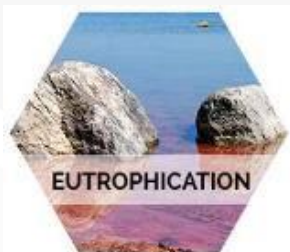
# EMODnet Chemistry

The European Marine Observation and Data Network (EMODnet) has 7 themes:

- Bathymetry
- Biology
- **Chemistry**
- Geology
- Human Activities
- Physics
- Seabed Habitats.



**EMODnet Chemistry:** goal of facilitating the discoverability, accessibility, and usability of marine chemical datasets and derived data products on:



Contributing to descriptors:

- 5 (eutrophication),
- 8 (chemical pollution),
- 9 (contaminants in seafood), and
- 10 (marine litter)

of the **Marine Strategy Framework Directive (MSFD)**



# EMODnet



# Datasets and data products

A huge amount of complex and heterogeneous data corresponding to:

- seawater,
- biota, and
- sediment are managed to prepare:

## Standardised, harmonised, and quality-controlled data collections and derived data products on marine water quality

Filter

Expand Collapse

**TYPE OF RESOURCES**

- Dataset (1282)
- Series (323)
- Service (1)
- ERDDAP gridcap (1)

**AVAILABLE ACTIONS**

- Viewable (987)
- Downloadable (467)

**TOPICS**

- Oceans (1401)
- Biota (431)
- Geoscientific information (148)
- Environment (112)
- Boundaries (14)

3 more

**KEYWORDS**

- Oceans (1401)
- Metadata ODI-VI-conform (872)
- Oceanographic geographical features (583)
- Habitats and biotopes (517)
- Biota (431)

10 more

**CONTACT FOR THE RESOURCE**

- EMODnet Chemistry (288)
- National Institute of Oceanography and Applied Geophysics - OGS, Division ... (185)
- National Institute for Marine Research and Development "Ongre Antipa" (168)
- Institute of Marine Sciences, Middle East Technical University (160)
- Federal Maritime and Hydrographic Agency (155)

20 more

**PROVIDED BY**

- EMODnet Seabed Habitats (797)
- EMODnet Chemistry (223)
- EMODnet Bathymetry (263)
- EMODnet Geology (180)
- EMODnet Physics (21)

2 more

**YEARS**

- Inve (19)
- 2023 (319)
- 2022 (31)

Categories

North Sea - Contaminants aggregated datasets 1970/2017 v2018

EMODnet Chemistry aims to provide access to marine chemistry data sets and derived data products concerning eutrophication, ocean acidification and contaminants. The chemicals chosen reflect importance to the Marine Strategy Framework Directive (MSFD). This regional aggregated dataset contains all unrestricted

Katsumi University, Department of Bioscience, Marine Ecology

Roskilde

Categories

North East Atlantic Ocean - Contaminants aggregated datasets 1970/2017 v2018

EMODnet Chemistry aims to provide access to marine chemistry data sets and derived data products concerning eutrophication, ocean acidification and contaminants. The chemicals chosen reflect importance to the Marine Strategy Framework Directive (MSFD). This regional aggregated dataset contains all unrestricted

Briese Schillhardt

Categories

Baltic Sea DIVA 4D analysis of Water\_body\_ammmonium

Units: umol/l Method: spatial interpolation produced with DIVA (Data-Interpolating Variational Analysis) URL: http://modb.oce.uig.ac.be/DIVA Comment: Every year of the time dimension corresponds to a 10-year centred average for each season : - winter season (December-February), - spring (March-

Swedish Meteorological and Hydrological Institute

Categories

Black Sea - Contaminants aggregated datasets 1974/2017 v2018

EMODnet Chemistry aims to provide access to marine chemistry data sets and derived data products concerning eutrophication, ocean acidification and contaminants. The chemicals chosen reflect importance to the Marine Strategy Framework Directive (MSFD). This regional aggregated dataset contains all unrestricted

Bulgarian National Oceanographic Data Centre(BIGODC), Institute of Oceanology

Categories

Black Sea DIVA 4D analysis of Water\_body\_nitrate\_plus\_nitrite

Gridded product for visualization of Water body nitrate plus nitrite in the Black Sea generated by DIVA 4.6.9 using all EMODNET Chemistry data from 1976 to 2013. Depth range (ICOE standard depth): 0 - 150m DIVA settings: signal-to-noise ratio and correlation length were estimated using data mean distance as a minimum (for L), and

National Institute for Marine Research and Development "Ongre Antipa"

Categories

1850 HRDTM 1/512 Elbe approach - Version 2

High Resolution DTM of the German Elbe Approach.

