



EMODnet



European Marine
Observation and
Data Network

EMODnet
ANNUAL
REPORT 2022

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Acknowledgements _____

This Annual report is produced by the EMODnet Secretariat, with input from EMODnet thematic and Data Ingestion Coordinators.

More information _____

Further information on EMODnet can be found on the Maritime Forum (maritime-forum.ec.europa.eu/en). More detailed information on progress, together with the access to the latest data and data products can be found on the Central Portal emodnet.ec.europa.eu

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About EMODnet

The European Marine Observation and Data Network (EMODnet) is a long-term marine data initiative funded by the European Maritime, Fisheries and Aquaculture Fund, which, together with the Copernicus Marine Service and the Data Collection Framework for fisheries, implements the EU's Marine Knowledge 2020 strategy.

EMODnet connects a network of over 120 organisations supported by the EU's Integrated Maritime Policy who work together to aggregate Ocean observations, process the data according to international standards and make that information freely available as interoperable data layers and data products. This 'collect once and use many times' philosophy benefits all marine data users, including policy makers, scientists, private industry and the public. It saves costs for offshore operators, while also opening up new opportunities for innovation and growth.

The aim of EMODnet is to increase productivity in all tasks involving marine data, to promote innovation and to reduce uncertainty about the behaviour of the sea. This lowers the risks associated with private and public investments in the blue economy, and facilitates more effective management and protection of the marine environment.

EMODnet provides easy and free access to marine data, metadata and data products and services spanning seven broad disciplinary themes: bathymetry, geology, physics, chemistry, biology, seabed habitats and human activities. Each theme is dealt with by a dedicated partnership of organisations with the expertise necessary to standardise the presentation of data and create data products within the scope of the thematic area. To demonstrate the power of opening up Europe's wealth of marine observations and data, EMODnet turns marine data into maps, digital terrain models, time series & statistics, dynamic plots, and provides map viewers and other applications to support researchers, industries and policy makers to tackle the many Ocean challenges we face.

High quality marine data are the foundation for delivering the EU Green Deal. The EMODnet service is the focal point for *in situ* integrated marine environmental and human activities data and data products that are used by thousands of users who need high quality, harmonised and standardised data and information as input to operations at sea, as observations and information on the health of the Ocean and on human impact for regional sea-basin assessments and European Directives e.g., the Marine Strategy Framework Directive, and as evidence to underpin wider policy decisions, international Ocean governance and more.

EMODnet is one of the core data infrastructures and Ocean services which, together with the Copernicus Marine Service and Copernicus Data and Information access service (DIAS), form the backbone of a future European Digital Twin Ocean, a key contribution to the EU marine data space and regional best practices for the global Ocean data ecosystem.



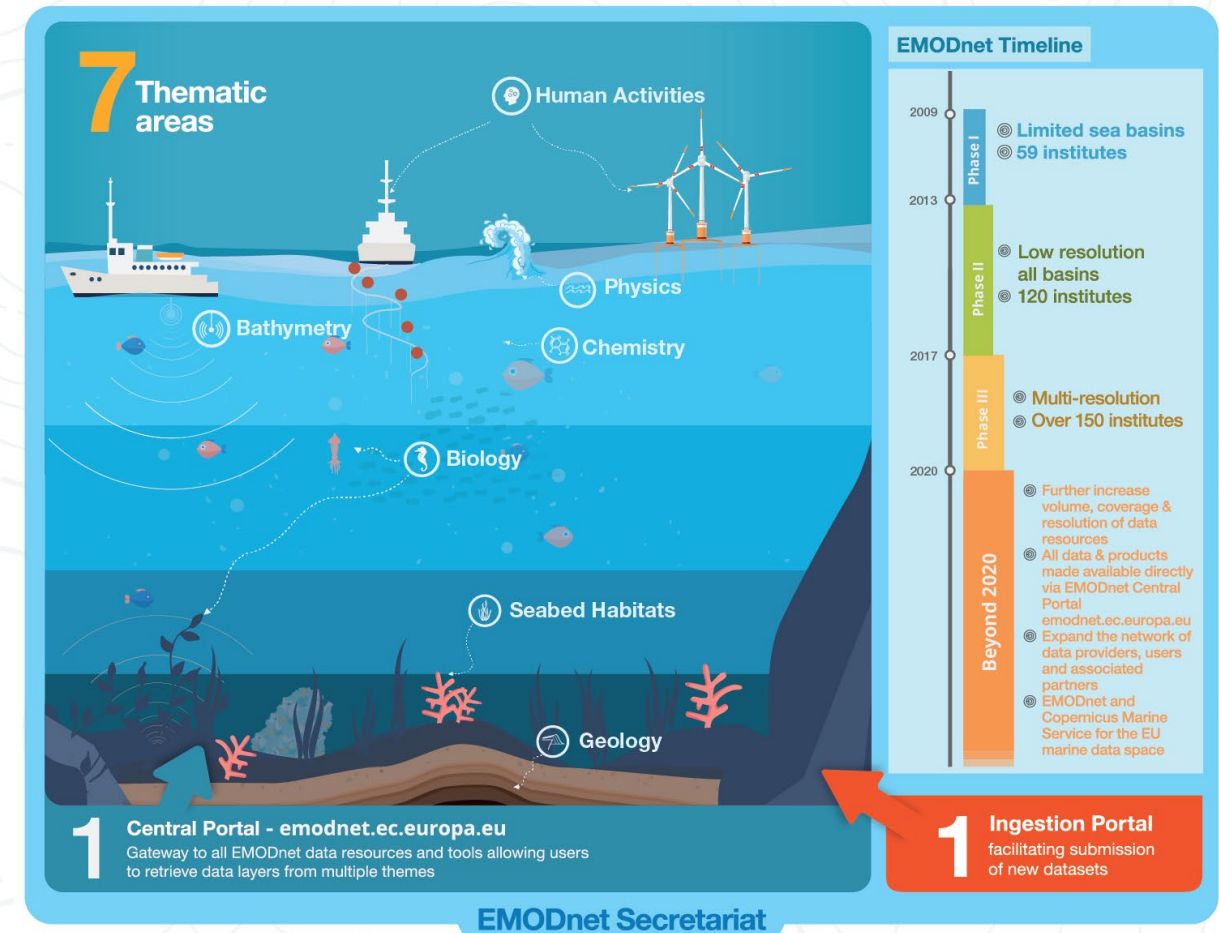
EMODnet



European Marine
Observation and
Data Network

THE EUROPEAN MARINE OBSERVATION AND DATA NETWORK - AT A GLANCE

In 2022, over **120 organisations** assembling and making available **marine data, metadata & products**



Why EMODnet?

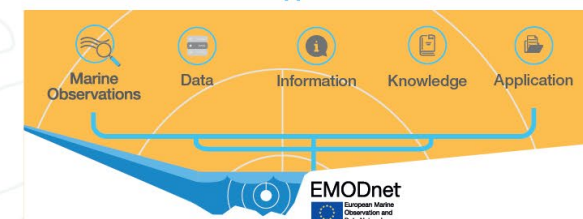
Every year, the EU & its Member States invest a huge amount in marine observations and data collection.

Most of this data ends up in different databases and systems scattered around Europe and is difficult to find, access, assemble and use.

EMODnet is making a difference



From raw data to real-life applications



Who is EMODnet for?

Professionals from: **Public Sector**, **Civil Society**, **Private Sector**, **Research Community**

Benefits

- More productivity:** Avoid costs of repeated collection of data by improving access to already existing data in compatible formats
- More innovation:** Anyone (including SMEs) can build value-added services using data from different sources
- Less uncertainty:** Better access to data improves forecasts of the behaviour of the seas, reducing costs of protecting life and property in coastal areas and offshore
- Adding value to your own data:** Sharing data with EMODnet allows your own data to be combined with data from others to generate better value-added products and information and supports the global open data movement.



The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) 2021/1139 of the European Parliament and of the Council of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund and its predecessor, Regulation (EU) No. 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.

emodnet.ec.europa.eu
@EMODnet



Jan-Bart Calewaert
Head of the EMODnet
Secretariat

© Dirk Leemans

Introduction from the Head of the EMODnet Secretariat

One Ocean, One EMODnet

Beyond any doubt, the most significant development in 2022 was the **integration of all EMODnet *in situ* marine data resources and services** into the **EMODnet Central Portal**. The entire EMODnet family, including the EMODnet Secretariat and EMODnet Thematic assembly groups, worked non-stop behind the scenes to make this happen. The new Central Portal marks another major and critical milestone for EMODnet, after its move to the Europa.eu domain in 2021 and the achievement of its EC Marine Knowledge Vision Objectives in 2020. From now onwards, the **EMODnet Central Portal** will be the **single point of access for searching, visualising and downloading EMODnet data and data products**. This thematic unification is a major upgrade to greatly simplify and enhance the EMODnet user experience. The move to one EMODnet Portal marks an end to the existing seven individual thematic portals which have been switched off, redirecting all traffic to the Central Portal from 2023 onwards.

To accommodate the unification, 2022 saw the launch of a **new central map viewer and data catalogue service** common to all thematics, enhancing the data and product visualisation capacity and the search and download experience for the user. All these developments make EMODnet more user-friendly and fit-for-purpose, adapting to the needs and requirements of tomorrow's data and information consumers, be they from science, public services, policy, civil society or another background.

New products and services

2022 also saw the start of the fourth phase of development for all of the EMODnet Thematic projects. Even though the focus in 2022 was on the integration of data, information and content from the thematic data portals into the Central Portal, the seven Thematic assembly groups continued making available new and updated datasets and data products. Some examples include the **two R packages** for Web Feature Services and Web Coverage Service developed by **EMODnet Biology** to assist users in extracting information across the various Thematic lots' services. **EMODnet Physics** added **new data on river flow** originating from the +ATLANTIC project, and **EMODnet Seabed Habitats** made available the latest **OSPAR Threatened and/or Declining Habitats**

dataset (version 2020), comprising point and polygon data showing the distribution of habitats on the OSPAR list of threatened and/or declining species and habitats within the Northeast Atlantic. The **Marine Spatial Plan (MSP) for Latvia** was included in the MSP dataset by **EMODnet Human Activities**, which already includes the plans for Belgium, Denmark, Finland and the Åland Islands. **EMODnet Geology** continued gathering additional data from partner countries for inclusion in existing data products and produced a new product **"Geomorphology line features"**. **EMODnet Bathymetry** increased the number of survey datasets to over 41,000 Common Data Index (CDI) entries and upped the number of Composite Digital Terrain Model (DTM) entries to more than 265. **EMODnet Chemistry** provided an **up-to-date, harmonised and validated dataset for beach litter** – containing data from 4,312 surveys (2015-2020) from 22 Member States – to the Technical Group on Marine Litter (TGML) for the implementation of the Marine Strategy Framework Directive (MSFD).

Early in 2022, **EMODnet Data Ingestion** was granted new funding for rolling out EMODnet Ingestion phase 3, which is now well underway. Data submissions increased to over 1,300 at the end of 2022, ranging from single datasets to large integrated **data from publicly funded research, the private sector, civil society and citizen science**.

EMODnet's expanding number of datasets continued to power the EC DG MARE **European Atlas of the Seas**. EMODnet remains the main data provider of this important data visualisation, web-mapping and **Ocean literacy tool** which now contains almost 300 maps, with content available in the 24 official EU languages. Atlas version 7.2 was released allowing for more customization. This included the development of new functionalities such as the interactive help functionality, a "boat race diploma" in the "European Maritime Day (EMD) in my country" map 2022, default activation of advanced features (e.g., print tool), and the "My Maps" functionality allowing users to authenticate using EU login and save specific map combinations and configurations in their account.

