The European Marine Observation and Data Network (EMODnet):

A public EU marine data service

EMODnet Secretariat

One central map viewer

to visualise all EMODnet data

1 OCEAN 1 EMODnet

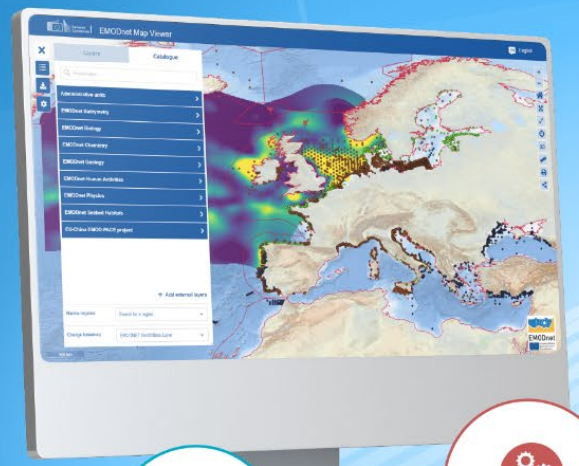
One single portal

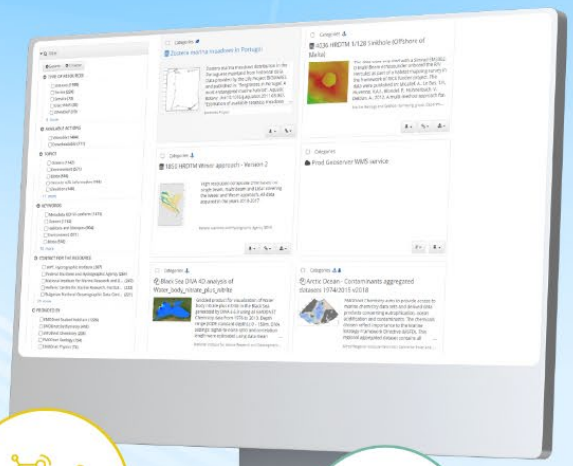
One central metadata catalogue

to enhance data search and discovery

140 partners

+100 use cases





Discover, visualise and download marine data and products across 7 thematics and hundreds of parameters

BATHYMETRY

HUMAN ACTIVITIES

PHYSICS

GEOLOGY

SEABED HABITATS

CHEMISTRY

BIOLOGY

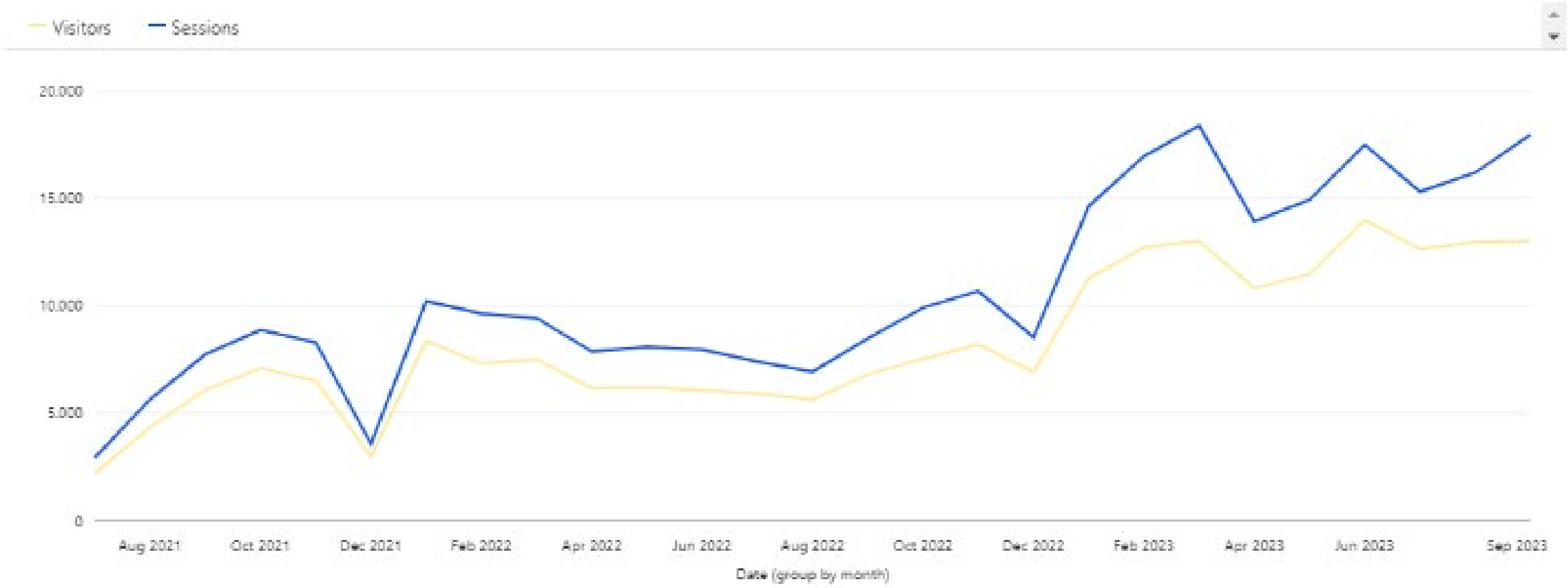
EMODNET.EC.EUROPA.EU

The European Marine Observation and Data Network (EMODnet) is financed by the European Union under regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund

YOUR GATEWAY TO *IN SITU* MARINE DATA IN EUROPE AND BEYOND

EMODnet
European Marine Observation and Data Network

EMODnet | One Portal statistics



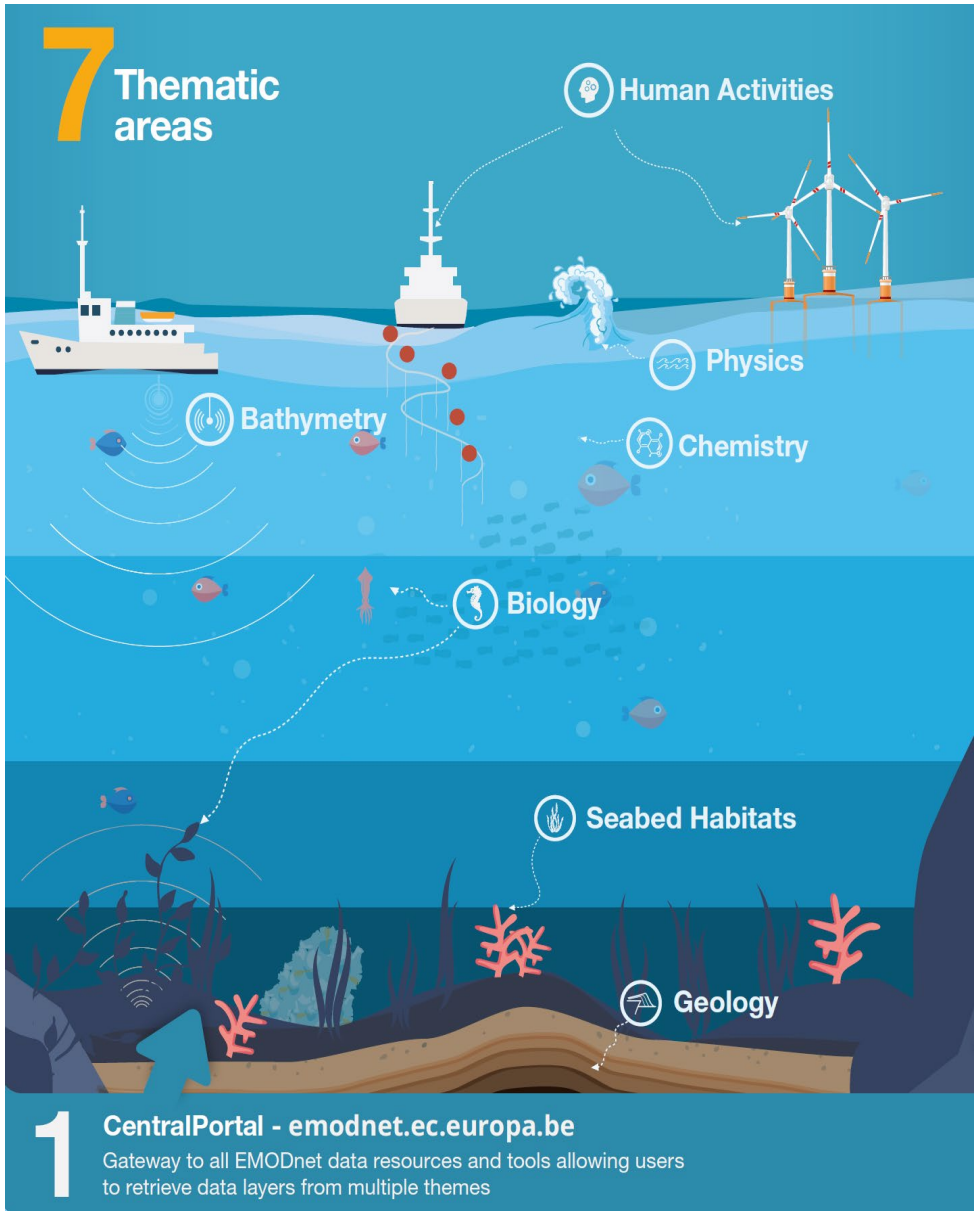
EMODnet Portal Unique Visitors

2023: >90,000

2023: Increase from January 2023 (post-centralization) estimate > 130,000 unique visitors in 2023*

based on 10,000 – 15,000 unique visits per month for January – September 2023 so far

EMODnet | Scope and coverage



- **EMODnet is an operational EU marine data service**, a flagship marine knowledge initiative of EC DG MARE, funded by the EMFAF, implemented by > 120 partners across EMODnet thematics, data ingestion, Central Portal and Secretariat
- **EMODnet offers pan-European (and beyond) FAIR data and metadata of *in situ* marine environmental and human activities, spanning 100's of parameters, crucially via data and web services**
  - ✓ Aggregated from > 610 unique data providers* (research/academia & research infrastructures, operational oceanography (some via CMEMS), hydrographic offices, geological surveys, regulatory monitoring, private sector, NGOs, citizen science, data infrastructures e.g., SeaDataNet, regional initiatives e.g., ICES
  - ✓ Standardised to EU/International standards; Harmonised into integrated data layers
  - ✓ Open data: open access and open source
  - ✓ Data and web services, including for machine-machine harvesting
- **EMODnet produces pan-European marine data products** e.g., Bathymetry Digital Terrain (DTM), Seabed Habitats EUSeaMap, Vessel Density composite map, all fully open access, data policy CC BY4.0