Federal Maritime and Hydrographic Agency

Categories

Arctic Ocean - Contaminants aggregated datasets 1974/2015 v2018

EMODnet Chemistry aims to provide access to marine chemistry data sets and derived data products concerning eutrophication, ocean acidification and contaminants. The chemicals chosen reflect importance to the Marine Strategy Framework Directive (MSFD). This regional aggregated dataset contains all unrestricted

Allied Wegener Institute Helmholtz Centre for Polar and Marine Research

Categories

Baltic Sea DIVA 4D analysis of Water\_body\_phosphate

Units: umol/l Method: spatial interpolation produced with DIVA (Data-Interpolating Variational Analysis) URL: http://modb.oce.uig.ac.be/DIVA Comment: Every year of the time dimension corresponds to a 10-year centred average for each season : - winter season (December-February), - spring (March-

Swedish Meteorological and Hydrological Institute

Categories

ASKOE\_WGS\_512

Multibeam bathymetry collected from Asköfjärden and Fåring Deep, east of Askö Island in southern Stockholm archipelago. The data were collected with Stockholm University research vessels (RV) Electra and Skögladner between 2012 and 2018 for multiple purposes. Some of the data were collected as a part of a course in marine geophysical mapping at Stockholm University. The processing of the raw data was carried out using the Oimera software by QPS. The data have been cleared for public release by

Swedish Maritime Administration

CHEMISTRY

EMODnet Data Discovery and Access Service - Extended search

FEEDBACK SURVEY

NEW SEARCH SEARCH RESET

Search within bounding box

Sea regions

- Arctic Ocean
- Asian mainland
- Atlantic Ocean
- Baltic Sea
- European mainland
- Indian Ocean
- Mediterranean Region
- Pacific Ocean
- South China and Eastern Archipelagic

Mediterranean Region X

Date search

From yyyyymmdd To yyyyymmdd

Parameters

Search Matrix categories

- biota
- sediment
- water body

water body X

Search Groups of variables

- Heavy metals
- Hydrocarbons
- Marine litter
- Organic matter



# EMODnet



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# Data preparation and validation

## OBP repository contains guideline documents on data preparation and quality control procedures for contaminants, eutrophication, acidification, and marine litter

unesco ocean best practices

All Fields Search OceanBestPractices Filter Options

ALL: EMODNET CHEMISTRY x All terms listed affect current search. Clear them to start a new search or add a second term and use the Boolean operators then displayed. Clear All Search Tips

MORE ABOUT TAGS Home / Search OBPS Select All Download Citations 593 results SORT BY RELEVANCE

2019 English Methodology: Guide

**Proposal for gathering and managing data sets on marine micro-litter on a European scale. [Updated version: 19/04/2019] [SUPERSEDED by http://dx.doi.org/10.25607/OBP-495]**

Galgani, Francois; Giorgetti, Alessandra; Vinci, Matteo; Le Moigne, Morgan; Moncoiffe, Gwenaëlle; Brosich, Alberto; Molina, Eugenia; Lipizer, Marina; Holdsworth, Neil; Schlitzer, Reiner; Hanke, Georg; Schaap, Dick; Addamo, Anna

of *EMODnet Chemistry* so far... *EMODnet Chemistry* achievements so far The *EMODnet Chemistry* consortium started in 2008 and successfully... *chemistry* defined in the *EMODnet chemistry*... *chemistry* defined in the *EMODnet chemistry*... *EMODnet chemistry* *Chemistry* data reporting...

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2021 English

**Quality Control steps and dataset formats for EMODnet Chemistry Contaminant aggregated datasets, Version 08.04.2021.**

Lipizer, Marina; Molina Jack, Maria Eugenia; Giorgetti, Alessandra; Buga, L.; Wesslander, K.; Gatti, J.; Østrem, A. K.; Iona, A.; Tsompanou, M.; Larsen, Martin M; Schlitzer, R.