A growing network, connecting new communities in Europe and globally

EMODnet continues to provide a user-driven service employed by a wide range of stakeholders. **The ten new use cases** published on the Central Portal are testament to this. In 2022 we were also delighted to welcome **three new EMODnet Associated Partners**, i.e. **BIOPOLIS-CIBIO**, **Cyprus Marine and Maritime Institute** and **Fugro**.

In 2022, EMODnet organized two **'EMODnet for business' workshops** focusing on the **offshore renewable energy sector** in the **Northeast Atlantic, North Sea and Baltic Sea**, and in the **Mediterranean Sea and Black Sea**. Furthermore, at **European Maritime Day 2022**, EMODnet presented its use cases for the EU Green Deal.

On 22 September 2022, the two EU marine data services **EMODnet and Copernicus Marine** came together with DG MARE and DG DEFIS for a **workshop** in Brussels (Belgium) to discuss the availability and needs for marine data and information on **coastal issues** and to assess emerging areas for collaboration.

At the **global level** EMODnet has continued at a high pace to contribute to international initiatives, among others in support of the **UN Decade of Ocean Science for Sustainable Development**, the **International Oceanographic Data and Information Exchange (IODE) programme of IOC-UNESCO** and more. Highlights included **two approved satellite events (webinars) of the UN Ocean Decade Laboratory "An Accessible Ocean"** co-organised and co-executed by EMODnet with great success. EMODnet also co-organised a **UN Ocean Conference hybrid side-event 'Interoperable, transparent, and accessible marine data for the implementation of the UN 2030 Agenda Sustainable Development Goal 14, the UN Decade**

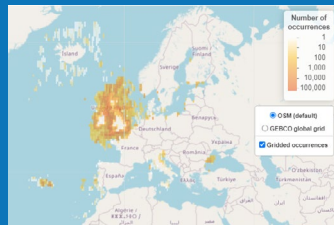
of Ocean Science, and for all', in collaboration with Fugro, UNESCO-IOC IODE/IOC, IOC's UN Ocean Decade Data Coordination Group, Mercator Ocean International (MOI)/Copernicus Marine Service and Flanders Marine Institute (VLIZ). Finally, EMODnet applied to become an implementing partner to the **UN Decade of Ocean Science for Sustainable Development**, established an informal working group 'EMODnet for the Ocean Decade Coordination and Implementation Group' (E4D-CIG), participated in meetings from a range of highly relevant Ocean Decade Programmes (e.g. COASTPREDICT, DITTO) and Actions (TURTLE, JIRECO-CORE), and the Head of the Secretariat co-chairs the UN Ocean Decade Data Coordination Group.

After 34 months of intense collaboration, the EU-China collaborative Ocean-data pilot projects **EMOD-PACE (EMODnet Partnership for China and Europe)** and CEMDnet (China-EU Marine Data Network Partnership) came to an end in 2022. Colleagues from both projects gathered online for an **open final workshop and meeting** to celebrate the achievements of this highly productive collaboration and to showcase and promote the impressive results to other interested experts, users and stakeholders. The excellent **collaboration between EMODnet and the Chinese National Marine Data and Information Service** will be maintained and even strengthened going forward.

In summary, we can say that 2022 was a particularly intense, but also very rewarding year. I take this opportunity to **thank all the EMODnet Project Coordinators and technical experts, the Secretariat staff and the EMODnet Central Portal technical team** for their dedication and hard work in 2022 reaching the important milestone of a unified and repatriated EMODnet data service, building on the wealth of thematic resources assembled by all. I am looking forward to see EMODnet further grow and evolve, together with you, in the year(s) to come.

2022 at a glance

EMODnet Biology published 3 million occurrence records from European waters from 30 datasets, mainly from the North Atlantic Ocean and North Sea.



Occurrence records published by EMODnet Biology in January 2022. ©EMODnet Biology

On 17 February 2022, **EMODnet experts joined the Copernicus Marine 2.0 kick-off meeting** that set the course for the Copernicus Marine workplan 2022-2028.



©Copernicus Marine

EMODnet Chemistry joined the **Global Partnership on Marine Litter platform**. The Global Partnership on Marine Litter (GPML) is a United Nations coalition among multiple interested parties who are involved in tackling marine litter pollution.



GPML Use Case. ©EMODnet Chemistry

EMODnet Human Activities released a new dataset on desalination plants in Europe. EMODnet welcomed **new Associated Partner Cyprus Marine and Maritime Institute (CMMI)**.

Start of the 3rd EMODnet Data Ingestion phase for an initial period of two years. This initiative is the result of unprecedented teamwork of 43 organizations working across Europe with hundreds of data collectors and providers to streamline the data ingestion process and make higher volumes of data from more diverse sources available through EMODnet.



Easter bells brought us EMODnet Data Ingestion III project. ©EMODnet Data Ingestion

EMODnet showcased partnerships with NMDIS, Copernicus Marine Service, and the EU All-Atlantic Ocean Research Alliance at **two UN Ocean Decade Laboratory "An Accessible Ocean"**. The satellite webinars focused on data interoperability between Europe and Asia, as well as the benefits of EU Marine Data Services.



The two satellite events co-organised by EMODnet. ©EMODnet Secretariat

Fugro joined the EMODnet Associated Partnership Scheme, following collaboration at Oceanology International 2022 and close dialogue on opportunities for data sharing. Fugro is the world's leading Geo-data specialist, operating at sea, on land and by air in the fields of geodetic, geotechnical, and geophysical business.

JANUARY

FEBRUARY

MARCH

2022

APRIL

MAY

JUNE

Collaboration between **EMODnet Biology, EMODnet Seabed Habitats and OBIS (Ocean Biodiversity Information System)** resulted in a full report on the standard approach to structuring classified habitat data using the Darwin Core Extended Measurement or Fact Extension.

EMODnet Physics developed a new sea level product covering European Seas and the Global Ocean.

EMODnet Secretariat engaged in the **Knowledge Hub on Sea Level Rise (SLR)** activities, communicating the many EMODnet data and data products from **EMODnet Bathymetry, Geology, Physics** and more that are relevant for assessing sea level rise.

Many experts from the EMODnet thematics, data ingestion and the Secretariat were active as technical advisors and mentors for the **Blue-Cloud Hackathon 2022 on 7-9 February**.



EMODnet Chemistry at the Blue-Cloud Hackathon 2022. ©Blue-Cloud



Oceanology International Conference. ©EMODnet Secretariat

On 15-17 March 2022 **EMODnet attended the Oceanology International Conference in London**, bringing together over 8,000 attendees and 500+ exhibitors from key players in maritime industry.

The new **EMODnet Seabed Habitat** map viewer displays and gives access to predictive habitat maps and collated seabed habitat maps from surveys within Europe's marine waters. In addition, habitat models, composite products, protected habitats and point data have also been collated.

Centralisation of EMODnet data discovery, access and visualisation services were high on the agenda at the **16th Steering Committee** and **11th Technical Working Group** meetings.

At European Maritime Day 2022, EMODnet **highlighted its value for the EU Green Deal** through the moderation and co-organisation of various workshops as well as the presentation of concrete use cases of EMODnet data and data products for the EU Green Deal.

EMODnet actively **participated in the EU4Ocean #MakeEUBlue campaign and Summit 2022**, sharing collective pledges for the Ocean. This campaign preceded the EU4Ocean Ocean Literacy Summit.



EMODnet Secretariat's Head Jan-Bart Calewaert presenting at the Marine Data Interoperability Side Event of the UN Ocean Conference. ©Louis Demargne. All rights reserved.

For the second UN Ocean Conference (27 June - 1 July), EMODnet co-organised a side event on Marine Data Interoperability with IOC-UNESCO, Fugro, IODE/IOC, VLIZ, Copernicus Marine Service, the Intertidal Agency, the EC, and the UN Ocean Decade Data Coordination Group. At the Conference, EMODnet was recognised as a vital marine data service for the EU Green Deal, Digital Twin Ocean, UN 2030 Agenda and UN Ocean Decade.



EMODnet and Euro-ARGO ERIC (European Research Infrastructure Consortium for Observing the Ocean) jointly signed a Memorandum of Understanding (MoU) to formalise the ongoing dialogues and relationship between EMODnet and the Euro-Argo ERIC. EMODnet co-signatories to the MoU included the Coordinators of EMODnet Physics, EMODnet Chemistry and the EMODnet Secretariat.



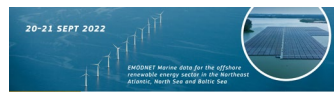
©EuroArgo

EMODnet Central Portal, Biology and Secretariat teams moved location. The Flanders Marine Institute (VLIZ), together with the EMODnet Secretariat as a hosted partner, relocated to the new InnovOcean Campus in Ostend.



InnovOcean Campus in Oostende, Belgium. ©Flanders Marine Institute

On 20-21 September, **EMODnet together with EC DG MARE** organised a workshop on “**EMODnet marine data for the offshore renewable energy sector in the Northeast Atlantic, North Sea and Baltic Sea**”. The workshop was attended by more than 65 offshore renewable energy experts with representatives from diverse sectors including industry, research and marine data services.

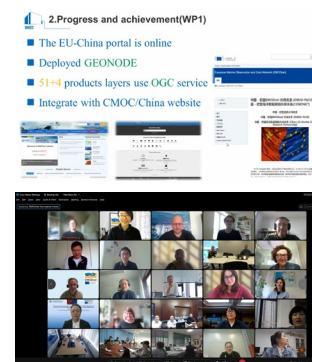


EMODnet-4-Business Workshop. ©EMODnet Secretariat

2022 at a glance



EMODnet joined the **Offshore Renewables and a Spatial Planning sprint workshop**, organised by the **UN Global Compact Ocean Stewardship Coalition** Ocean management working group ‘**Offshore Renewables and Sustainable Ocean Planning**’. The EMODnet Secretariat and EMODnet Human Activities presented EMODnet to the international community bringing key updates on EMODnet’s offer of marine environmental, human activities data and data products, including the hosting of National EU Member State Maritime Spatial Plans.



Final EMOD-PACE and CEMDnet meeting. ©EMODnet Secretariat



Marine Spatial Planning map. ©EMODnet Human Activities

JULY

AUGUST

SEPTEMBER

2022

OCTOBER

NOVEMBER

DECEMBER

A collaboration between **EMODnet Biology** and the Meise Botanic Garden (Belgium), resulted in the set-up of the online crowdsourcing platform **DoeDat**, to help scientists document and digitize herbarium specimens, historical documents and images. A first EMODnet Biology - DoeDat citizen science test-project was about the digitization of the expedition data from the Mercator training ship.

EMODnet Biology contributed to the Ocean Best Practices System (OBPS), highlighting work towards EMODnet standards and a book published in 2022 on “Ocean Science Data” to which many EMODnet thematic Coordinators, Secretariat and wider experts contributed.

On 22 September the **second EMODnet-Copernicus Marine Thematic workshop on Coastal issues took place**. The meeting brought together EMODnet and Copernicus Marine Service experts together with inter-DG representation from the European Commission and CINEA.



Second EMODnet-Copernicus Marine Thematic Workshop on Coastal Issues. ©EMODnet Secretariat



UN Global Compact Website Banner. ©United Nations

On 17-18 October, Ocean stakeholders including EMODnet, gathered in Venice, Italy for the first edition of the **pan-European Sea Level Rise Conference**.

Experts from EMODnet and the National Marine Data and Information Service (NMDIS) of China met for the **final meeting of the EU-China Ocean data project EMOD-PACE (EMODnet Partnership for China and Europe)** and Chinese counterpart project **CEMDnet**, connecting EMODnet with Chinese NMDIS services. **Results of 34-month Ocean data collaborative projects were presented.** The **17th EMODnet Steering Committee** brought together stakeholders, to discuss the network’s progress towards centralisation, with an upgraded, unified, EMODnet data service coming soon.