*https://emodnet.ec.europa.eu/en/data-providers-list

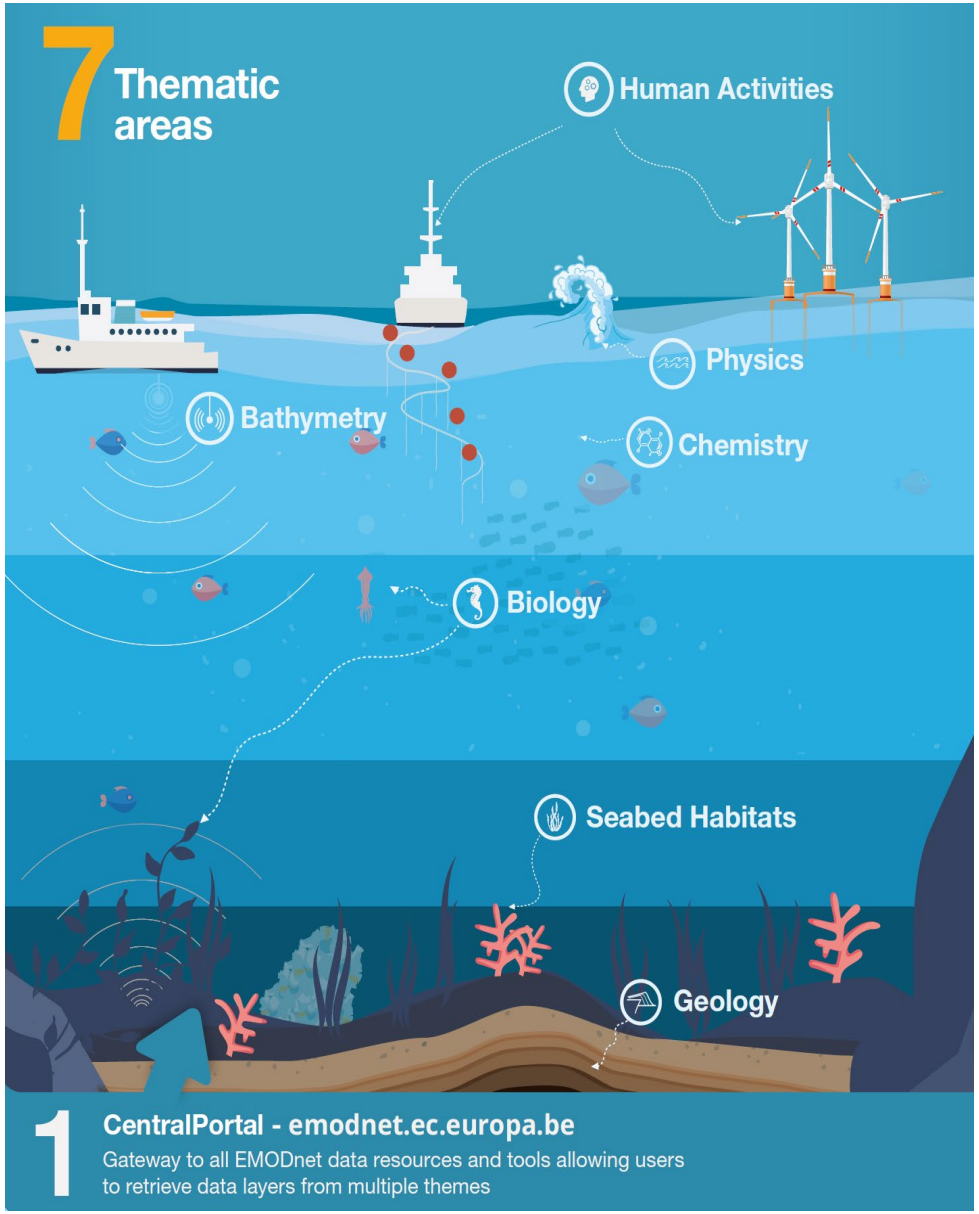
EMODnet | Coastal offer

EMODnet has a diverse offer of surface – seafloor; coast to open ocean; across seven broad thematics and 100s parameters.

For the coastal area, examples of EMODnet pan-European FAIR data/data products based on *in situ* ocean observations and resulting marine data include:

- Coastal behaviours (EMODnet Geology)
- Riverine inputs (EMODnet Physics)
- Coastal polluants & marine liter (EMODnet Chemistry)
- Coastal blue economy operations, sittings and shipping/vessel transportation & Maritime Spatial Plans (EMODnet Human Activities)
- Coastal bathymetry (EMODnet Bathymetry)
- Sea level: Absolute and Relative Trends and Anomalies (EMODnet Physics)
- Coastal biodiversity (EMODnet Biology)
- Coastal Seafloor/Benthic Habitats (EMODnet Seabed Habitats)

EMODnet | Service evolution



EMODnet content evolution: maintain & optimize existing data streams, expand coverage, parameters, resolution & sources

User-driven front-end: map viewer, metadata catalogue, data and web service evolution

- User-driven service evolution: map viewer, metadata catalogue, data and web services
- Infrastructure developments and common data lake with CMEMS/MOi for the EU Digital Twin Ocean (DTO)
- Coastal and land-sea interface parameters and data products
- Filling geographical, resolution and parameter gaps, e.g., biodiversity in pan-Mediterranean
- Expanding the diverse sources of data provision to EMODnet and emerging parameters e.g., citizen science, NGOs
- Data integration from European Overseas territories e.g., Caribbean Sea and polar regions (Arctic & Southern Ocean)
- Regional partnerships worldwide e.g,. EU-China (NMDIS)
- Global partnerships e.g., OceanInfoHub, GEOSS and more

*https://emodnet.ec.europa.eu/en/data-providers-list

EMODnet | Interoperable data/metadata, harvested by global ocean data catalogues

GEOSS Portal

International portal, implemented by ESA

Ocean InfoHub

Implemented by IODE of IOC/UNESCO

EMODnet's FAIR common metadata catalogue is the backbone for EMODnet's contribution to the the **global ocean data digital ecosystem**, the UN Decade of Ocean Science for Sustainable Development, Sustainable Development Goals (SDG) agenda and OeanData 2030, via **machine-machine data harvesting.**

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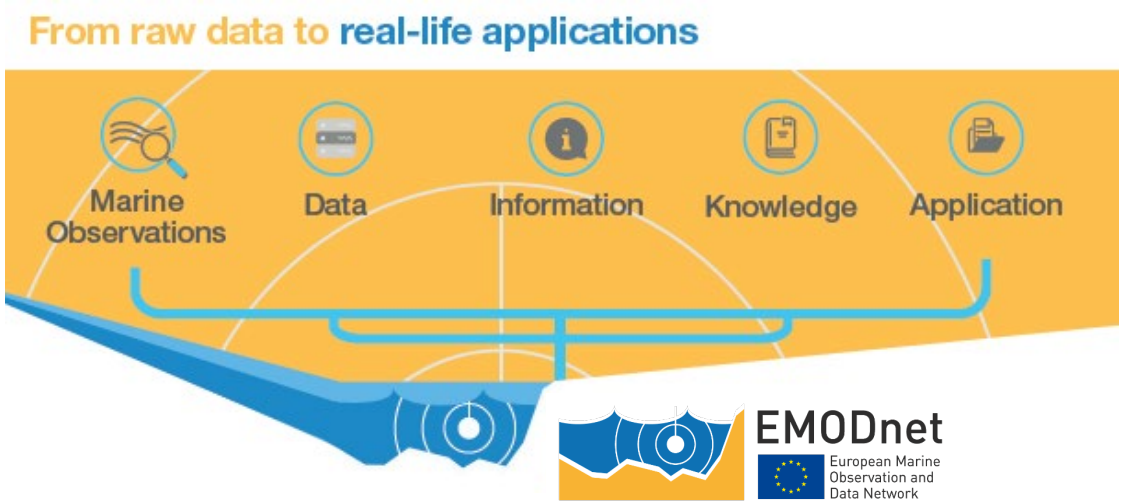
EMODnet: Data Ingestion service

- EMODnet service supporting data collectors and providers in data curation, management and ingestion into EMODnet
- Key data submitters include private sector
- Centralising into EMODnet Central Portal in Spring 2024 (work ongoing)

EMODnet supports EU Policy implementation, offering FAIR marine data / data products as a key component of the marine knowledge base to meet the ambitious targets of the EU Green Deal (including MSFD, MSP), EU Climate Pact, EU 2030 Biodiversity Strategy, EU Mission Restore our Ocean and Waters, and global policy initiatives.



SUSTAINABLE DEVELOPMENT GOALS

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

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EMODnet European Marine Observation and Data Network

EMODnet is working together with Copernicus Marine Service to provide the back-bone for the European Digital Twin Ocean (with associated data lake by Spring 2024) that will lead to a step change in capability for big (ocean) data analyses, ocean prediction and scenario-setting with Climate Change and broader societal applications.

VLIZ, EMODnet Secretariat and MOi are key stakeholders in the Digital Twin Ocean Forums since the first edition in 2022 and will co-organize the Digital Twin Ocean Forum 2024.