*EMODnet Chemistry* Quality Control steps and dataset formats for *EMODnet Chemistry*... Introduction *EMODnet Chemistry* aims to provide access to marine *chemistry* data sets and derived data... *EMODnet Chemistry* is focused on the parameter groups listed in the table below... The links between P36 (Terms based on the EU MSFD used by the *EMODNET chemistry* lot to provide coarse... *Chemistry* Quality Control steps for *EMODnet Chemistry* Contaminant aggregated...

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2022 English

**Guidelines and forms for gathering marine litter data: beach and seafloor trawlings. Version 7.1, 26/10/2022.**

Galgani, Francois; Giorgetti, Alessandra; Le Moigne, Morgan; Brosich, Alberto; Vinci, Matteo; Lipizer, Marina; Molina Jack, Marina Eugenia; Holdsworth, Neil; Schlitzer, Reiner; Hanke, Georg; Moncoiffe, Gwenaëlle; Schaap, Dick; Giorgi, Giordano; Addamo, Anna; Chaves Montero, Maria del Mar; Cociancich, A.

*EMODnet* Thematic Lot n°4 – *Chemistry* EASME/EMFF/2018/1.3.1.8 Guidelines and forms for... Version 7.1 *EMODnet* Thematic Lot n° 4 - *Chemistry*... *EMODnet* Thematic Lot n° 4 - *Chemistry* Guidelines and forms for gathering... ) data collection, its synergy with existing information systems and achievements of *EMODnet Chemistry*... Considering this situation *EMODnet Chemistry* decided to adopt the data gathering and data management...

View Tags Explore Document Generate Citation View Statistics EMODnet Chemistry

2022 English

**EMODnet Phase V: Updated guidelines for SeaDataNet ODV production. Eutrophication Contaminants, Version 16/9/2022.**

Lipizer, Marina; Molina Jack, Maria Eugenia; Kubin, Elisabeth; Buga, Luminita; Fryberg, Lotta; Gatti, Julie; Larsen, Martin; Moncoiffé, Gwenaëlle; Ostrem, Ann Kristin; Schlitzer, Reiner; Wesslander, Karin; Giorgetti, Alessandra

*EMODnet Chemistry* *EMODnet* Phase V Updated guidelines for SeaDataNet ODV production Eutrophication &... • SeaDataNet ODV production Eutrophication &... • SeaDataNet ODV import format All data entering *EMODnet Chemistry* must be converted to SeaDataNet... In order to correctly produce SDN ODV datasets for *EMODnet Chemistry*, the use of NEMO software is STRONGLY... Fig. 9: Export from P36 spreadsheet (*EMODnet Chemistry* aggregated datasets page)... Data According to guidelines obtained during the previous phase of *EMODnet Chemistry*... contaminants...

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**EMODnet**



# Data preparation



PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

PARTNERS   

USERS     

- ABOUT US
- METADATA
- DATA ACCESS
- STANDARDS**
- SOFTWARE
- PRODUCTS
- EVENTS
- PUBLICATIONS

**STANDARDS**

Interoperability is the key to distributed data management system success and it is achieved in SeaDataNet by using common vocabularies, adopting the ISO 19115 metadata standard for all metadata directories, using harmonised Data Transport Formats for data sets delivery and using common quality control protocols and flag scales.

- Common Vocabularies** → UK's NERC NVS
- Metadata formats**
  - CSR
  - CDI** → Common data index (CDI) mechanism to access data with data policy.
  - EDMED
  - EDMERP
  - EDIOS