On 12 December 2022, the **EMODnet Secretariat** presented EMODnet’s diverse marine environmental and human activities data and data products to the EU Member State Expert Group on Maritime Spatial Planning, including the National Maritime Spatial Plans that EMODnet now offers. Standardised, integrated and validated data on contaminants freely available on **EMODnet Chemistry** were used for a new study recently published in Marine Pollution Bulletin that focuses on the Eastern Mediterranean.

EMODnet services facts and figures

Over **EMODnet Partner Organisations** **120**




EMODnet Associated Partners **28** by end 2022




103 Use cases by end 2022




267 JIRA tickets generated in 2022 by the Technical Working Group to find technical solutions for EMODnet services



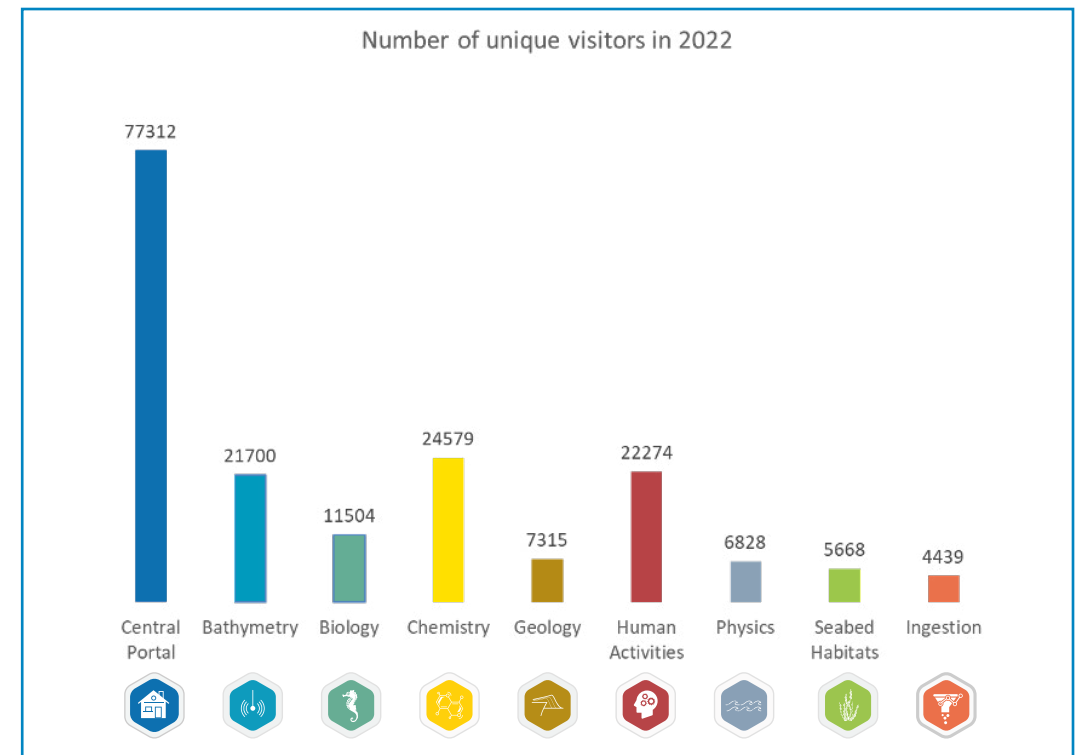
More than 77,000 unique visits to the EMODnet Central Portal in addition to some users going directly to thematic portals



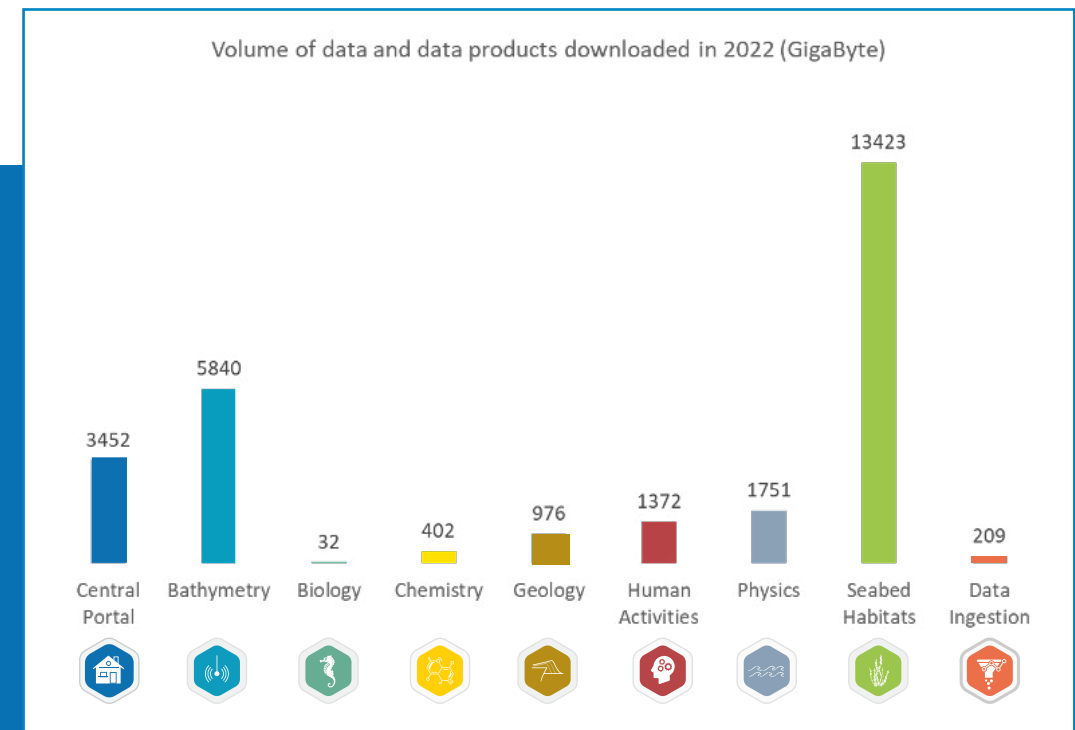
Data & data product offer
2168 entries in the EMODnet product Catalogue
Over 578 layers in the EMODnet map viewer
 Data offered for over **70** parameter groups across **7** thematic areas at the level of the marine and human activities environment



Social media reach 2022
5,971 Twitter followers
170 Tweets
1.6M Impressions
1,273 LinkedIn followers
206 YouTube subscribers
2,861 views
92.1 hours watch time

In 2022, more than 77,000 unique visitors accessed EMODnet through the Central Portal. In 2023, all of the visitors will be channelled through the EMODnet Central Portal.



Total volume of 27,457 GigaBytes of data and products downloaded across all EMODnet services in 2022.



One Year of EMODnet

EMODnet Central Portal

2022 key facts

In 2022 the Central Portal reached a total of 77,312 unique visitors.

Throughout the year, almost 60 meetings involving the thematic lots, Bilbómatica and the EMODnet Central Portal technical team took place in order to streamline the centralisation process. Various topics were discussed, including static web content, metadata catalogue, data/data products implementation in the central map viewer, OGC web services, ERDDAP, new or improved map viewer functionalities and EC (security) guidelines compliance. Progress by all those involved culminated with the update of the static content in mid-2022 and the soft launch of the central map viewer in December 2022.

The agile approach and prioritisation of each new version release allowed for multiple periods of testing and reporting by all thematic lots. The process was complex and forced all thematic lots to implement changes to the way their products are exposed via the Central Portal, compared to what was available through the individual portals. Layer rationalisation was agreed with each thematic lot and various solutions applied in an attempt to cater for the requirements of users of each thematic. This resulted in an overall better user experience for all lots' products and data.

An official website of the European Union How do you know? Search

Energy, Climate change, Environment

European Marine Observation and Data Network (EMODnet)

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What is EMODnet?

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- The Challenge**
- The Solution**
- How does EMODnet work?**
- What is available?**
- Principles**
- Benefits**

The Challenge

Data from the marine environment are a valuable asset. Rapid access to reliable and accurate information is vital in addressing threats to the marine environment, in the development of policies and legislation to protect vulnerable areas of our coasts and oceans, in understanding trends and in forecasting future changes. Likewise, better quality and more easily accessible marine data is a prerequisite for further sustainable economic development, so-called 'blue growth'.

The Solution

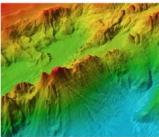
Unfortunately, marine data collection, storage and access in Europe has been carried out in a fragmented way for many years. Most data collection has focused on meeting the needs of a single purpose by a wide range of private and public organisations, often in isolation from each other.

The European Marine Observation and Data Network (EMODnet) is a network of organisations supported by the EU's integrated maritime policy. These organisations work together to observe the sea, process the data according to international standards and make that information freely available as interoperable data layers and data products.

This "collect once and use many times" philosophy benefits all marine data users, including policy makers, scientists, private industry and the public. It has been estimated that such an integrated marine data policy will save at least one billion Euros per year, as well as opening up new opportunities for innovation and growth.


How does EMODnet work?

EMODnet provides access to European marine data across seven discipline-based themes:




Bathymetry

Data on bathymetry (water depth), coastlines, and geographical location of underwater features: wrecks.



Biology

Data on temporal and spatial distribution of species abundance and biomass from several taxa.



Chemistry

Data on the concentration of nutrients, organic matter, pesticides, heavy metals, radionuclides and antifoulants in water, sediment and biota.

EMODnet Secretariat

The European Marine Observation and Data Network (EMODnet) is supported by a dedicated Secretariat funded by the European Commission. The Secretariat provides coordination and communication support as well as technical advice to the network to guide the development of the EMODnet Central Portal, monitors the progress of the various EMODnet projects, and disseminates their results. In addition, the Secretariat team fosters strong coherence, interaction and collaboration across the EMODnet partnership, provides support and advice to the network on European Ocean observation and manages the Atlas of the Seas. The main aim is to develop a more coherent, effective, efficient and fit-for-purpose EMODnet, and to stimulate its use by industry, policy and scientific data users.

Since 2013, the EMODnet Secretariat is administered by Seascope Belgium and hosted at the InnovOcean Campus in Oostende (Belgium) with the support of the Flemish Government. From September 2018 through the end of 2022, the core secretariat staff from Seascope Belgium has also been supported by three other organisations: Trust-IT for communication and web design, the European Marine Board to support European Ocean Observation stakeholder interactions, and Bilbómatica for technical and development support for the European Atlas of the Seas.