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European Marine Observation and Data Network

EDITOInfra
European Digital Twin Ocean

Copernicus Marine Service

Implemented by MERCATOR OCEAN INTERNATIONAL

Bringing nature back into our lives
EU 2030 Biodiversity strategy

EUROPEAN CLIMATE PACT
#MyWorldOurPlanet
#EUClimatePact

The European Green Deal
#EUGreenDeal

EUROPEAN UNION
EU MISSIONS
RESTORE OUR OCEAN AND WATERS

SUSTAINABLE DEVELOPMENT GOALS

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EMODnet European Marine Observation and Data Network

EMODnet: Key partnerships with Copernicus Marine Service

Data flows:

- Some physical parameters flow CMEMS INSTAC to EMODnet Physics
- Some CMEMS outputs are used by EMODnet thematics e.g., bottom-water currents used by Seabed Habitats for EUSeaMap
- EMODnet Chemistry supply EMODnet FAIR eutrophication and acidification datasets for Copernicus Marine biogeochemical products
- EMODnet Physics providing FAIR in situ data to CMEMS INSTAC for a new CMEMS product on sea level

Marine *In Situ* Coordination Working Group: cross-service CMEMS, EMODnet, EuroGOOS (*in situ* data flows; harmonisation of citizen science data

European Digital Twin Ocean: EDITO-Infra technical infrastructure and common data lake

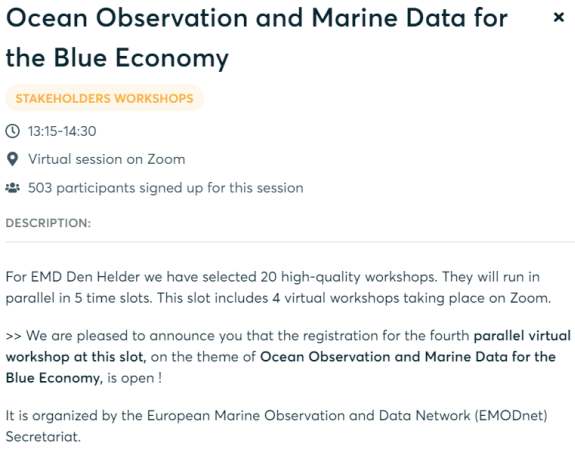
European Atlas of the Seas: Increasing the offer of EMODnet and CMEMS in EU Atlas

Other joint activities

-joint training and events in 2024 e.g., UN Ocean Decade Conference
-joint use cases

EMODnet | Contributions to wider initiatives

EMODnet: Working with other key actors in the Marine Knowledge Value Chain, supporting EC DG MARE's activities related to Ocean Observation



https://webgate.ec.europa.eu/maritimeforum/en/node/6188

EMODnet European Marine Observation and Data Network

European MARINE BOARD Advancing Seas & Ocean Science

EuroGOOS European Global Ocean Observing System

Copernicus Marine Service

Copernicus MERCATOR OCEAN INTERNATIONAL

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EMODnet European Marine Observation and Data Network

EMODnet: Ongoing contributions to coastal related initiatives

JPI Oceans Sea Level Rise

JPI Oceans Sea Level Rise Knowledge Hub as:

- Presenter/participant at kick-off meeting, April 2020
- Co-Chair of Task Group 4 on Communication and Outreach, member of the Steering Committee
- Editor of first assessment
- Contributor to Sea Level Rise event, Venice, October 2022 and the Assessment Report

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

UN Ocean Decade activity as:

- COAST Predict-CORE Advisor
- Collaborative Centre on Ocean Prediction Advisor
- DITTO on digital Twins + TURTLE & many more

CoastPredict - Observing and Predicting the Global Coastal Ocean

.....

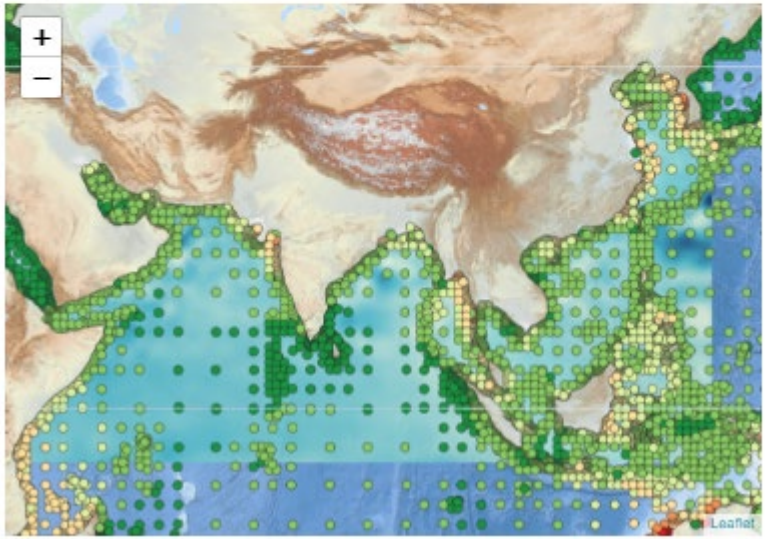
EMODnet | global ocean data initiatives and regional partnerships worldwide

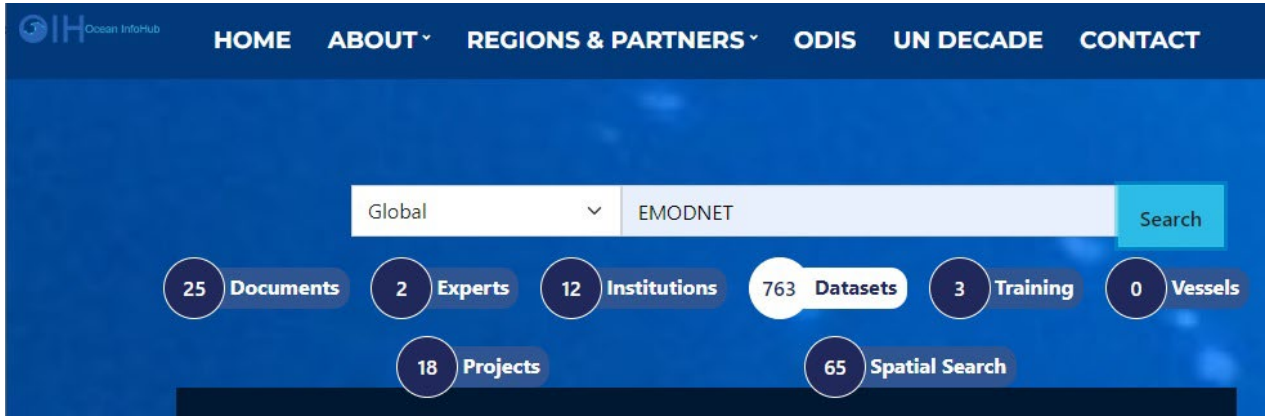
EMODnet Partnership for China and Europe (EMOD-PACE)

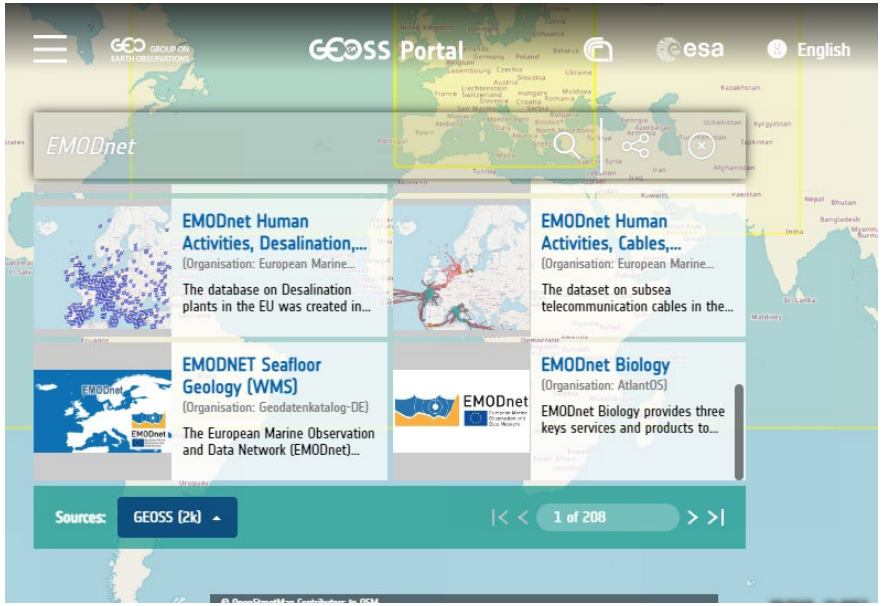
China-EU Marine Data Network Partnership (CEMDnet)