- Data Transport Formats
- Data Quality Control

**Software tools** are also used for metadata and data formatting, data exchange, and visualisation.

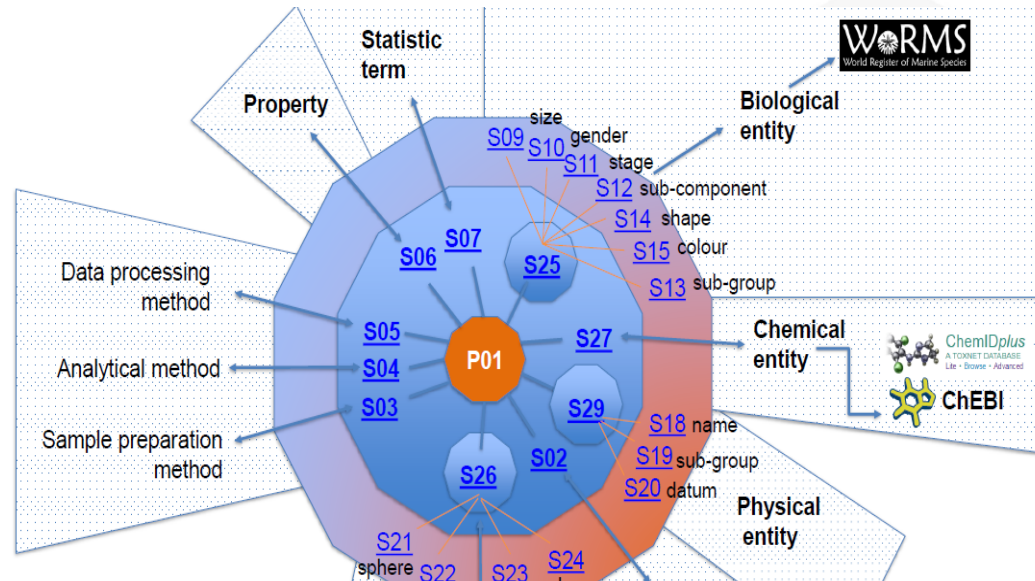


# NERC Vocabulary Server (NVS)

Common vocabularies for the metadata fields of a dataset include:

- L05 codes (device categories, e.g., CTD),
- L06 codes (platform categories, e.g., research vessel), and
- P02 (parameter discovery vocabulary)

**P01 codes** describe information associated with a sample and are comprised of other vocabularies:



<u>PBXXICP2</u>	Concentration of lead {Pb CAS 7439-92-1} per unit volume of the water body [particulate >0.4/0.45um phase] by acid leaching of filter residue and inductively-coupled plasma mass spectrometry
<u>PBUFICXX</u>	Concentration of lead {Pb CAS 7439-92-1} per unit volume of the water body [dissolved plus reactive particulate phase] by acidification and inductively-coupled plasma mass spectrometry
<u>MTWD0046</u>	Concentration of lead {Pb CAS 7439-92-1} per unit volume of the water body [dissolved plus reactive particulate <0.4/0.45um phase]
<u>PBUFWC02</u>	Concentration of lead {Pb CAS 7439-92-1} per unit volume of the water body [dissolved plus reactive particulate phase]



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## Data flow

Considerable **data flow** has implications for harmonisation and quality control procedures owing to **differences in methods and discrepancies between the supporting information** that is collected (or lost).

This data flow starts with the collection of samples in the field to which relevant vocabulary can be assigned...

**FIELD**

**Field monitoring platform (L06 vocabulary):**

- Research vessel
- Floating platform/in-situ measurement etc.



**Sampling instrument (L05 vocabulary) for:**

- Biota (e.g. baited trap, fyke net, by hand)
- Seawater (e.g. CTD, discrete water sampler, probe)
- Sediment (e.g. box corer, sediment grab)
- Microlitter

+

**«Field method citation»**

- Instrument instructions and any calibration guidelines.
- Immediate sample treatment/handling (e.g. filtration (P01), special container requirements, acidification, euthanise biota).
- Sample storage and transport (e.g. freezing, dark conditions, duration)



**Sample transport or analysis on vessel if not in-situ measurement**

**LABORATORY**

**«Laboratory storage method»**

- Temperature
- Time limit
- Dark/light

+

**Laboratory QA procedures, certification, competency etc.**



**«Laboratory pretreatment method» (S03 vocabulary), e.g.:**

- Dissection protocol for biota.
- Sediment grain size etc.
- Extraction/digestion/purification



**Analytical method as instrument (L05 and S04), e.g.:**

- Gas chromatography–high resolution mass spectrometry
- High performance liquid chromatography
- Spectrophotometry
- Atomic absorption spectrometry

+

**«Analytical method citation»**

- Analytical instrument instructions and any calibration guidelines.
- Certified reference material?
- Methods used to calculate limit of detection and quantification.
- Control charts etc.