2022 EMODnet Secretariat contributions to key events

Some examples of key events where the EMODnet Secretariat actively presented, participated and/or co-organised are presented below. You can find more information on the events page of the EMODnet website: [Events | European Marine Observation and Data Network \(EMODnet\) \(europa.eu\)](#)

- » Blue-Cloud Hackathon, 7-9 February 2022, online hackathon
- » International Ocean Data Conference 2022 - The Data We Need for the Ocean We Want, 14-16 February 2022, Sopot, Poland
- » Oceanology International, 15-17 March 2022, London, UK, conference
- » OceanChallenge4Africa Hackathon, 8-9 April 2022, online hackathon
- » Digital Ocean Forum, 20-21 April 2022, Paris, France, conference
- » European Maritime Day 2022, 19-20 May 2022, online and Ravenna, Italy, conference
- » European MSP Stakeholder Conference - Planning for the future of Europe's Marine Space, 14-15 June 2022, Brest, France, conference
- » Talking Blue Sustainability - Governing the Oceans of tomorrow: How Ocean monitoring delivers on the blue arm of the Green Deal, 22 June 2022, online event
- » UN Ocean Conference 2022, 27 June - 1 July 2022, Lisbon, Portugal, conference
- » EMODnet Marine Data for the Offshore Renewable Energy sector in the Northeast Atlantic, North Sea and Baltic Sea areas, 21-22 September 2022, online workshop
- » 2nd EMODnet-Copernicus Marine Thematic Workshop on Coastal Issues, 22 September 2022, online workshop
- » European Research and Innovation Days 2022, 28-29 September 2022, online conference
- » UN Global Compact Offshore Renewables and Marine Spatial Planning sprint workshop, 4 October 2022, online workshop
- » Pan-European Sea Level Rise Conference 2022, 17-18 October 2022, Venice, Italy, conference
- » EMODnet marine data for the offshore renewable energy sector in the Mediterranean Sea and Black Sea, 20-21 October 2022, online workshop
- » 1st International Joint Conference MARBLUE 2022, 26-28 October 2022, Constanța, Romania
- » EMOD-PACE Final Meeting and Open Workshop, 22-23 November 2022, Oostende, Belgium, workshop
- » EU Member State Expert Group on Maritime Spatial Planning, 12 December 2022, online meeting



Thematic node:
EMODnet Bathymetry

BATHYMETRY

Bathymetry describes the topography of the seabed, by measuring the distance from the sea surface to the seafloor. It provides essential information to understand the dynamics of the marine environment: the shape of the seabed can influence Ocean circulation and currents, local fauna and seafloor habitats. It is also very important for hydraulic models calculating tides and waves and other derived parameters.

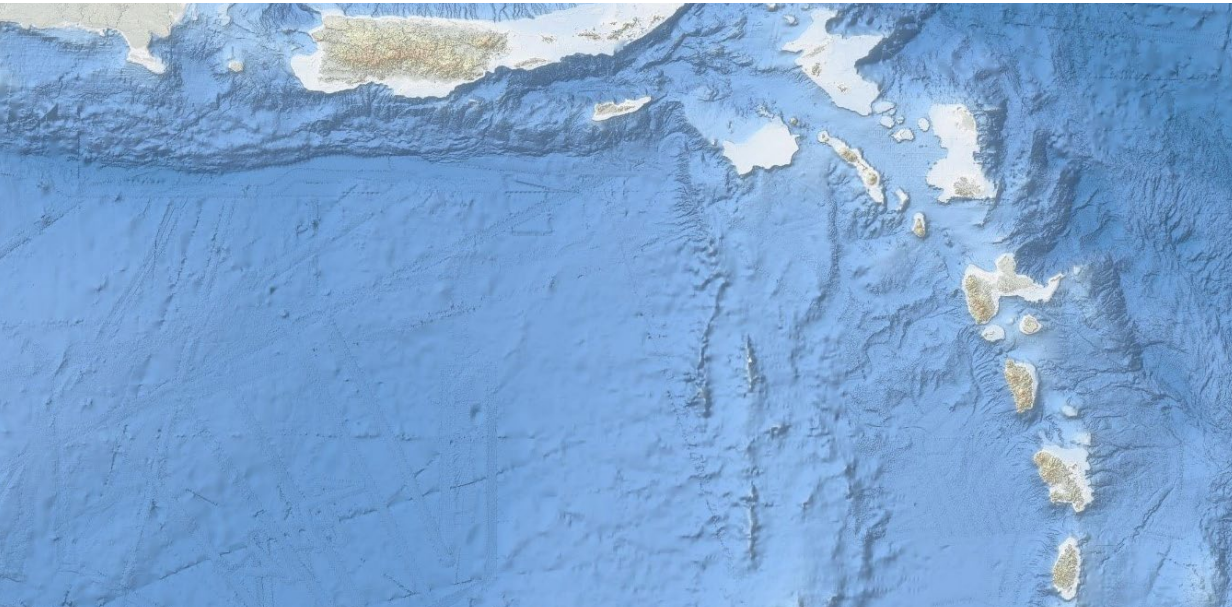
The EMODnet Bathymetry theme provides access to data and data products on bathymetry (water depth), such as the EMODnet Digital Terrain Model (DTM) for all European seas, depth contours, survey tracks, best-estimate satellite derived coastlines, national baselines, and various options to view, query, and download.

2022 Key Facts

Activities in 2022 were mostly dedicated to generating the new EMODnet 2022 DTM. This has been prepared using a common methodology by an experienced team of bathymetry experts as a composite of more than 17,000 datasets, selected from the EMODnet Bathymetry catalogues and processed to common standards and grid. The latest DTM has again a grid resolution of 1/16 arc minutes * 1/16 arc minutes, but can now be viewed with several layers as part of the Bathymetry folder in the Map Viewer of the Central Portal, following the migration. The 2022 DTM includes a selection of the latest datasets and efforts were undertaken for improving anomalies and artefacts identified in the earlier 2020 version. As part of this, data providers in 2022 brought together another 10,000 bathymetric datasets, bringing the total collections of EMODnet Bathymetry to 41,315 survey datasets and 274 composite Digital Terrain Models (DTMs) and Satellite Derived Bathymetry products. These are available in the EMODnet Bathymetry catalogue services, based upon SeaDataNet.

The DTM has been expanded with the Caribbean Sea region, gathering new survey datasets and generating Satellite Derived Bathymetry data for coastal waters of several Caribbean islands.

Publication of the highly successful EMODnet World Base Layer Service (EBWBL) continued as OGC WMTS service. It provides a fast and easy access to worldwide bathymetric and topographic information as a



New 2022 Digital Terrain Model of the Caribbean region. ©EMODnet Bathymetry

composite of EMODnet DTM, General Bathymetric Chart of the Oceans (GEBCO) 2019, and a satellite derived DTM for land cover with a common grid and colour palette, while the coastline is based upon OpenStreetMap.

A new 2022 set of satellite derived coastlines for Europe has been prepared for Lowest Astronomical Tide (LAT), Mean Sea Level (MSL) and Mean High Water (MHW), expanded with coastlines for the Caribbean. The coastlines are included as extra layer in the Bathymetry map layers, allowing to view and download these in shape format. The layers are also included in the WMS – WFS service. Processing of satellite images at large spatial and temporal scales concerns large volumes of satellite data. Use was made of the Google Earth Engine platform, allowing parallel processing of huge volumes of satellite data in reasonable time and harmonizing satellite data acquired by different satellite missions performed by ESA and NASA. A mixture was used of top-of-atmosphere reflectance satellite images from NASA/USGS Landsat 8 and ESA Sentinel-2 satellite missions, acquired during 2013-2020.

Key data providers and users in 2022

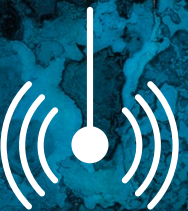
The key data providers of EMODnet Bathymetry continue to include national hydrographic services, marine research institutes, governmental departments, and companies, bringing the total number of data providers to 75 organisations. New data providers, for instance, were the Icelandic Coast Guard Hydrographic Department (ICGHD) and Marine and Freshwater Research Institute (MFRI), both from Iceland, and the Finnish Transport Agency (FTA) from Finland, underpinning that now most hydrographic survey institutes from Europe are involved in EMODnet Bathymetry.

Key users of EMODnet Bathymetry are academia and research – including from the international community, governmental departments, Non-Governmental Organisations (NGOs) and a wide range of marine and offshore companies as bathymetry is a key input and base layer for many operations and projects at sea and along the coasts. In 2022, just like in 2021, circa 50,000 DTM tiles were downloaded by more than 5,700 unique users. Also, the OGC web services (machine-to-machine) are very popular with more than 32 million OGC service requests in 2022. The variety of uses can also be derived from EMODnet Bathymetry references in research papers, journals and books.

BATHYMETRY 2022 EVENTS

EMODnet Bathymetry was presented at several events, including:

- » IODE International Ocean Conference, 14-16 February 2022, Sopot, Poland, hybrid conference
- » Oceanology International 2022, 15-17 March 2022, London, United Kingdom, conference and exhibition
- » GEBCO Guiding Committee meeting, 22-24 April 2022, Monaco
- » IHO – Europe Commission 10 year anniversary, 6 May 2022, Brussels, Belgium, workshop
- » Décennie des sciences des océans (UNESCO COI), 6 July 2022, Brest, France, conference
- » Map the Gaps / GEBCO meetings, 26-28 October 2022, Southampton, United Kingdom, symposium
- » Hydro 2022 conference, 6-8 December 2022, Monaco, conference





Thematic node: EMODnet Biology

BIOLOGY

Understanding species distributions through time and space is essential to assess the state of the marine environment. EMODnet Biology provides access to marine biodiversity data and products, including species occurrences, biotic and abiotic parameters.

The biodiversity data originates from various sources, from citizen science to tracking, imagery to visual observations. The data we publish were collected in short and long terms projects, monitoring or ad-hoc surveys, citizen science activities and literature review, and covers not only recent but also historical data.

2022 Key Facts

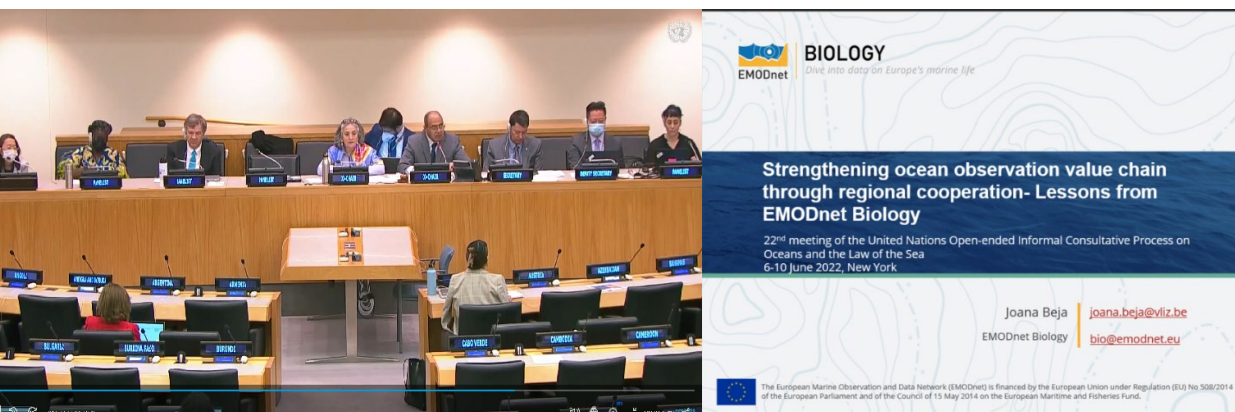
2022 was a year where focused effort was put towards the EMODnet centralisation. Changes were made not only to the way our data are made available, but also our products, which took considerable effort as most developments and systems are not designed for a seamless integration and publication of biological information/data.

By the end of the year, EMODnet Biology had surpassed the 30 million occurrence records and almost 57 million extended measurements and facts, covering biotic and abiotic information, originating from 1251 datasets.

Two use cases were published, highlighting 1) the work developed with EMODnet Seabed Habitats, which allowed for the establishment of a data flow for habitat data and 2) the use of data to estimate the probability of restoring reef-building benthos populations in the North Sea.

Alongside with the implementation of Phase III products in the EMODnet Central Portal viewer, development of Phase IV products continued throughout the year, with partners sharing guidance on the best formats to deliver the products and also tips and tricks. A new R package, to query EMODnet's WCS services, was developed and published. The partners involved in data product creation began drafting a position paper which is planned for publication in 2023.

The work developed during the years is gaining more visibility and relevance. In 2022, the United Nations invited EMODnet Biology to join other experts in the 22nd meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, which focused on the 'Ocean observing' topic. EMODnet Biology was part of the panel 'International cooperation and coordination' to discuss ways of advancing Ocean observing and addressing related challenges.