In support of EU and China Blue Partnership

Explore the EMOD-PACE map viewer



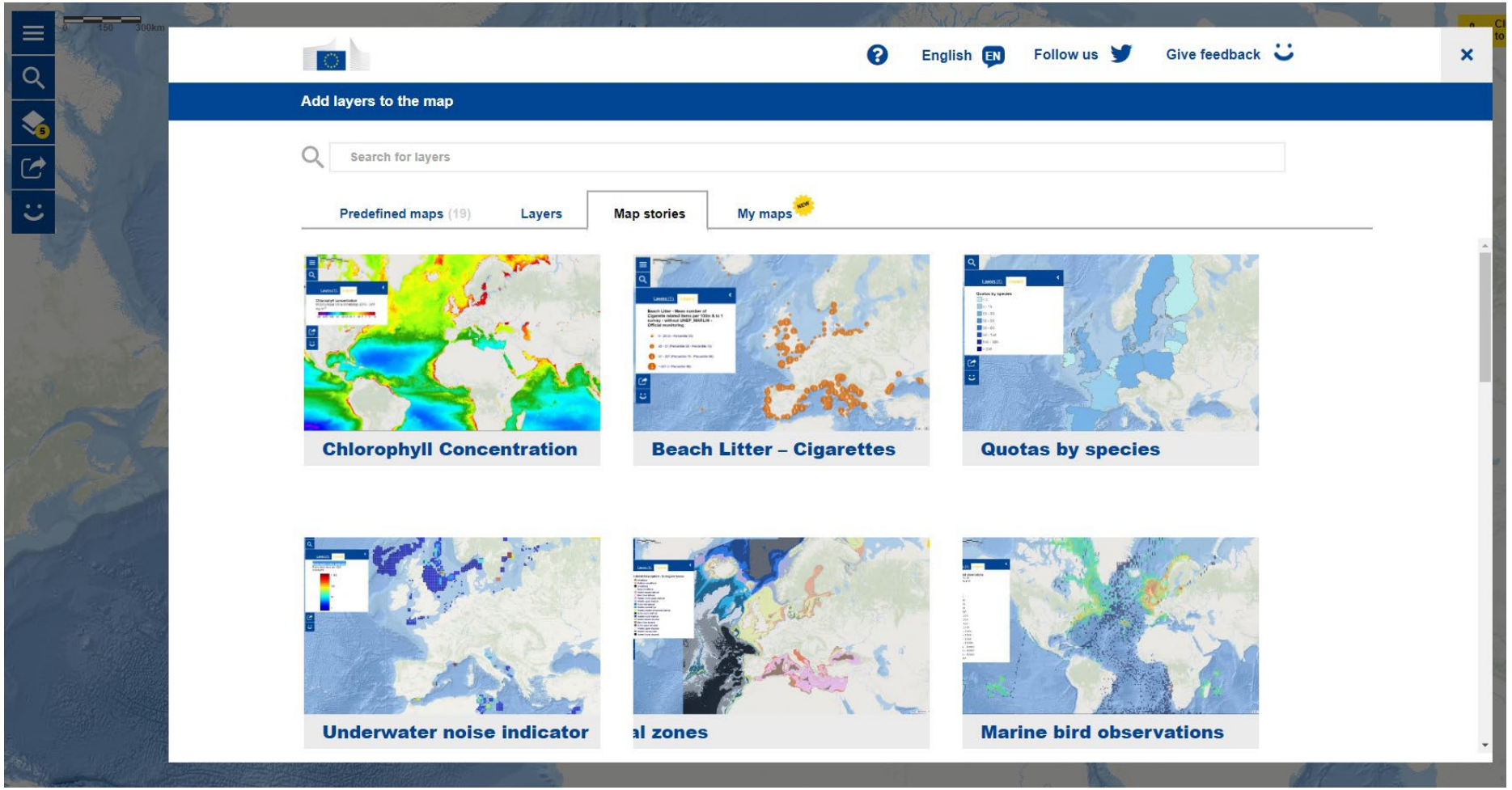




EMODnet

EMODnet | European Atlas of the Seas

EMODnet for Society | European Atlas of the Seas



EMODnet and other open source data are also made available for society via the EC Communication Tool European Atlas of the Seas, available in 24 EU languages

https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/

European Atlas of the Seas | Key figures

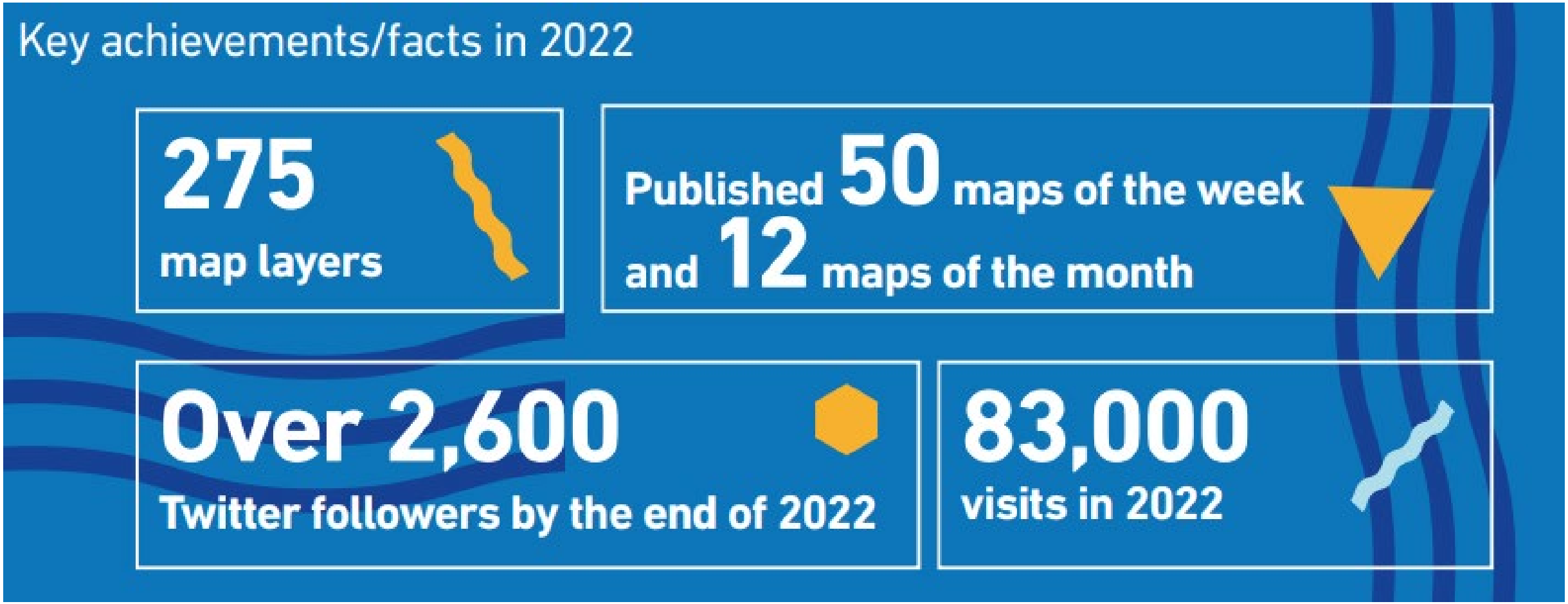
24 languages

Select your language

Close

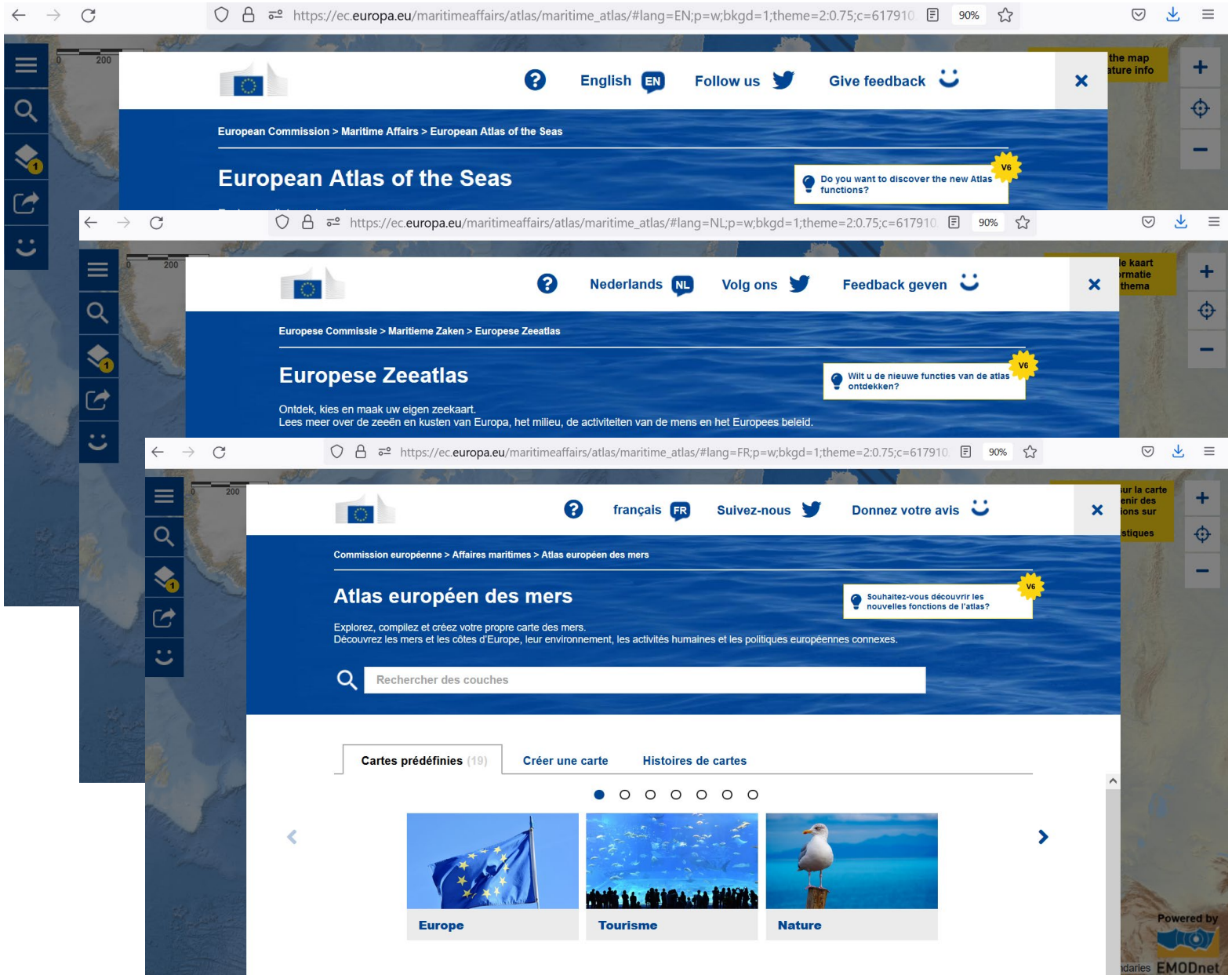
български	latviešu
čeština	lietuvių
dansk	magyar
Deutsch	Malti
eesti	Nederlands
ελληνικά	polski
English ✓	português
español	română
français	slovenčina
Gaeilge	slovenščina
hrvatski	suomi
italiano	svenska

European Atlas of the Seas | Key figures



2023: Expect > 100,000 unique visits, based on current statistics

EMODnet data for society: The European Atlas of the Seas



- A tool for education and ocean literacy with a teachers' corner with resources developed with education professionals;
- Contributing to the EU4Ocean European Ocean Literacy Network;
- User tutorial:

https://www.youtube.com/watch?v=QdsZUlqAlns

https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1482

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European Atlas of the Seas | Current Copernicus Marine Service map layers

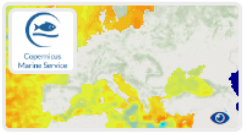
- Global mean sea level regional trend (Year: 1993-2019)
- Global sea surface temperature regional trend (Year: 1993-2018)
- Land cover (Year: 2012-2018)
- Global Ocean Chlorophyll (daily)
- Global Ocean Chlorophyll (monthly-mean)

Copernicus Marine Service

Implemented by MERCATOR OCEAN INTERNATIONAL

Climate change

Global mean sea level regional trend



The Global mean sea level regional trend (Millimeters per year) is provided by the Copernicus Marine Service. Sea level is rising as a result of ocean heating and land ice -mass loss. Water expands when heated and about 30% of contemporary global mean sea level rise can be attributed to this thermal expansion alone. Sea level rise can seriously affect human populations in coastal and island regions as well as natural environments such as marine ecosystems.