**Data set:**

- Quality control?







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## Addressing gaps

To improve:

- transparency in data quality,
- reliability, and
- comparability,

a new element was recently incorporated into the data flow process:

a **“questionnaire”** that provides a **record of field and laboratory information** for the chemical parameters submitted by a data originator.

Developed based on a comparison of **non-sample specific terms** in the **data collection templates** of:

- UNEP/MAP MEDPOL,
- ICES (for OSPAR and HELCOM),
- WISE-6,
- JRC (for the Water Framework Directive, WFD), and
- NORMAN Network for emerging contaminants.



# Questionnaires

Cover sheet - general questions on laboratory proficiency and quality assurance (QA)

Worksheets - biota, seawater, and sediment - field and laboratory information inserted for each chemical parameter using drop down lists.

Y4   

	Y	Z	AA	AB	AC	AD	AE
1	<a href="http://vocab.nerc.ac.uk/search_nvs/">http://vocab.nerc.ac.uk/search_nvs/</a>		<a href="http://vocab.nerc.ac.uk/search">http://vocab.nerc.ac.uk/search</a>				
2	Select from the <b>drop-down list</b> (definitions are provided on the worksheet 'main S03 sample preparation')	Autolink unless	Select the analytical method from the <b>drop-down list</b> or search the	Autolink unless	If available, insert a citation for the	Select yes or no from the	Insert a relevant protocol if the analytical method has been validated according to it
3	<b>Sample preparation (pre-treatment/extraction/digestion)</b>	<b>S03 code</b>	<b>Analytical method</b>	<b>S04 code</b>	<b>Analytical method citation</b>	<b>Is a standardised analytical method used?</b>	<b>Protocol used to validate analytical method</b>
4	filtration, incubation	S03107	fluorometry	S04185	Lorenzen C, Jeffrey	Yes	ISPRA, SIBM (2010) Metodologie di studio
5	filtration	S0393	Colorimetric analysis	S04136	Hansen, H.P.,	Yes	GO-SHIP Repeat Hydrography Nutrient
6	filtration	S0393	Colorimetric analysis	S04136	Hansen, H.P.,	Yes	GO-SHIP Repeat Hydrography Nutrient
7	filtration, persulphate oxidation	#N/A	Colorimetric analysis	S04136		Yes	ISPRA, SIBM (2010) Metodologie di studio
8	filtration	S0393	Colorimetric analysis	S04136	Hansen, H.P.,	Yes	GO-SHIP Repeat Hydrography Nutrient
9	filtration, persulphate oxidation	#N/A	Colorimetric analysis	S04136		Yes	ISPRA, SIBM (2010) Metodologie di studio
10		#N/A		#N/A			
11		#N/A		#N/A			
12		#N/A		#N/A			
13		#N/A		#N/A			
14		#N/A		#N/A			
15		#N/A		#N/A			
16		#N/A		#N/A			
17		#N/A		#N/A			
18		#N/A		#N/A			
19		#N/A		#N/A			