EMODnet Biology at the 22nd Meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea (©United Nations - Office of Legal Affairs. All rights reserved.)

Key data providers and users in 2022

The consortium includes 20 organisations that are responsible for maintaining a constant data flow to the project, additionally several submissions from ad-hoc providers were received throughout the year. The established data flow from EMODnet Seabed Habitats and EMODnet Ingestion also contributed to the increase of available data.

Specific actions were taken to ensure different data were made available via the thematic lot:

- » Upon discussion with the Caribbean OBIS node, the data they publish will be made available through EMODnet Biology as well. The efforts have allowed for two datasets to be available in 2022, a number which will increase in the future;
- » With the incorporation of the European Seabirds At Sea (ESAS) dataset, 90 thousand bird occurrence records were made available for reuse, contributing to decreasing the gap in data for this group;
- » Technical developments to the database and data publication procedures to ensure that new data types, e.g. taxa identified through images and tracking data will be available before the end of Phase IV.

Due to the war in the Ukraine, there was a major disruption to the work planned by our partners in the country and no data were made available during 2022.

The main users continue to be from a research/academia organisation, followed by government and private industry organisations. Noting that most marine biology users have traditionally used the OBIS infrastructure to access the EMODnet Biology data, it will be interesting to see if the trend changes and there is a bigger uptake via the EMODnet Central Portal now that the service has moved there.

BIOLOGY 2022 EVENTS

EMODnet Biology was presented at several events, including:

- » Black Sea CONNECT Innovation Workshop, 2 February 2022, online workshop
- » Ocean Data Conference, 14-16 February 2022, Sopot, Poland
- » NCK Data Day, 11 April 2022, online conference
- » Digital Ocean Forum, 20-21 April 2022, Paris, France
- » ICES Benthos Ecology Working Group, 9-13 May 2022, Sardinia, Italy
- » European Maritime Day, 19-20 May 2022, Ravenna, Italy
- » 22nd meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, 6-10 June 2022, New York, United States
- » OSPAR ICG-COBAM meeting, 14-16 June 2022, online meeting
- » How to expand the GROOM RI data management capacity to the "new" data type collected by Gliders in Europe, 7 July 2022, online workshop
- » EMODnet for Business Workshops – Marine Data for and from the Offshore energy sector in the Northeast Atlantic, North Sea and Baltic Sea areas, 20-21 September 2022, online workshop
- » European Marine Biology Symposium, 19-23 September 2022, Sopot, Poland
- » EU-Canada Ocean Partnership Forum, 3-4 October 2022, Brussels, Belgium
- » EMODnet for Business Workshops: Marine data for and from the Offshore energy sector-Mediterranean and Black Sea, 20-21 October 2022, online workshop
- » EuropaBON Conference 2022 in collaboration with Biodiversa+, 8 November 2022, online conference
- » Copernicus workshop on Biodiversity and coastal ecosystems, 11 October 2022, online workshop



Thematic node: EMODnet Chemistry

As one of the seven themes, EMODnet Chemistry has the overarching goal of facilitating the discoverability, accessibility and usability of marine chemical datasets and derived data products on eutrophication, Ocean acidification, contaminants and marine litter in three matrices: water, biota, and sediment. All major European sea regions are covered.

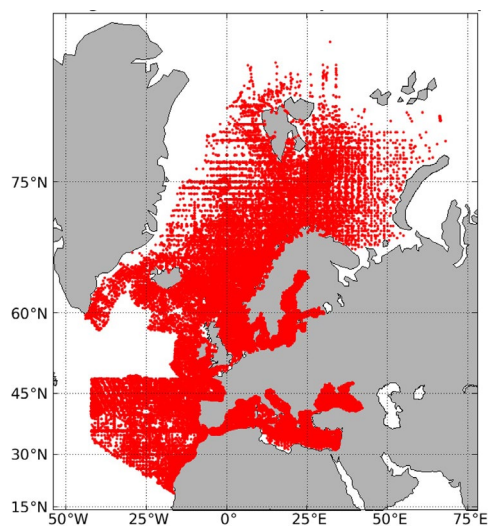
To this end, EMODnet Chemistry first collects and validates data and make them freely available and interoperable. Secondly, EMODnet Chemistry generates and publishes standardised, harmonised and quality-controlled data collections and reliable, derived products to visualise, for example, the distribution and density of sampling stations and the abundance of a variety of pollutants over space and time. In addition, users can perform in-depth scientific analyses, subset and extract data and prepare all kinds of visualisations with the help of practical online functions. In this way, EMODnet Chemistry plays a key role in the implementation of European Union marine policies such as the Marine Strategy Framework Directive (MSFD), the Water Framework Directive (WFD) and the Maritime Spatial Planning Directive (MSPD). In particular, EMODnet Chemistry contributes to descriptors 5 (eutrophication), 8 (chemical pollution) and 10 (marine litter) of the MSFD. This effort is also ensured through ongoing cooperation with the Regional Sea Conventions (RSCs) and the International Council for the Exploration of the Sea (ICES).

2022 Key Facts

Integration and centralisation were the keywords of 2022. The migration of the thematic portals to the single EMODnet portal emodnet.ec.europa.eu under the domain of the European Commission makes EMODnet more coherent and harmonised to better reach the different data users: Business leaders, policy makers, UN activists and academics. The section dedicated to the content of EMODnet Chemistry, as well as the search functions for documents and services, such as the [map viewer](#) and the [products catalogue](#), are now available under the Themes > Chemistry. Almost 1,200,000 datasets can be downloaded via the [CDI Data Discovery and Access Service](#). Their quantity, quality and interoperability have steadily increased, as documented in four new guidelines. Measurements harvested this year were harmonised, standardised and validated to produce the latest data collections for Ocean acidification, contaminants and eutrophication. The latter form the basis for creating climatologies of selected eutrophication-related parameters, including maps along relevant coastal areas near river mouths. These higher resolution and even more comprehensive proxy products for river discharge are most needed by several technical working groups of Copernicus, the Marine Strategy Framework Directive and the European Environment Agency. To this end, EMODnet Physics and EMODnet Chemistry produced the [List of major](#)

[rivers with identified data sources](#) in 2022 to present a selection of the most important rivers together with a detailed inventory of existing geoportals, databases, projects and publications on freshwater and riverine inputs to the sea. This technical document is accessible through the [Tools and Guidelines](#) of the central portal, as is the new Python data formatting tool called Marine Litter Manager. This helps users submit litter data from beaches and seabeds. Also the new [webODV Data Explorer and Extractor](#) features were implemented this year to ensure maps using the OGC WMS - WFS service protocol are easily accessible through the unique access point to EMODnet services.

Worth highlighting is the continued investment of time and resources in strengthening international collaboration. Firstly, EMODnet Chemistry worked to further harmonise standards, procedures and workflows for the ingestion and exchange of operational oceanography data by signing a Memorandum of Understanding with EURO-ARGO ERIC and participating in



EMODnet
Chemistry
vertical profiles
ingested in the *In
Situ* TAC product
of the Copernicus
Marine Service.
©EMODnet
Chemistry

CHEMISTRY

the Marine *In Situ* Collaboration (MIC) Technical Working Group with EMODnet Ingestion, EMODnet Physics, Copernicus Marine Service *In Situ* TAC, EuroGOOS, and SeaDataNet. Secondly, the Consortium signed an additional Memorandum of Understanding with UNEP to facilitate collaboration between the parties. A fruitful dialogue with ICES on the assessment and quality assurance of marine litter and microplastic data in OSPAR area has also taken place. In addition, EMODnet Chemistry expertise was required in three Horizon Europe (HE) projects: [Blue-Cloud 2026](#), [iMagine](#) and [FAIR-EASE](#). At the global level, EMODnet Chemistry has collaborated with expert groups working on the implementation of global data platforms to support the Ocean-related goals of the UN 2030 Agenda for Sustainable Development.

These efforts have led to new uses of EMODnet Chemistry data, data products and services. Some examples are presented in five 2022 scientific publications and further use cases are described in the next section.

Key data providers and users in 2022

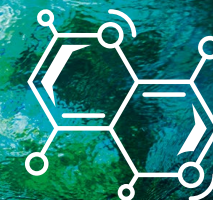
EMODnet Chemistry draws on the extensive experience of an ever-increasing network of 66 data centres in 32 countries. Measurements are regularly sourced from over 500 data providers, mainly from monitoring agencies and research institutes, but also from non-governmental organisations and companies. In this context, a growing contribution of data from citizen science activities was registered, such as the sampling of micro-litter at the sea surface carried out by the non-profit organisation 'OceanEye' worldwide. In terms of data from official monitoring to assess the state of the marine environment, EMODnet Chemistry managed beach litter data from the signatories of the Convention on the Protection of the Marine Environment of the Baltic Sea Area, providing high quality information on this sea basin. In addition, the expertise gained at international level led to the EC Joint Research Commission electing EMODnet Chemistry to manage data from the Marine Strategy Framework Directive monitoring programme for other types of marine litter and contaminants.

The use of EMODnet Chemistry data, products and services has also increased. First, EMODnet Chemistry data products were published on the digital platform of UN Global Partnership on Marine Litter, which provides high quality data and information for the implementation of the UN 2030 Agenda for Sustainable Development. Secondly, the data collections for eutrophication and Ocean acidification were integrated into the biogeochemical product service managed by the Copernicus Marine Service's *In Situ* Thematic Assembly Centre. More details on the main data providers and users of 2022 can be found in the Use Cases section of the EMODnet Central Portal.

CHEMISTRY 2022 EVENTS

EMODnet Chemistry was presented at several events, including:

- » Blue-Cloud Hackathon 2022, 7-9 February 2022, online hackathon
- » IODE International Ocean Data Conference, 14-16 February 2022, online conference
- » Ocean Sciences Meeting, 24 February-4 March 2022, online meeting
- » G20 MoEJ International Expert Meeting on microplastics, 4 March 2023, online meeting
- » Meeting with ICES Working Group on Marine Litter, 27-29 April 2022, Trondheim, Norway
- » Meetings of the Ecosystem Approach Correspondence Groups on Pollution and Marine litter Monitoring of UNEP/MAP, 31 May 2022 and 27 June 2022, online meeting
- » UN Ocean Conference, 27 June-1 July 2022, Lisbon, Portugal
- » Blue Growth Summer School by OGS, 2-8,11 July 2022, Trieste, Italy, education
- » INTERREG Med SHAREMED project Summer school, 27 June-1 July 2022, Lisbon, Portugal, education
- » National event on Black Sea affairs, 6 July 2022, Batumi, Georgia, conference
- » Meetings of UN Working Groups on Vocabulary and Metadata for Ocean acidification data, 30 August 2022 and 2 September 2022, online meeting
- » 7th International Marine Debris Conference, 18-23 September 2022, Busan, Republic of Korea
- » Second EMODnet-Copernicus Marine Thematic workshop on Coastal issues, 22 September 2022, online workshop
- » Third meeting of the Marine *In situ* Collaboration TWG, 29 September 2022, online meeting
- » Ocean Practices, OBPS Workshop VI, 5-19 October 2022, online workshop
- » 1st International Conference MARBLUE 2022, 26-28 October 2022, Constanta, Romania





Thematic node: EMODnet Geology

GEOLOGY

The geology of Europe's seafloor is diverse, ranging from hard rock outcrops to glacial sediment layers that may reach hundreds of metres in thickness. The geological picture is further complicated by structural faults, complex geomorphological structures on the seafloor surface, episodic events such as earthquakes, submarine landslides and volcanic activity. Geological data is essential to support maritime spatial planning, coastline prediction, geohazard assessment, offshore installation design and environmental conservation.