The time series shows that the average global sea level has risen by more than 8 cm since the early 1990's and it continues to rise at a rate of 3.3 mm each year. New calculations reveal that global mean sea level rise is accelerating, with this rate increasing by 0.12 ± 0.073 mm each year.

Sea levels do not rise homogeneously and thus some regions are more threatened than others. The map shows the spatial distribution of sea level trends since 1993. It reveals that sea level is rising for the vast majority of the global ocean but there is large-scale variation with regions like the western tropical Pacific Ocean reaching amplitudes of up to +8 mm/year. In this area, the regional trends are mainly due to thermal expansion. The regional sea level trend uncertainty is on the order of 2-3 mm/year with values as low as 0.5 mm/year or as high as 5.0 mm/year depending on the region.

This sea level ocean monitoring indicator is derived from the DUACS delayed-time (DT-2018 version). These products are distributed by the Copernicus Climate Change Service and also available in the Copernicus Marine Service catalogue.

Global sea surface temperature regional trend

The Global sea surface temperature regional trend (degree Celsius (°C) per year) is provided by the Copernicus Marine Service. Sea surface temperature is one of the Essential Climate Variables, defined by the Global Climate Observing System, required for monitoring and characterizing the state of the global climate.

The time series shows that the average global sea surface temperature has risen by more than 0.3 °C since the early 1990s and continues to rise at an unprecedented rate of 0.014 ± 0.001 °C per year. The past four years we observed the warmest ocean surface temperatures since records began.

Sea Surface Temperature does not rise homogeneously and thus some regions are more threatened than others. The map shows the spatial distribution of the mean sea surface temperature trends over the Global Ocean since 1993. It reveals that warming is occurring for the vast majority of the globe between 1993 and 2018. One of the exceptions to this trend is the North Atlantic, particularly the region south of Greenland where a cooling trend is observed.

This sea surface temperature ocean monitoring indicator is based on daily, global climate sea surface temperature (SST) analyses generated by the European Space Agency (ESA), SST Climate Change Initiative (CCI) and the Copernicus Climate Change Service (C3S) and is available from the Copernicus Marine Service catalogue.

EMODnet

European Atlas of the Seas | Potential for future integration 2024 onwards?

Copernicus Marine Service

- Global ocean acidification - mean sea water pH trend map from Multi-Observations Reprocessing
- Surface partial pressure of carbon dioxide in sea water
- Surface downward mass flux of carbon dioxide expressed as carbon
- Mole concentration of dissolved inorganic carbon in sea water

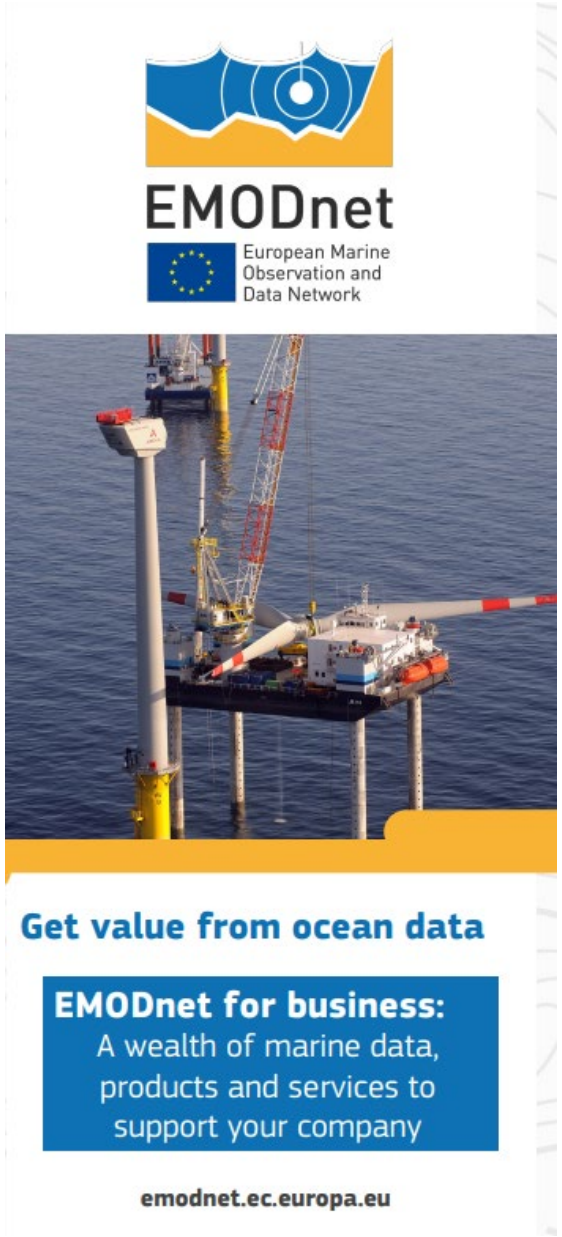
Copernicus Marine Service

Implemented by MERCATOR OCEAN INTERNATIONAL

EMODnet European Marine Observation and Data Network

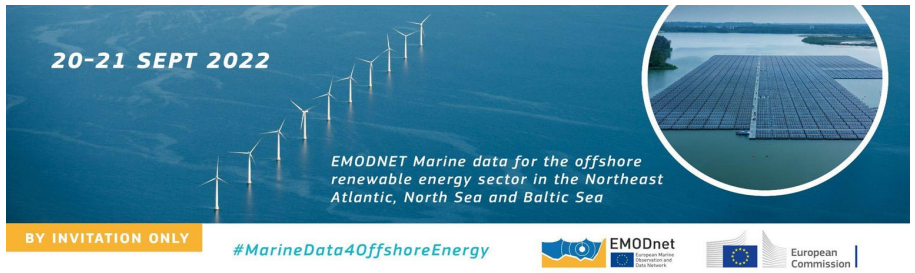
EMODnet | Events

EMODnet: Business events and dialogues



In addition to attending industry-led events, EMODnet organizes it's own Blue Economy dialogues:
e.g., Offshore Renewable Energy (2022); Coastal Tourism (2023)

- Data use, needs and requirements
- Data sharing and ingestion to EMODnet



EMODnet

EMODnet: Open Sea Lab 3.0

EMODnet: External events Q3-4 2023 and forward look Q1-2 2024

Summer - Autumn 2023: EMODnet as speaker and/or co-organiser:

- Ocean Race Finale: Ocean Data Week
- Sustainable Blue Economy Partnership
- Fish-X
- EuroGOOS 2023
- EurOCEAN 2023
- Ocean Best Practices System

Upcoming events in 2024

- Ocean Sciences 2024 (NOAA – EMODnet ERDDAP session)
- UN Ocean Decade Conference 2024 (Joint side event & physical exhibition on EU marine data services: EMODnet and Copernicus Marine Service)
- IMDIS 2024
- European Maritime Day 2024
- Digital Ocean Forum 2024

Join us at the EMODnet Open Conference 2023!

Registration is open now!

Full programme coming in September 2023

https://emodnetconference2023.eu/

EMODnet Open Conference = Public event 29 (PM) – 30 November 2023

EMODnet Jamboree = EMODnet partnership, 27-28 and 29 (AM) November 2023

- Plenary Panels and Presentations
- Townhall Break-out discussions
- EMODnet partner dialogues
- Virtual Exhibition: Call for abstracts community (e-)posters by 14th September 2023!

https://emodnet.ec.europa.eu/en/emodnet-open-conference-2023

EMODnet Open Conference = Public event 29 (PM) – 30 November 2023

EMODnet Jamboree = EMODnet partnership, 27-28 and 29 (AM) November 2023

- EMODnet innovations in data, data products and services
- EMODnet, Mission Ocean and Wider Society
- EMODnet, EU Policy and regulatory monitoring data
- EMODnet, Ocean Best practices and Interoperability
- EMODnet and the Blue Economy
- EMODnet, Ocean Observation and the marine knowledge value chain
- EMODnet and the Digital Era
- EMODnet for Global and the UN Ocean Decade

EMODnet Open Conference = Public event 29 (PM) – 30 November 2023

Participants

- EMODnet (>120) Partners (including Marine data centres, hydrographic offices, other)
- EMODnet Associated Partners (Private sector, wider data providers and users)
- EU Policy makers (EC, multiple DGs)
- Marine knowledge value chain stakeholders: EU / regional Marine data services, Marine research community, Blue Economy, NGOs

Copernicus Marine Service / DG DEFIS invited contributions

- **Opening Session:** Pierre Bahurel, MOi / CMEMS (TBC)
- **Session 2 EMODnet and Digital Ocean:** Marina Tonani, MOi / CMEMS
- **Session 4 EMODnet, Ocean Observation and the Marine Knowledge Value Chain**
  - **Panel 1:** Dominique Obaton, Ifremer, CMEMS INSTAC
  - **Panel 2:** Pierre-Yves Le Traon, MOi / CMEMS
- **Session 6:** Enrique Alvarez, MOi / DCC Ocean Predict (video)
- **Closing Session:** Tim Lemmens / Richard Gilmore, EC DG DEFIS

EMODnet
European Marine Observation and Data Network

OPEN CONFERENCE

29-30 November 2023
Brussels | NHow

#EMODnetConference2023

Call to Action (to be launched at Closing Session)

EMODnet community statement on:

- EMODnet achievements
- Opportunities for EMODnet evolution
- Challenges and barriers
- Calling community to action

2024 wider consultation with CMEMS and other key actors for a EMODnet Vision

EMODnet
European Marine Observation and Data Network

Thank you for your attention, and in advance for your inputs!

Contact us to learn more about EMODnet data services, data use and data sharing (via EMODnet Data Ingestion).