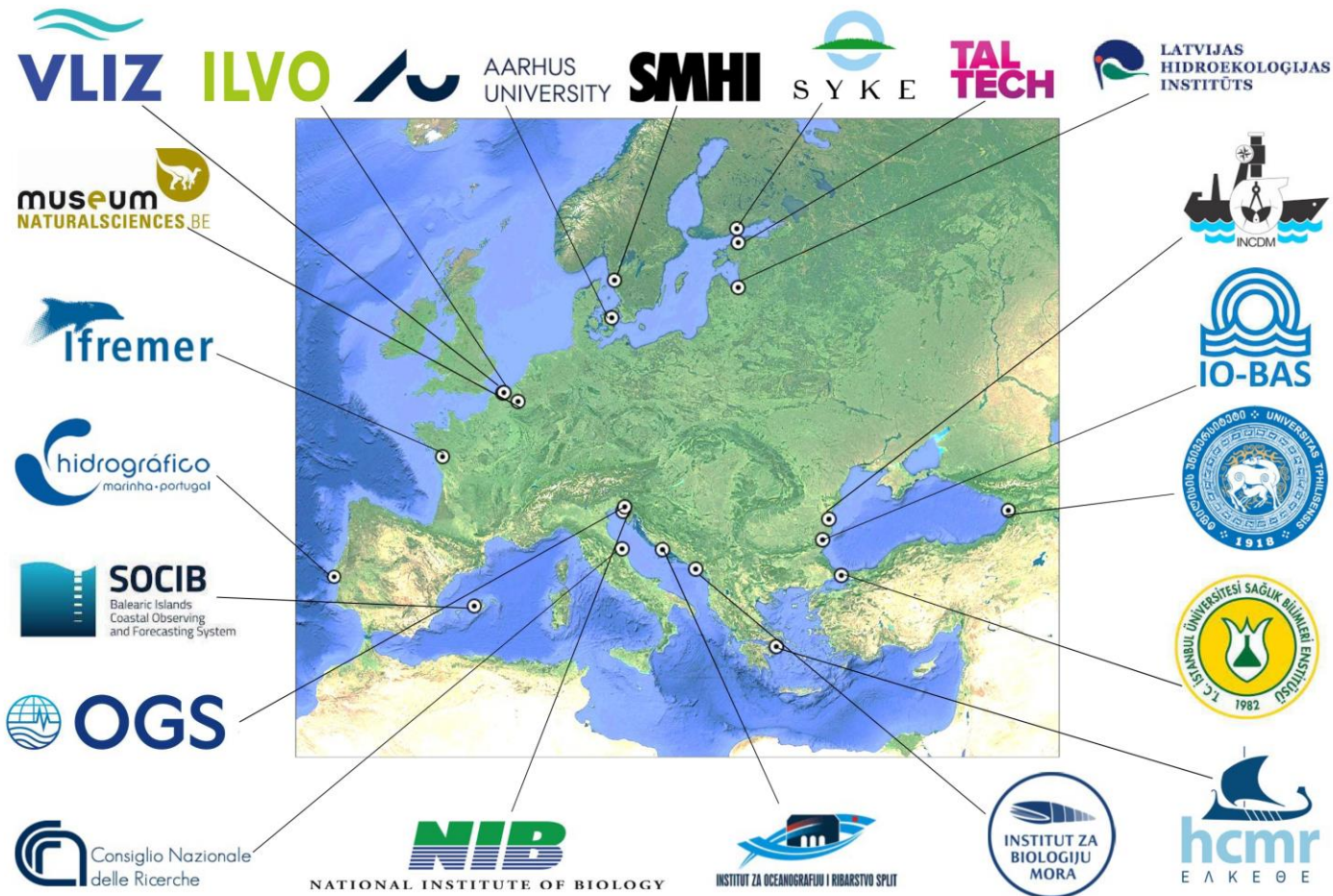
# EMODnet

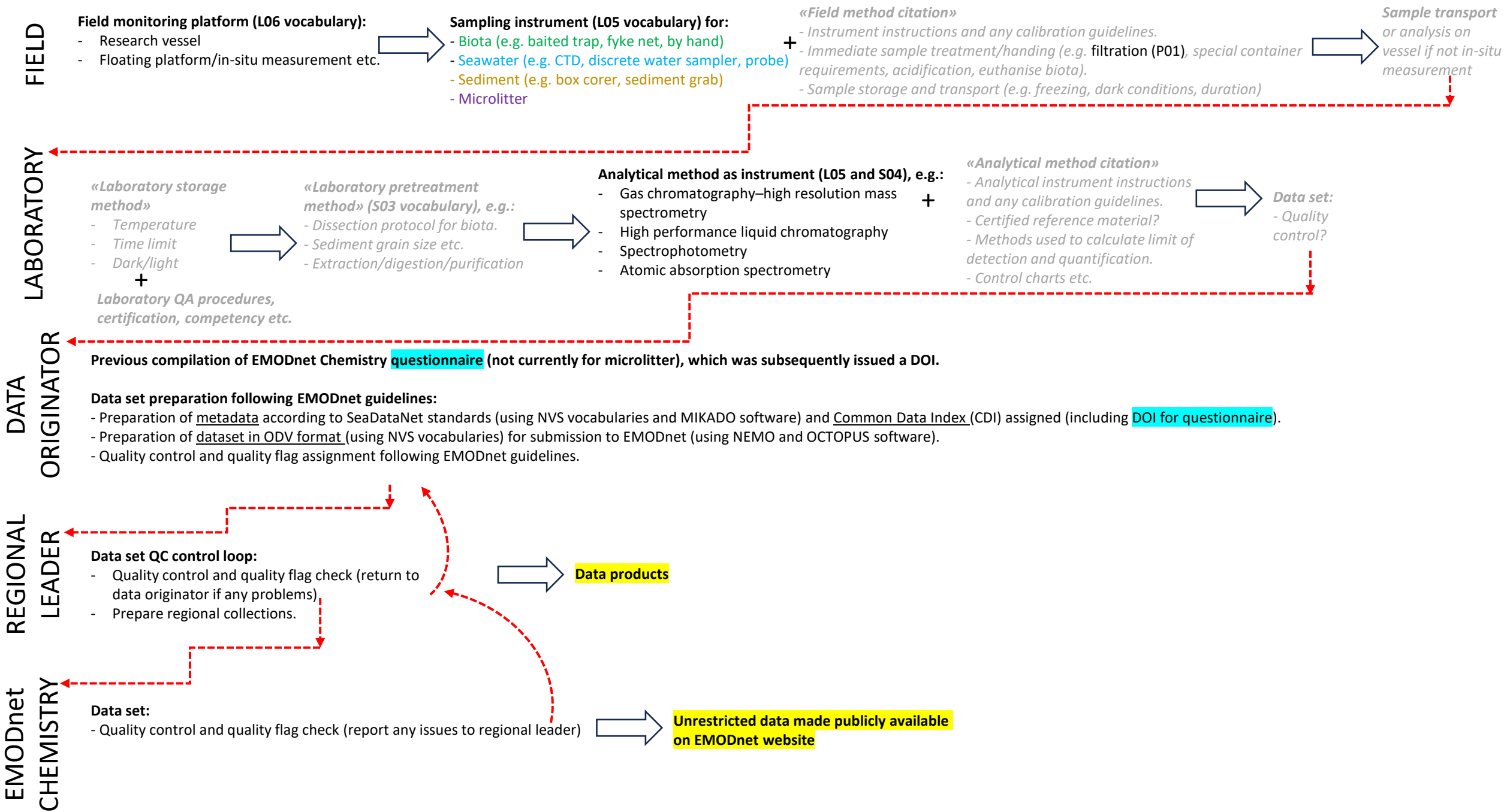
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## Questionnaires

Questionnaires were collected from 63 laboratories associated with 21 institutes.

- each was assigned a DOI that is included in the CDI record for data submissions.







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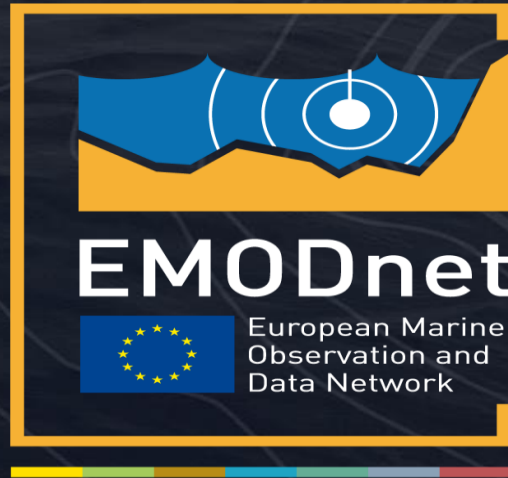
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## Closing remarks

- **EMODnet Chemistry** facilitates the accessibility of chemical **data collections** and derived **data products**
- **Data flow** has implications for harmonisation and quality control procedures
- Addressing gaps - fundamental to improve **transparency in data quality**, reliability, comparability
- Ultimate aim: to obtain open and trusted data and data products on marine water quality to support **harmonised environmental status assessment**
- For more information on the development and results of the questionnaire – a paper titled “**Improving data reliability to support marine pollution assessment according to MSFD Descriptor 8 in the European Seas: the contribution of EMODnet Chemistry**” will be published soon in *Frontiers in Marine Pollution*.

# Thank you!



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*Your gateway to marine data in Europe*