A variety of marine landscapes, submarine processes and relics of ancient environments evident throughout our Oceans have resulted in different types of mineral accumulations on and beneath Europe's seafloor from coastal areas to deep abyssal plains. The importance of submarine mineralisation systems is related to the abundance and exploitation-potential of many strategic aggregates, energy, metals, and Critical Raw Materials (CRM), necessary for the modern society development, especially green transition.

The EMODnet Geology thematic provides access to data and data products on seabed substrate, seafloor geology, coastal behaviour, sediment accumulation rates, geological events and probabilities, and mineral occurrences, as well as submerged landscapes.

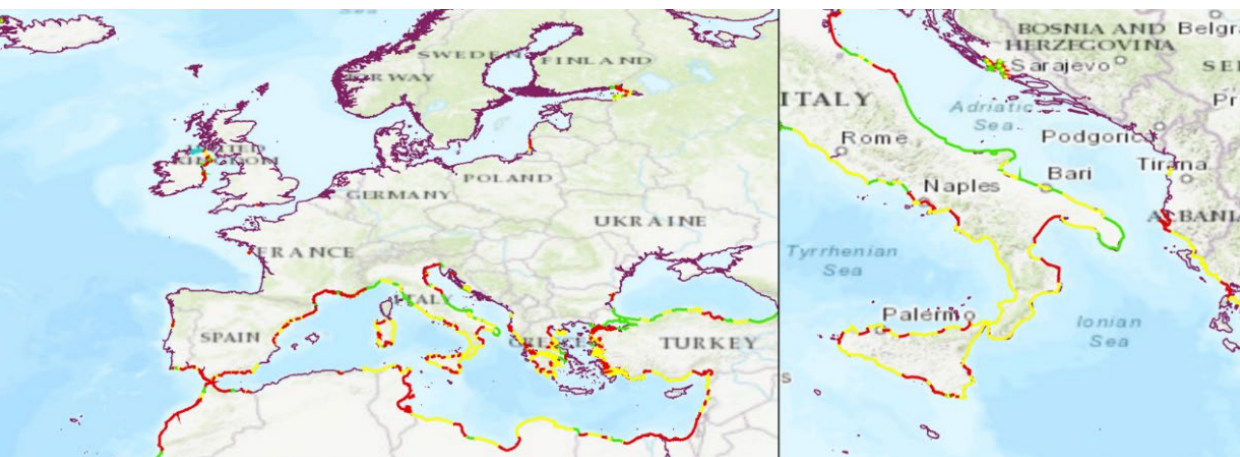
2022 Key Facts

EMODnet Geology Seabed substrate work package introduced a new way to manage the seabed substrate data updates, which helps to improve the data continuity, accuracy and also develops a solid foundation for the future work by providing a checking point for all the data delivered during previous phases.

A new layer for the geomorphology theme (WP 4), i.e. "Geomorphology line features" was uploaded at the BGR Geoviewer for quality check by all participants, which proved to be excellent for quality assurance. The data were reviewed by the participants remotely, the BGR WP 4 team added the suggested changes and then transferred the optimized data layers to our data management for inclusion in the EMODnet Central Portal catalogue and map viewer. With that process we can provide data in as high quality as possible.

Furthermore, a modified colour scheme for Quaternary age (stratigraphy) was developed to allow a better distinction of the Quaternary units on the map layer. This is already implemented at the BGR Geoviewer for quality check and will be published at the EMODnet portal together with new data in 2023.

Work on coastal behavior focused on the collation of data and information on coastal vulnerability (the ability of a coastline to resist, absorb and recover from erosion before a critical state is reached), and on improvement and increased coverage of the coastline-migration map based on satellite data. Georeferenced coastal-vulnerability studies provided by the entire partnership were turned into a harmonized pan-European map with excellent coverage, especially for southern Europe. The southern Mediterranean, Caribbean Sea and Macaronesia were included in a new satellite map on coastline migration,



EMODnet Geology's harmonized map of coastal vulnerability (with detail), showing excellent coverage in southern Europe. ©TNO (Geological Survey of the Netherlands)

which also filters out unreliable data identified during Quality Control on the first version that is currently online. Both maps will be published on the EMODnet Central Portal in 2023.

The Seabed Minerals work package group was looking at mineral subtypes for aggregates and hydrocarbon to further detail these important layers on the EMODnet portal, and we had a fruitful discussion to establish useful and possible categories for all partners. These are going to be used for reclassification of aggregates and hydrocarbon in 2023. Pan-European standardised aggregated maps have already become very popular and useful, but reclassification will further increase the usability in the future.

For usability reasons, the EMODnet Central Portal asked all the thematic groups to reduce their number of product layers. EMODnet Geology used geoserver to achieve this, and the number of layers were mainly reduced by creating layer groups. With respect to the creation of layer groups, the layers inside the groups also needed to be updated and harmonized so that the filtering of data could work across data that originated from within the different layers. This process worked well, and EMODnet Geology data products were then ready for sharing via the Central Portal.

In addition, the Geological Society of London Special Issue "From Continental Shelf to Slope: Mapping the Ocean Realm" was completed and contains nine contributions from EMODnet Geology partners. It has been published and is available at <https://www.geolsoc.org.uk/SP505>, ISBN 9781786204950. Editors: Asch, K. (WP 4 lead), Kitazato, H. & Vallius, H. (Project lead).

Key data providers and users in 2022

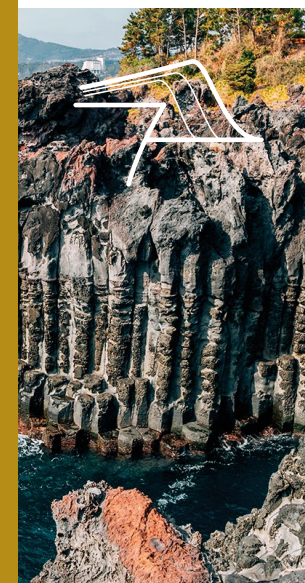
Main data providers for EMODnet Geology are the marine geology departments and teams of the national geological surveys as well as research institutes of European maritime countries, participating in the project as project partners or subcontractors. Some additional data are collected nationally by the project partners and added to our different data products.

Our data products are widely used in maritime spatial planning, coastal zone management and environmental impact assessments, and especially by a rapidly growing community of offshore renewable energy sector actors. One such case is from Denmark where Energinet, an independent public enterprise owned by the Danish Ministry of Climate, Energy and Utilities, builds, owns, and operates offshore electricity utility cables and gas pipelines that connect Denmark to neighbouring countries in the North Sea, Skagerrak and in the Baltic Sea. Energinet uses EMODnet Geology data products as background data. Energinet also uses map services and data from other EMODnet Lots such as EMODnet Bathymetry, EMODnet Human Activities, and EMODnet Seabed Habitats, highlighting areas of potential constraints e.g. vulnerable habitat areas. Energinet develops offshore wind farms and energy islands in the Danish marine territory pursuant to the Danish Act on the Promotion of Renewable Energy.

GEOLOGY 2022 EVENTS

EMODnet Geology was presented at several events, including:

- » International Ocean Data Conference 2022, 15 February 2022, Sopot, Poland in person and online
- » Webinar on Baltic Sea, The Finnish association of nature conservation, 16 October 2022, online webinar
- » INFOMAR seminar 2022, 21 February 2022, Dublin, Ireland, seminar
- » FINMARI Researcher Day, 23 March 2022, online conference
- » Expanding Ocean data interoperability between Europe and Asia, 11 May 2022, online webinar
- » Nordic Geological Winter Meeting 2022, 11-14 May 2022, Reykjavik, Iceland
- » The GeoHab 2022 Conference, 16-20 May 2022, Venice, Italy
- » EMODnet Geology Project Meeting, 17-19 May 2022, Utrecht, Netherlands + online meeting
- » Kick-Off EMODnet for Ocean Decade Coordination Group, 10 June 2022, online meeting
- » International Conference for Seafloor Landforms, Processes and Evolution, 4-6 June 2022, Malta + online
- » First online meeting between EMODnet-Geology partner IGME, the coordinator (GTK), and Asociación de Servicios de Geología y Minería Iberoamericanos (ASGMI), online meeting
- » Kick-off meeting CSA Geological Service for Europe WP5: Coastal Vulnerability and Windfarm Siting, 11 October 2022, online meeting
- » Workshop: EMODnet marine data for the offshore renewable energy sector in the Mediterranean Sea and Black Sea, 20-21 October 2022, online workshop
- » EuroGeoSurveys 50 Years Conference, 27 October 2022, Brussels, Belgium
- » EMODnet Geology project meeting, 7 November 2022, Varna, Bulgaria
- » EuroGeoSurveys Marine Geology Expert Group meeting, 10 November 2022, Varna, Bulgaria





Thematic node:

EMODnet Human Activities

HUMAN ACTIVITIES

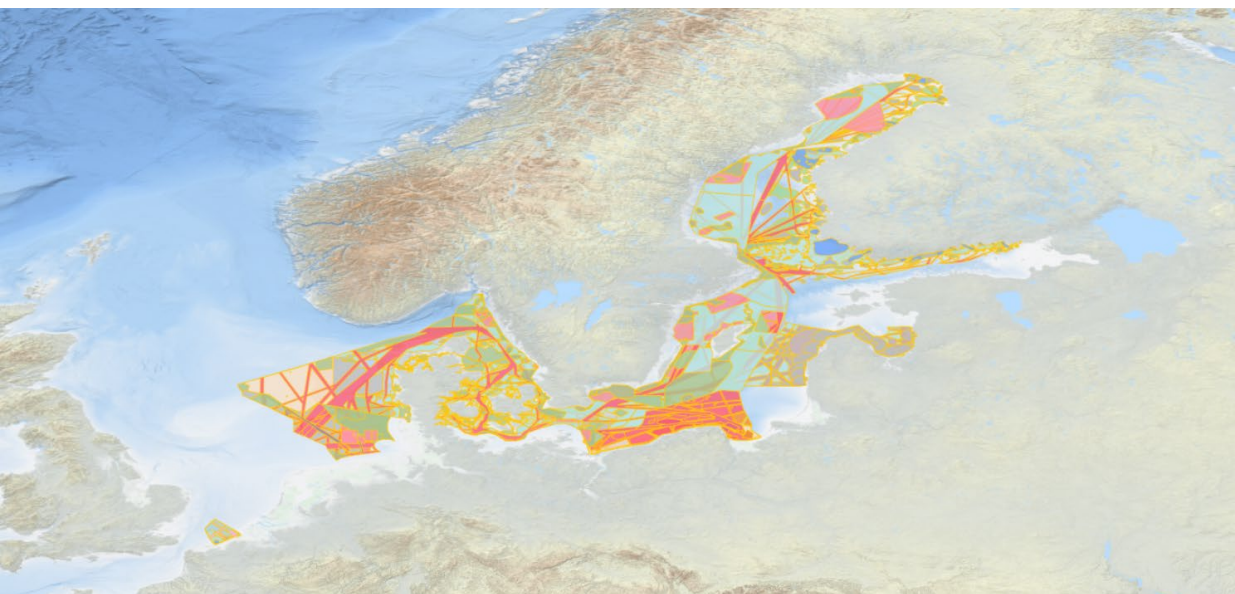
Pressure on Europe's marine space and resources is high. Continual demand for resources such as oil and gas, marine minerals and seafood must be managed alongside the need to use marine space for renewable energy installations, communications cables, waste disposal sites and shipping. Additionally, societal demand for marine tourism and leisure activities, and the need to conserve marine ecosystems and habitats is leading to increased competition and conflict between different marine sectors.

The EMODnet Human Activities thematic provides access to data and data products on the spatial extent and intensity of human activities at sea.