Email: secretariat@emodnet.ec.europa.eu
Twitter and LinkedIn: @EMODnet
Feedback form: https://ec.europa.eu/eusurvey/runner/EMODnetFeedbackForm

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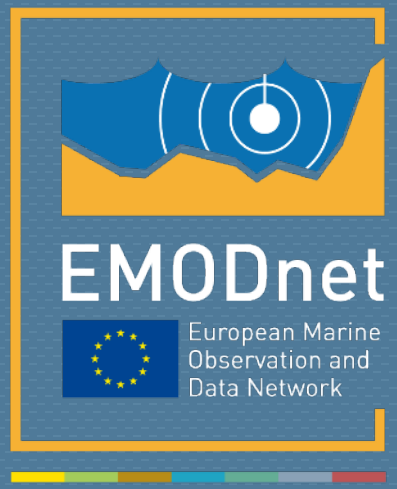

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www.emodnet.eu

Your gateway to marine data in Europe

Extra slides

EMODnet Copernicus Marine Service Coastal Meeting, 22 September 2022

Actions

1- Organise a follow up meeting between **EMODnet Chemistry and Copernicus Marine INSITU TAC**. The first meeting was considered very fruitful.

2- Organise a meeting between **Copernicus Marine coordination and EMODnet Bathymetry** project coordinator. Copernicus Marine aims at developing a global bathymetry product from S2 data, first static, then a dynamic version. An interaction is much needed between Copernicus Marine and EMODnet bathymetry to discuss the details and the synergies between the different approaches. See also the different user requirements/analyses/surveys on bathymetry that have also recently been published (Copernicus Marine, EMODnet Checkpoints) (e.g. https://www.frontiersin.org/articles/10.3389/fmars.2021.740830/full).

3- Organise a meeting with **Copernicus Land, Marine coordination and EMODnet Geology project coordinators for coastline monitoring activities** shared between the two groups.

Additional points / gaps raised:

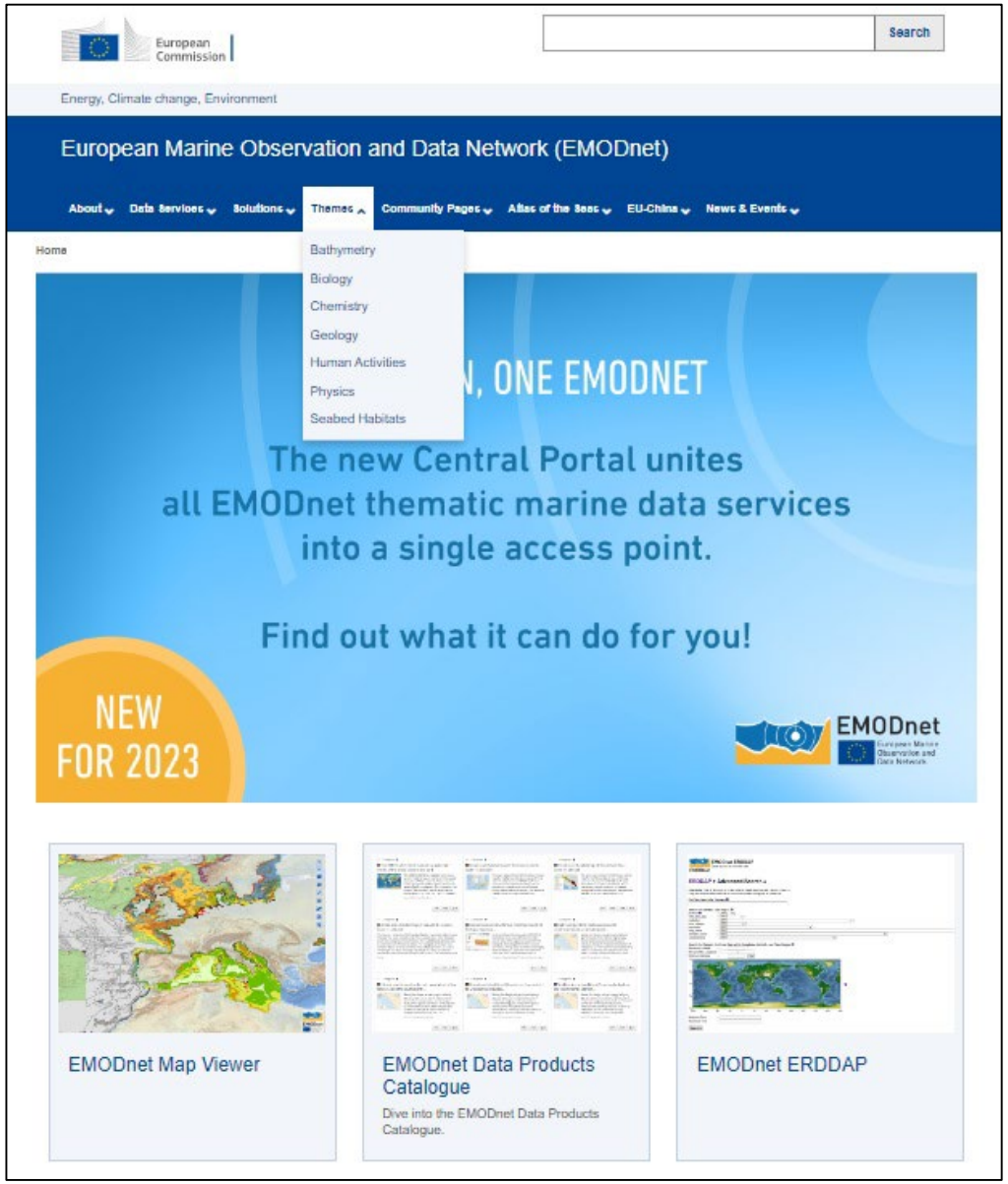
1- **Citizen science data:** the activity needs to be structured as data are currently not quality controlled. A data structure as to be set up to better answers user needs for qualified data.

2- **Rivers:** there are different initiatives in different Copernicus Services (Marine, Emergency, Land) and in EMODnet Physics. Those activities need to be well aligned.

3- **Sea level:** products already exist in Copernicus Marine INSITU TAC and through EMODnet physics. A new reprocessed product is planned in Copernicus Marine catalogue in November 2022. A good understanding of the different initiatives, the different processing steps applied is necessary. These activities need also to be well aligned to ease the user experience.

EMODnet | Latest features and functionalities

EMODnet: One new portal to replace all thematic portals



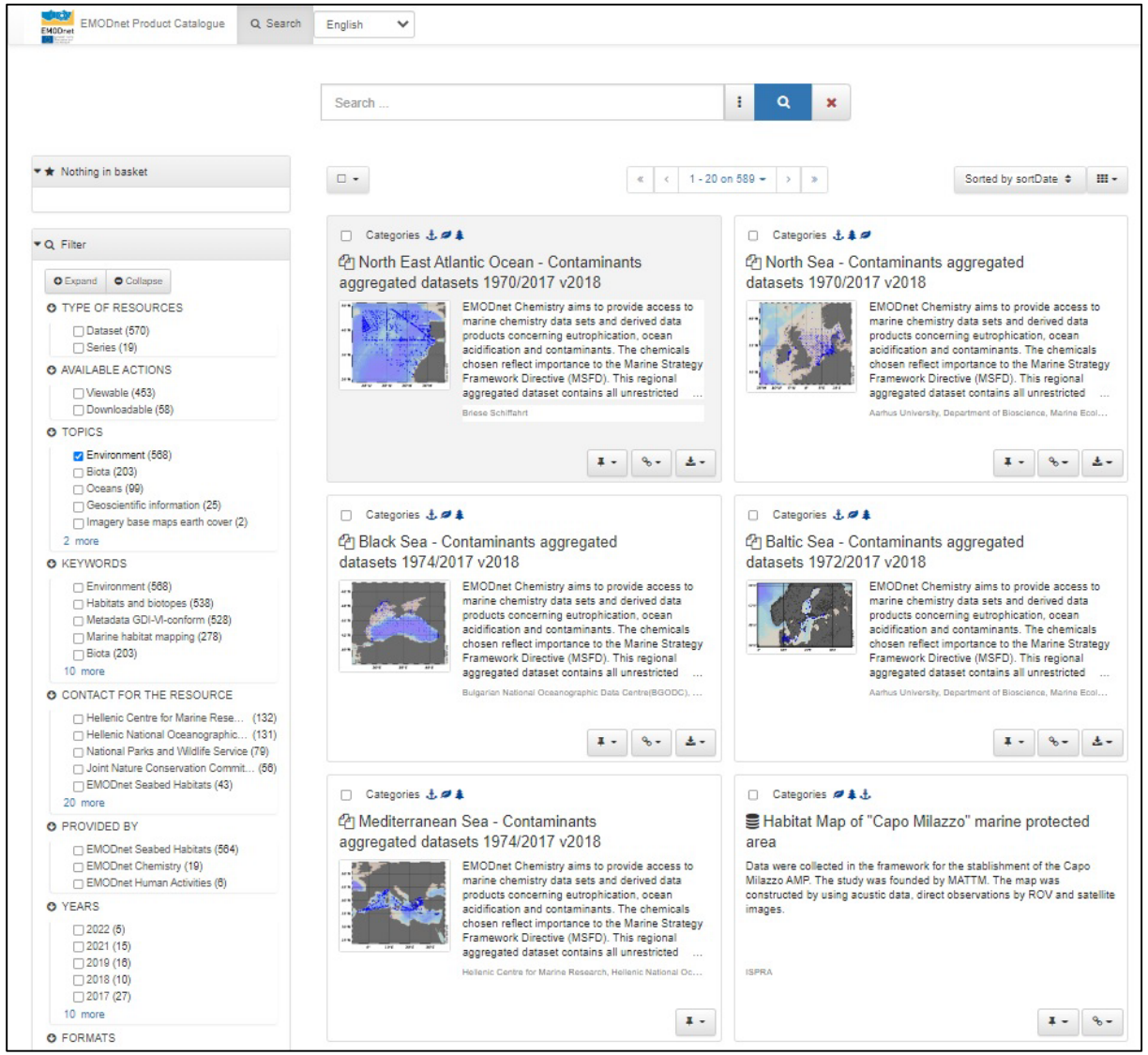
Since January 2023:

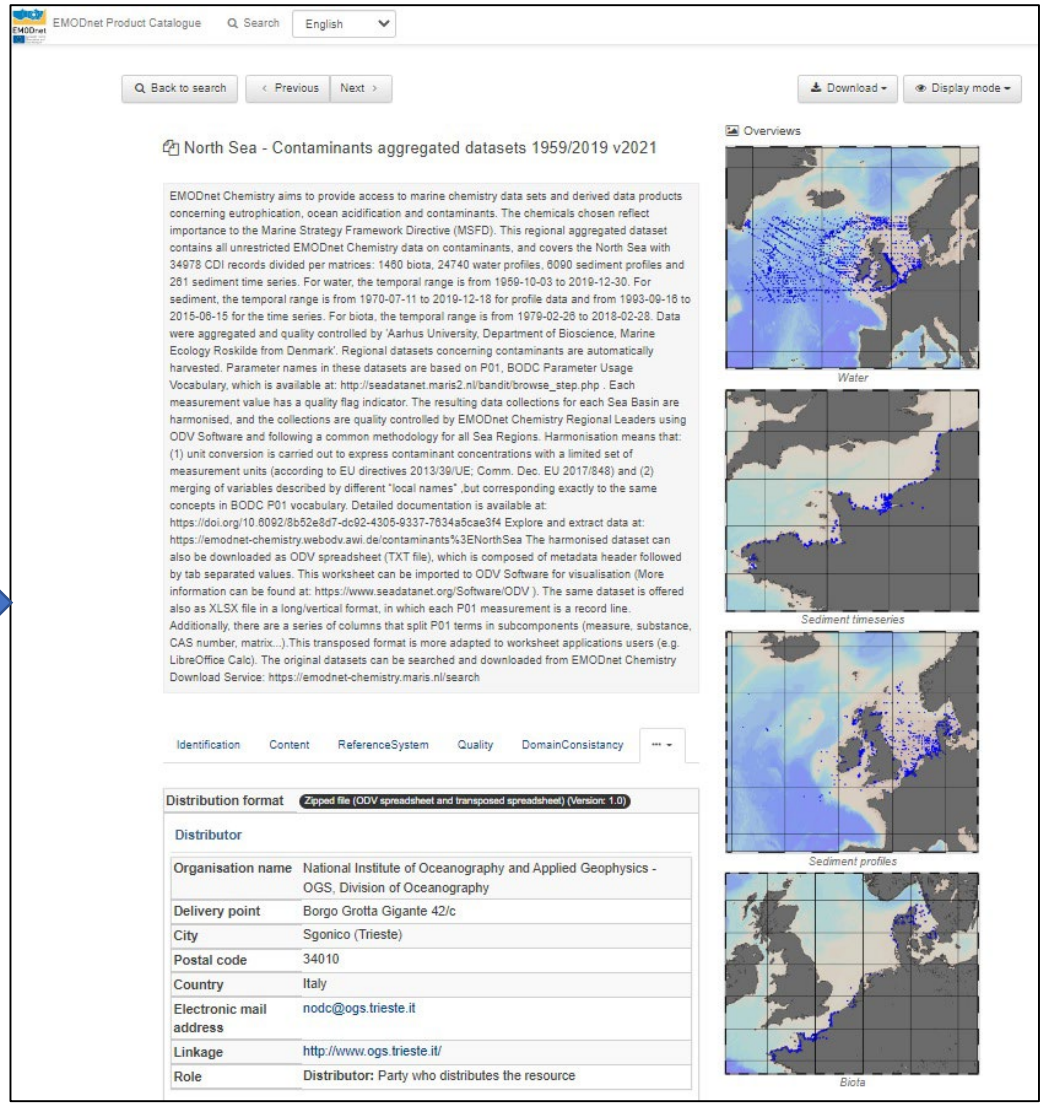
- **Unification of all EMODnet thematics** and the shutting down of individual portals
- One EMODnet **website**
- One EMODnet **map viewer**
- One EMODnet **catalogue**
- One EMODnet **ERDDAP**
- Striving for **consistency** across **themes** in:
  - Metadata
  - File formats
  - Download APIs
  - Web Services