2022 Key Facts

2022 was primarily a year of "consolidation", with all EMODnet Human Activities' datasets receiving their regular update, and relatively few new developments. There were important exceptions, though. Marine protected areas, which used to only cover the European Union, were complemented with protected areas of the EU's neighbouring countries, thanks to the addition of the World Database on Protected Areas. Work continued on Maritime Spatial Planning, albeit with some difficulty. As more and more EU Member States adopted their plan, EMODnet Human Activities standardised the data to the EMODnet data model and made the contributions available online.

Last but not least, EMODnet vessel density maps went global. The US National Geospatial-Intelligence Agency launched the [Global Maritime Traffic Density Service](#), an online platform that provides a holistic picture of global maritime traffic densities over time. The method used to derive shipping density from AIS data is based on the [method developed by EMODnet Human Activities](#). The US Coast Guard also started work on a waterways risk model to which vessel density – as measured by EMODnet – is a crucial input. Last but not least, EMODnet's vessel density method was also used to [map shipping traffic in South Korea](#).



EMODnet Human Activities data layer: National Maritime Spatial Plans. ©EMODnet Human Activities

Key data providers and users in 2022

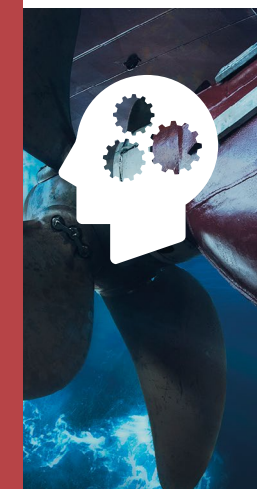
EMODnet Human Activities datasets and product span a diversified range of blue economy sectors, and for this reason the thematic group caters to a wide variety of data providers and users. Data providers include EU institutions, international organisations, regional sea conventions, national agencies, research companies and even private companies.

Users are no less diverse and range from academics and researchers (~50%) to private companies (~30), with the remaining users being from governments and public administration, as well as users who do not fall under a precise category. Among business users, developers of offshore wind projects and companies laying cables and pipelines clearly stand out as the most recurring users. They make use of EMODnet data mainly in the preliminary phases of their projects when screening potential areas that may be suitable for their activities.

HUMAN ACTIVITIES 2022 EVENTS

EMODnet Human Activities was presented at several events, including:

- » Med OSMoSIS Workshop, 20 January 2022, online workshop
- » Planning for the Future of Europe's Marine Space – MSP Stakeholder Conference, 14-15 June 2022, Brest (France)
- » Community of Practice Workshop on Data Sharing, Information and Communication Technology serving MSP, 1 September 2022, online workshop
- » Offshore Renewable Energy and MSP Data Sharing, Global Compact workshop, 19 October 2022, online workshop
- » Technical Expert Group on MSP Data Workshop, 5 December 2022, online workshop





Thematic node: EMODnet Physics

PHYSICS

Prompt and continuous access to physical properties of the Ocean such as Ocean circulation, distribution of and transport of heat, salt and other water properties is crucial to deliver Ocean forecasts and early warnings, climate projections and assessments and to protect Ocean health and its benefits.

EMODnet Physics provides access to collections of ocean physical data and data products covering: temperature of the water column, salinity of the water column, horizontal velocity of the water column, changes in sea level and sea level trends, wave height and period, wind speed and atmospheric pressure, water clarity (light attenuation), underwater sound (noise), inflow from rivers, and sea ice coverage. Provided *in situ* data products include collections of *in situ* data, reanalysis and trends from data, elaboration in space and/or time of *in situ* data and model output for a given parameter.

2022 Key Facts

In 2022 EMODnet Physics data management tools were updated, improving the overall system performance, facilitating service maintenance and making the system ready for the centralization process. Tools for improving and updating machine-to-machine layers and interoperability according to common standards and directives have been updated. New integrated and re-processed data products have been developed and the EMODnet Physics catalogue counts more than 500 items between products and data collections. A selection of those were elevated to web-page products to offer the user an advanced and easier experience to discover products in time, space and depth. Connected platforms continuously provided EMODnet Physics with new operational data and as such contributing, according to the type of the platform, to a single parameter data collection (e.g. tide gauges and rivers gauge stations) or multiple parameters at once (e.g. ARGO collects temperature and salinity; drifting buoys collect temperature, currents, atmospheric pressure; etc.). New datasets and observing platforms have also been ingested and made accessible. More specifically 732 ARGO,

1074 drifting buoys, 175 tagged sea mammals, 370 tide gauges, 419 river gauge stations, 45 unmanned vehicles (gliders, sailing drones, etc.), 11 vessels (including fishing vessels, ferrybox and data from Ocean race ships), and 161497 CTD profiles. Importantly, operational platforms (ARGO, drifting buoys, moorings, tide gauge, river stations) are delivering data on a regular basis (mainly daily): once a new platform is linked to EMODnet Physics, the data stream continues as long as the platform is operational. EMODnet Physics is, at present, integrating more than a million platforms and millions of data.

This important result was possible thanks to the tight collaboration with OCEANOPS, EuroGOOS task teams, and the Copernicus Marine INS TAC team. 2022 also marked the Memorandum of Understanding with the



Voice of the Ocean. ©Natalia Quintana

H2020 ARICE project that enabled better and further interoperability between EMODnet Physics and PANGAEA. Despite the worldwide restrictions due to the COVID-19 pandemic, with more than 70 events, the EMODnet Physics team continued to actively participate in events, organised thematic workshops to engage with new communities and expand the data provider and data user network.

Key data providers and users in 2022

EMODnet Physics users are mainly from the research and academia sector (59% since ever, 69% in 2022); the number of users from the private sector is steady (19% since ever, 19% in 2022) and from government and public administration (10%), while users from NGO and other groups are lowering (from 9% to 2%). Data are mainly used for implementing marine and coastal applications (51%) and climate and weather forecasting (30%), other uses are for marine resources (11%) and marine safety (7%). EMODnet Physics users are not limited to EU Countries.

Several use cases are available in the use-case section of the EMODnet portal and provide examples of how EMODnet Physics data has been used for both private and public downstream applications. Interestingly the most viewed use cases are the two from industry (DHI and fishing vessels) and the two on the collaboration between EMODnet and Copernicus Marine Service INS TAC. Other use cases that generated a lot of attention are on sea level, wave, wind, and river products. Description of tools to facilitate interoperability (EMODnet Physics ERDDAP docker) and how to adopt them are also attracting increasing interest.

PHYSICS 2022 EVENTS

EMODnet Physics was presented at several events, including:

- » International Ocean Data Conference 2022, 14 February 2022, Sopot, Poland + online
- » Ocean Science Meeting, 3 March 2022, online meeting
- » Marine Biology Live – EMODnet and Actions on Citizens Science, 24 March 2022, online conference
- » European Marine Days - EU4Ocean, 20 May 2022, Ravenna, Italy, conference
- » European Glider Data Management Workshop, 5 July 2022, online workshop
- » Open Science Conference, 4 August 2022, online conference
- » EMODnet-for-Business Workshop on Offshore Energy Sector, 20-21 September 2022, online workshop
- » WhyBio, 23-25 September 2022, Savona, Italy
- » Salone Nautico 2022 – International Boat Show, 25 September 2022, Genova, Italy, exhibition
- » MetroSea 2022, 04 October 2022, Milazzo, Italy, online workshop
- » GENOA SEA SUSTAINABLE CITY, 05 October 2022, Genova, Italy, conference
- » Green Blue Days, 11 November 2022, Taranto, Italy, conference
- » DATAMEQ, EuroGOOS Data Management, Exchange and Quality Working Group, 14 October 2022, online working group
- » Knowledge Hub - Sea Level Rise Conference 2022, 17-18 October 2022, Venice, Italy, conference
- » EMODnet-for-Business Workshop on Offshore Energy, Mediterranean and Black Sea stakeholders, 20-21 October 2022, online workshop
- » International Ocean Governance, 16 November 2022, online course
- » ONTM General Assembly, 14 December 2022, Rome, Italy, meeting





Thematic node: EMODnet Seabed Habitats

SEABED HABITATS

EMODnet Seabed Habitats deliverables, datasets, and models can be used to inform effective monitoring of environmental change on the ecosystem and biodiversity in European seas and adjacent regions. Understanding the occurrence and distribution of different seafloor habitats is important for effective planning, conservation and sustainable development of the marine environment. EMODnet Seabed Habitats facilitates access to the EUSeaMap product (broad-scale seabed habitat map for Europe) and is the one-stop-shop for accessing seabed habitat data. The largest European collection of habitat maps from individual surveys and survey-based sample points, with detailed metadata, can be accessed here alongside composite data products, environmental variables data and seabed habitat models.

2022 Key Facts

During 2022, a new data exchange format for Essential Fish Habitat (EFH) maps and an updated data exchange format for seabed habitats that can also accept coastal wetland maps were developed and published. Under the new EFH sub-theme a confidence assessment method for EFH maps, based on the MESH confidence assessment for seabed habitat maps, and a guidance document for EFH maps, which includes a simple classification scheme for types of EFH were also published. For the new sub-theme of coastal wetlands, EMODnet Seabed Habitats produced an internal guidance document that clarifies the scope of 'coastal wetlands' including which classification schemes are applicable; submitted the global Ramsar Classification System for Wetland Type to the NERC Vocabulary Server; and produced the first known translation table between the Ramsar Classification System for Wetland Type and Annex I of the Habitats Directive.

Throughout the year, the compilation of spatial data and products from around Europe on European seabed habitats has continued to grow. In 2022, 26 new habitat maps from surveys, 24 EFH maps, three modelled maps of specific habitats and nearly 3,600 new point observations of habitats from surveys were made available online and via webservices. Additionally, several new external products are now also provided directly by machine-to-machine connections, including Vulnerable Marine Ecosystems records from ICES, biotope maps from the Geological Survey of Norway and Habitats Directive Annex I habitat layers sourced directly from the HELCOM Map and Data Service via Web Map Service.



Metsähallitus Parks & Wildlife Finland. ©Essi Keskinen

EMODnet Seabed Habitats has also continued to work with EMODnet Biology to develop guidance on a standard approach to including habitat observations as Event Core measurements when submitting data into the European node of the Ocean Biodiversity Information System (EurOBIS).

In March 2022, EMODnet Seabed Habitats delivered an updated, combined, harmonized data product showing the best evidence for extent of habitats EUNIS level 3 in the OSPAR area and classified to MSFD benthic broad habitat types, for use by EU Member States in MSFD assessments and reporting.

The next update to EUSeaMap is due in 2023, and work during 2022 has focused

on preparing the base layers and defining the habitat classification schemes for the two new areas in the Caspian and Caribbean Seas. Environmental data layers have been prepared from existing data archives and progress has been made in defining the seabed habitat types in these areas.

Key data providers and users in 2022

In 2022, dozens of data providers from over 12 countries in Europe and the Caribbean contributed to growing the compilation of habitat maps, essential fish habitats, habitat models and observations from surveys. These included Governments/public bodies, academia, and NGOs.

EMODnet Seabed Habitats users are very diverse, ranging from researchers to policy-makers to the private sector. For example, the updated EUNIS level 3 and MSFD benthic broad habitat type translation for the OSPAR area are being used to support OSPAR in carrying out an up-to-date assessment of the OSPAR common indicator 'Extent of Physical Damage to Predominant and Special Habitats' for the 2023 Quality Status Report and for MSFD assessments and reporting.