emodnet.ec.europa.eu

EMODnet

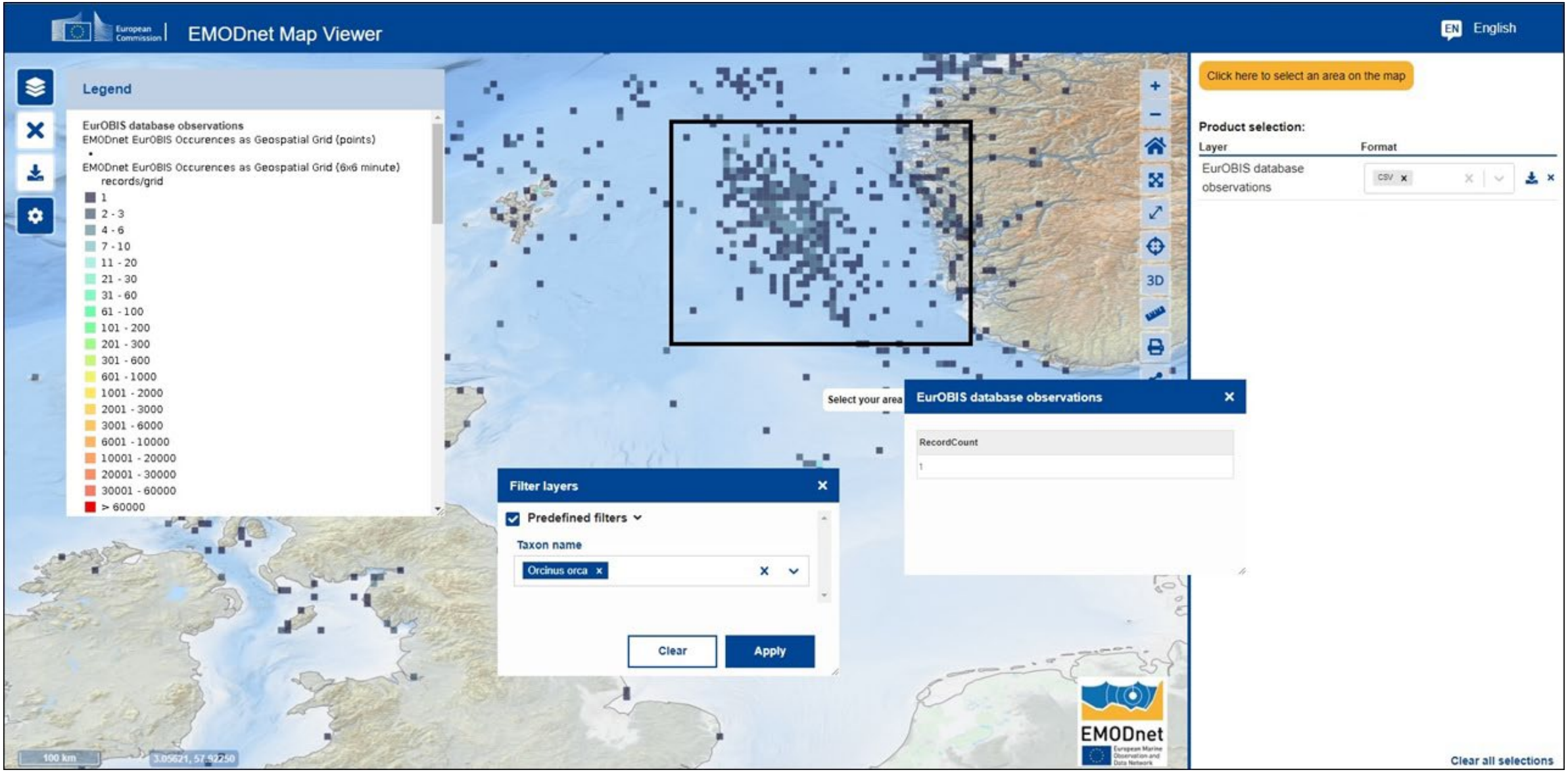
EMODnet: One central catalogue





Users can access metadata and data service information in the catalogue

EMODnet: One map viewer – subset and download e.g., species occurrence data



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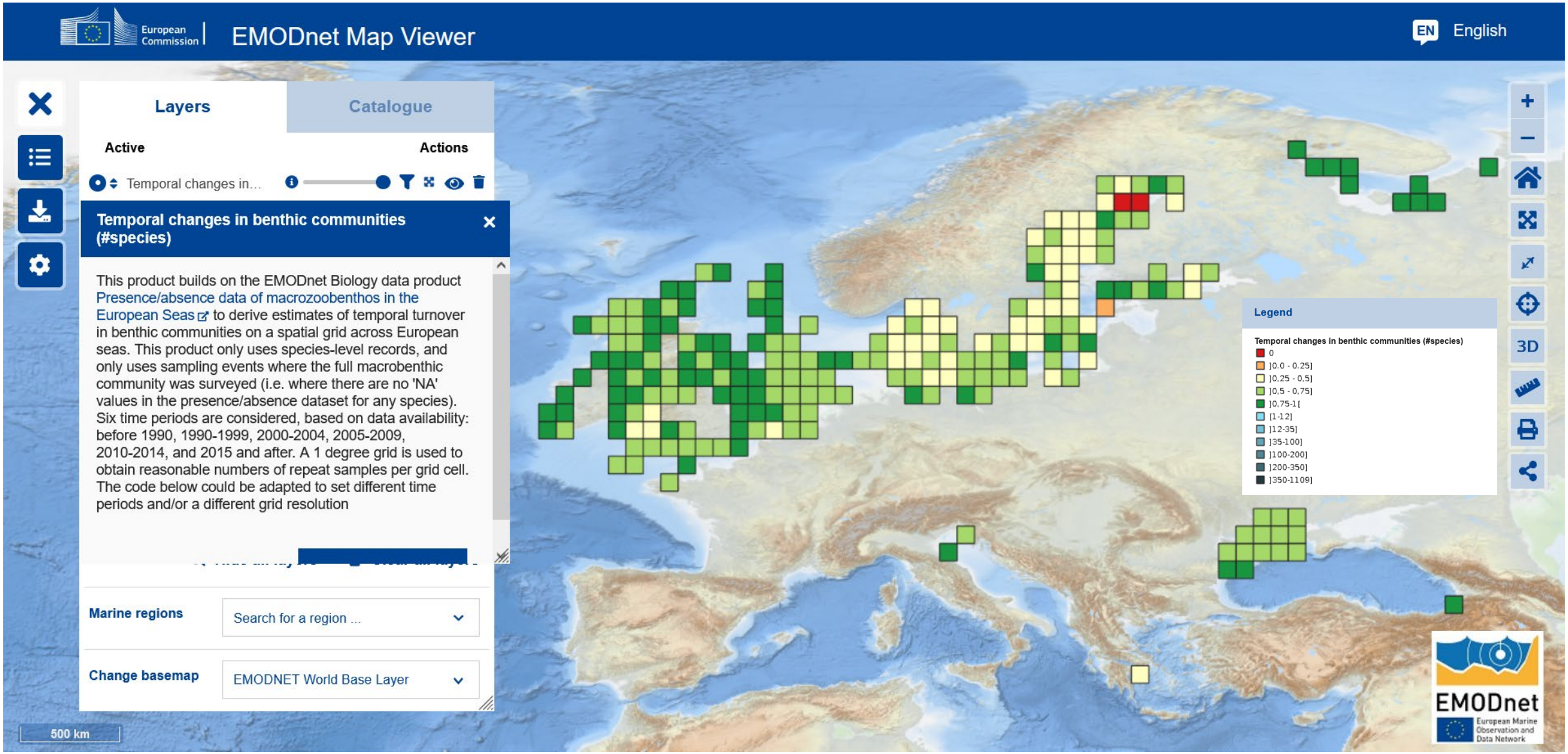
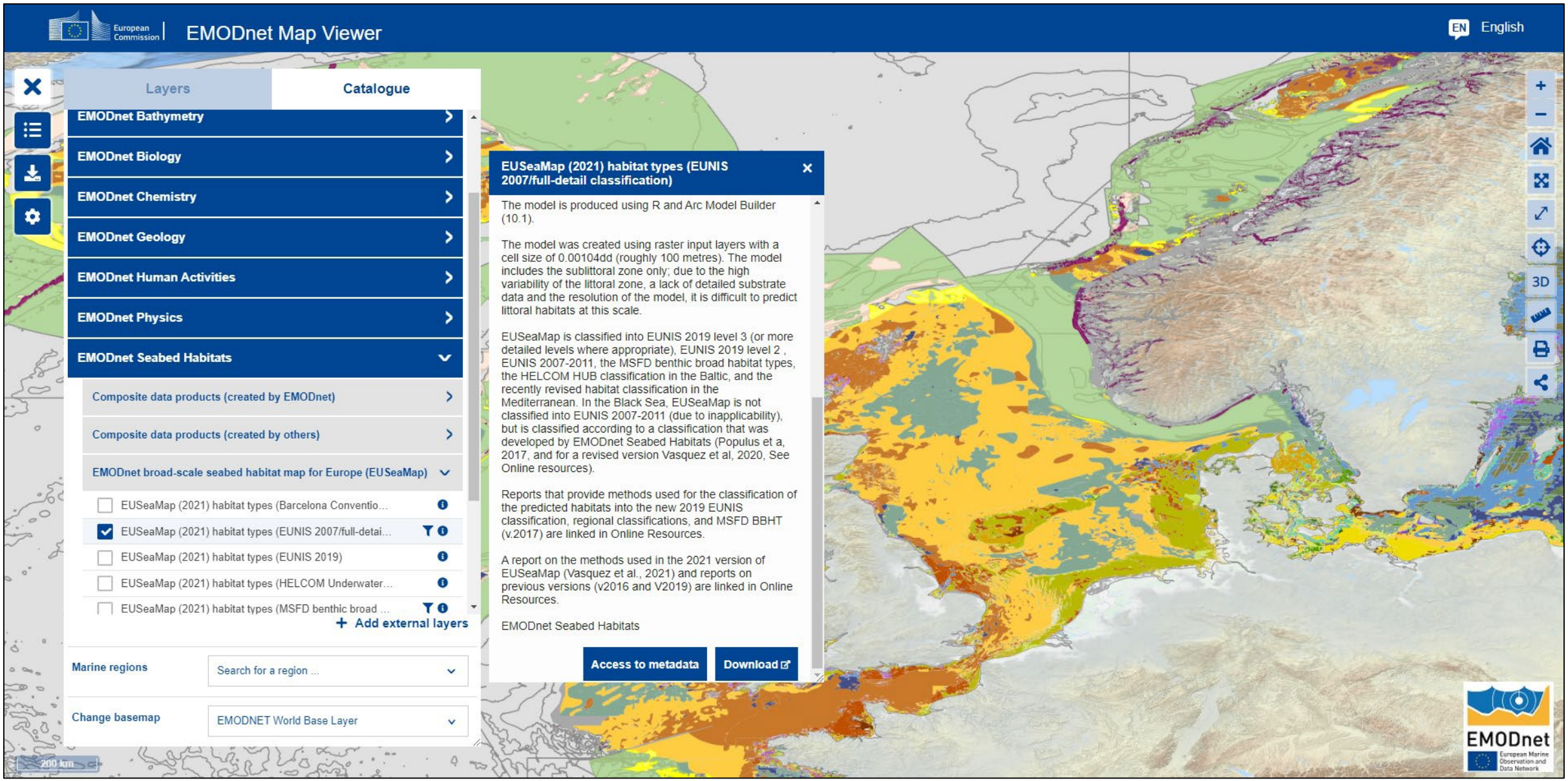
EMODnet: One map viewer – subset and download e.g., Biology data product



EMODnet: One map viewer – full download e.g., Seabed Habitats EUSeaMap



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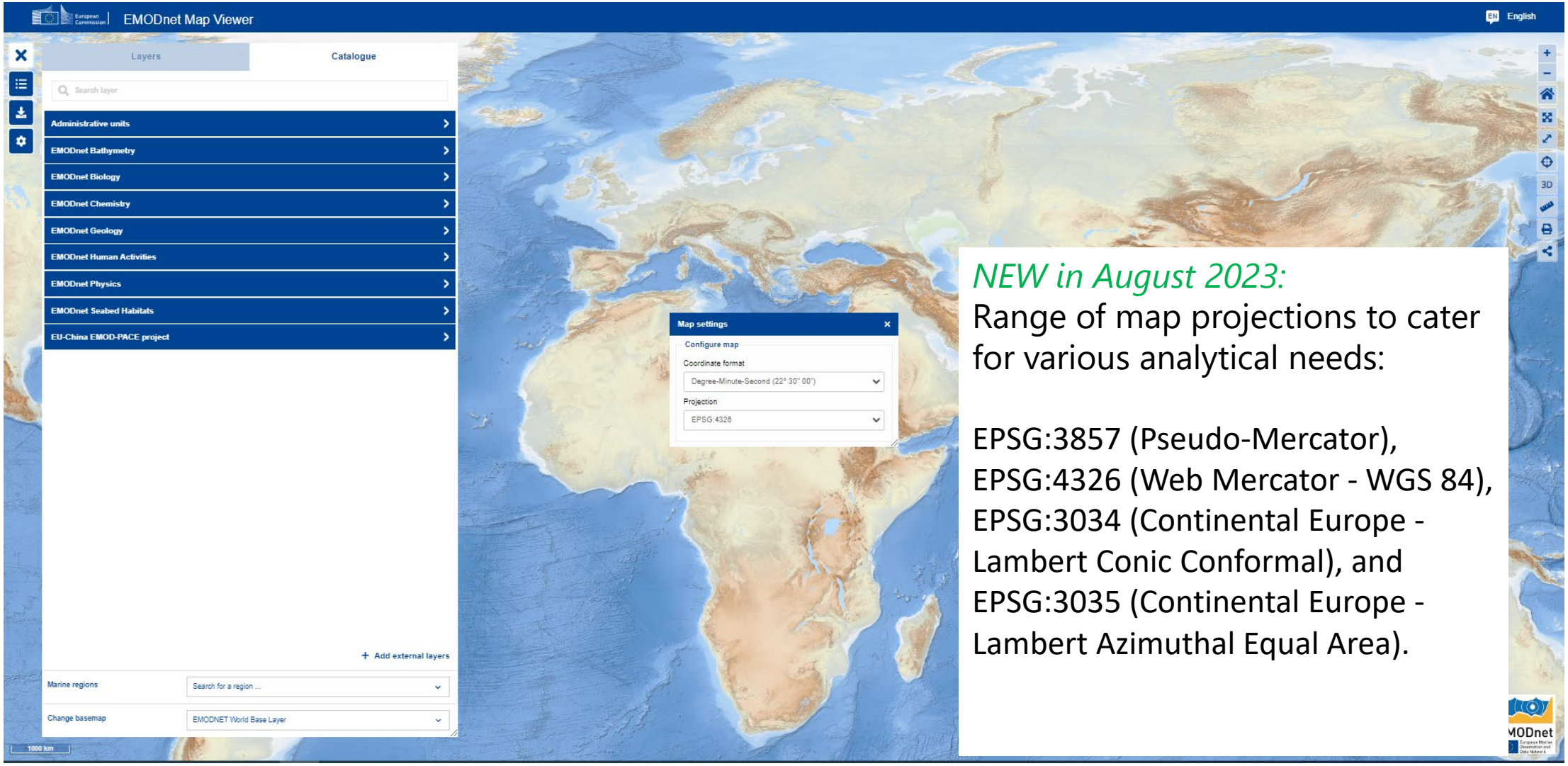
EMODnet: Recent (summer 2023) upgrades to the EMODnet map viewer

1. Map projections



NEW in August 2023:

Range of map projections to cater for various analytical needs:

EPSG:3857 (Pseudo-Mercator),
EPSG:4326 (Web Mercator - WGS 84),
EPSG:3034 (Continental Europe - Lambert Conic Conformal), and
EPSG:3035 (Continental Europe - Lambert Azimuthal Equal Area).

EMODnet: Recent (summer 2023) upgrades to the EMODnet map viewer

2. Customised parameter exploration e.g. Bathymetry Digital Terrain Model

Now, when you're sub-setting and downloading the Bathymetry Digital Terrain Model (DTM) for your specific area of interest, you have the opportunity to select parameters and customize your exploration. This option is available if you're choosing to download the DTM in the esriAscII or GeoTIFF file format. With this upgrade, you can tailor the data you receive to match your analytical requirements precisely. See an example of the power of parameter selection in Figure 2.