SEABED HABITATS 2022 EVENTS

EMODnet Seabed Habitats was presented at several events, including:

- » Stakeholder discussion for the "Urbanization and Climate Change Adaptation in the Caspian Sea Region" project, 1 February, 2022 online meeting
- » EMODnet Biology and Seabed Habitats joint meeting, 8 February, 2022, online meeting
- » "International Ocean Data Conference 2022 - The Data We Need for the Ocean We Want", 14 February, 2022, Paris, France
- » INFOMAR National Seabed Mapping Conference, 21 February, 2022, Dublin, Ireland
- » MEDIN Open Meeting, 23 March, 2022, London, UK
- » European Marine Board Working Group on Marine Habitat Mapping, 7 April, 2022, online meeting
- » GEOHAB Conference, 16-20 July, 2022, Venice, Italy
- » Meeting MSFD EU TG Seabed Chair regarding EUSeaMap, 13 July 2022, online meeting
- » INSTITUT FOR KEMI OG BIOVIDENSKAB Researchers Conference, 16 August 2022, Aarhus (Denmark)
- » Technical Group on seabed habitats and sea-floor integrity (TG SEABED), 14 September 2022, online meeting
- » ICES Annual Science Conference, 19 September 2022, Dublin, Ireland
- » Copernicus Biodiversity and coastal ecosystems workshop, 11 October, 2022, online meeting
- » EMODnet for Business workshop: offshore renewable energy sector (Med & Black Sea), 20 October, 2022, online meeting
- » Blue Growth: Challenges and opportunities for the Black Sea, 26 October, 2022, Constanta, Romania
- » Hydrographic Society UK & Ireland - Ireland Branch Winter Meeting, 2 December, 2022, Dublin, Ireland





Portal:

EMODnet Data Ingestion
emodnet-data-ingestion.eu

DATA INGESTION

There is a wealth of marine data collected in Europe by public and private users, such as governmental organisations carrying out environmental monitoring, academic researchers studying the marine environment, private companies planning and building marine infrastructures, such as pipelines and wind farms, and even citizen science initiatives. In recent years, EMODnet has made huge progress in facilitating access to data from many sources. However, many data still remain hidden or unusable.

EMODnet's Data Ingestion Portal tackles these problems by reaching out to data holders, explaining the benefits of sharing their data and offering a support service to assist them in releasing their data for subsequent processing and quality control.

2022 Key Facts

The Data Submissions service achieved a steady increase of submissions from 1,107 to 1,308 from the start to the end of 2022. In turn, the number of completed submissions went from 982 to 1,176 throughout 2022, with submissions being published for discovery and downloading by users via the View Submissions service. Most datasets were published 'as-is', however, the number of elaborated datasets went up from 442 to 536. This means that these datasets have been curated by assigned data centres from the EMODnet Ingestion network to common formats and are made available through EMODnet Thematic Portals and as input for EMODnet data products.

The network of qualified data centres collaborating through EMODnet Data Ingestion counts 50 data centres from EU countries. These data centres are experts in marine data management for specific EMODnet data themes and are also populating European marine data management infrastructures such as SeaDataNet, EurOBIS, ICES, and others which feed into EMODnet.

The (semi-)automatic coupling as established in 2019 between SEANOE and EMODnet Ingestion continued to perform well with many deliveries. SEANOE,

operated by IFREMER, is a SeaDataNet service, inviting European scientists to publish their scientific papers and associated data collections in return for a Digital Object Identifier (DOI), which will facilitate their wider citation. The coupling facilitates that the (selected) scientific submissions from SEANOE are harvested by EMODnet Ingestion for further metadata completion, publishing 'as-is', and elaboration of datasets for inclusion and publishing in national, European and EMODnet Thematic Portals. So far, 170 SEANOE submissions have been published, of which 37 were fully elaborated.

EMODnet Data Ingestion together with EMODnet Physics also reaches out to operators of Near Real Time (NRT) and Real Time (RT) oceanographic monitoring sites, consisting of fixed platforms such as moorings, buoys, tide gauges, High Frequency (HF) radars, and moving platforms, such as surface drifters, ferryboxes, argo floats, and gliders. In 2022, again several oceanography operators and platforms were motivated and given guidance for connecting and sharing their data streams within the European oceanography data exchange as managed by Copernicus CMEMS-INSTAC, EuroGOOS, and SeaDataNet, which are pillars under EMODnet Physics.

The cooperation with H2020 Eurofleets+ project was continued. This project is about giving young researchers transnational access to shiptime at European research vessels for undertaking observations and research. Eurofleets+ has an open data strategy and therefore, the EMODnet Ingestion portal is used by the research teams to submit their collected datasets for further elaboration and inclusion in the European marine and Ocean data exchange, such as inclusion in EMODnet thematic portals. In 2022, this has resulted in 15 published data submissions of which six are fully elaborated.

Key data providers and users in 2022

The data for the 1,176 published data submissions originated from more than 190 data providers of which circa 59% from academia & research, 15% from companies such as Fugro GeoConsulting Limited, Aquamarine Power Ltd, Gardline Geosurvey Limited, just to name a few, 20% from governmental organisations, and 6% from NGOs such as Association Oceaneye, Black Sea NGO Network, Oceana and Archipelagos Institute of Marine Conservation.

DATA INGESTION 2022 EVENTS

EMODnet Data Ingestion was presented at several events, including:

- » IODE - International Ocean Data Conference 2022: The data We Need for the Ocean We Want, 14-16 February 2022, Sopot, Poland
- » European Maritime Days, 19-20 May 2022, Ravenna, Italy
- » National Marine Citizen Science Workshop, 19 May 2022, Gothenburg, Sweden
- » 7as Jornadas de Engenharia Hidrográfica/ 2as Jornadas Luso-Espanholas de Hidrografia symposium, 21-23 June 2022, Lisbon, Portugal
- » UN Ocean Conference, 27 June – 1 July 2022, Lisbon, Portugal
- » European Glider Data Management Workshop, 5 July 2022, online
- » Symposium of the Iberian Atlantic Margin, 7 July 2022, Bilbao, Spain
- » SHAREMED International Workshop, 13-14 September 2022, Qawra, Malta
- » Marine & Inland Waters Research Symposium, 16-19 September 2022, Porto Heli, Greece
- » EMODnet-for-Business Workshops – Marine Data for and from the Offshore Energy Sector, 20-21 September 2022 and 19-20 October 2022, online
- » EMODnet-Copernicus Marine Service Coastal Workshop, 22 September 2022, Brussels, Belgium
- » European Marine Biodiversity Symposium 55th, 19-23 September 2022, Gdansk, Poland
- » SeaTechWeek 2022. Conference, 26-30 September 2022, Brest, France
- » Workshop EU-Canada – Ocean Partnership, 3-4 October 2022, Brussels, Belgium
- » International MARBLUE Conference "Blue Growth: Challenges and Opportunities for the Black Sea", 26-28 October 2022, Constanta, Romania
- » HYDRO2022 Conference, 6-8 December 2022, Monaco

YOUR DATA WORK IT

12+ success stories
 180+ data providers
 1200+ data sets

The Radiation and Nuclear Safety Authority of Finland collects ¹³⁷Cesium data from seabed sediments in the Baltic Sea for environmental monitoring purpose. The data are used for sedimentation rates estimates in EMODnet Geology.

Check out the movie

Case 10. ¹³⁷Cesium activity contents in seabed sediments in the Baltic Sea

FI
 GTK

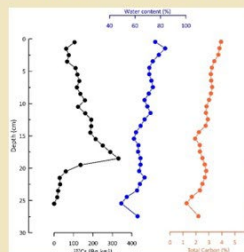
Fallout from the 1986 Chernobyl nuclear power plant accident has rendered the Baltic Sea as the most polluted marine body in the world with respect to ¹³⁷Cesium. Radioactivity from ¹³⁷Cs in sediments has generally declined due to decay of ¹³⁷Cs over the last decades. However, ¹³⁷Cs contents in subsurface sediments remain at elevated levels compared to pre-Chernobyl levels, especially in the northern Baltic Sea sediment and it is considered that Chernobyl fallout created a clear chronostratigraphic marker.



Laminated sediments

The Radiation and Nuclear Safety Authority (STUK) supervises radiation and nuclear safety in Finland with the purpose to protect people and the environment from the detrimental effects of radiation. STUK measures ¹³⁷Cs data in the sediments of Baltic Sea for environmental monitoring purposes. The Geological Survey of Finland (GTK) contacted STUK and received the data in April 2021 after a few encouragements.

Acting as data ambassador, GTK submitted the standardized data on behalf of the data owner, to the EMODnet Geology portal. It was considered that the ¹³⁷Cesium peak in the sedimentary record could be used to define recent rates of sedimentation. After this fruitful collaboration, a joint article about ¹³⁷Cs in the Baltic Sea sediments was published in Sept. 2021 in the Marine Pollution Bulletin.



¹³⁷Cesium (Ba kg-1) activity content (black), water content (%) (blue), and total carbon (%) (orange) down-core vs. depth profile in sediment core from the Bothnian Bay, the Baltic Sea.



EMODnet in practice



Our users' opinion

Users are at the centre of EMODnet's strategy. EMODnet's data and data products across all seven thematics are widely used across sectors including research and engineering, blue economy planning and operations, marine conservation, management, policy and more. The data- and web services are crucial to the discovery and access of such data and data products by diverse communities from Europe and beyond, to enable marine and maritime stakeholders to generate the information necessary to improve our knowledge of the seas; support the Blue Economy and its sustainable management and diversification; and to provide citizens, businesses, NGOs and policy makers alike with the information to help meet the ambitious targets of the European Union's Green Deal, and to wider evidence-based decision making and policy assessments at European and global levels.

In this section, we present examples of concrete uses of EMODnet published in the course of 2022, together with further information on dialogue with the private sector in the section EMODnet for Business (below). The full portfolio of use cases can be consulted at <https://emodnet.ec.europa.eu/en/use-cases>. This searchable database facilitates filtering use cases based on case type (i.e. business, policy and research) and EMODnet component/thematic. The free text search field allows further filtering on specific terms.

To fully understand the full benefits of EMODnet, users are invited to describe how EMODnet supports them in their daily work and activities! If you have developed an application using EMODnet products that you would like to share with us or if you use EMODnet data for other purposes, we invite you to submit your use case by contacting secretariat@emodnet.ec.europa.eu.

European Marine Observation and Data Network (EMODnet)

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Home > Solutions > Use Cases

Search options

EMODnet component

- Any - ▾

Case Type

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Search text:

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Use Cases

[Chemistry](#)

26 Oct 2022

EMODnet Chemistry: the gateway to HELCOM beach litter data



In 2021, the Helsinki Commission (HELCOM) chose EMODnet Chemistry as the web-based platform to manage Baltic Sea data on beach litter for the 'State of the Baltic Sea' holistic assessment report (HOLAS) purposes. Since then EMODnet Chemistry has ingested, harmonised and validated data that had been collected from 2016 to 2021 on 141 beaches in 9 countries.

[POLICY MAKERS](#)

NODE



CHEMISTRY

USE CASE SECTOR

Policy Makers

1. EMODnet Chemistry: the gateway to HELCOM beach litter data

The Convention on the Protection of the Marine Environment of the Baltic Sea Area (the Helsinki Commission, [HELCOM](#)) is an intergovernmental organisation established to ensure the implementation of the Convention on the Protection of the Marine Environment of the Baltic Sea Area ([Helsinki Convention](#)).

HELCOM's vision for the future is "...a healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable economic and social activities". The 'State of the Baltic Sea' holistic assessment report (HOLAS) is a powerful instrument adopted by the Commission to achieve this objective. Since 2010, HOLAS reports have provided a comprehensive overview of the ecosystem health of the Baltic Sea region from 2003 onwards. In 2022, HELCOM carried out the third holistic assessment (HOLAS 3) of the Baltic Sea, covering the period 2016-2021, of which the results are expected to be published in 2023. The Helsinki Commission asked all countries that are signatories to the Helsinki Convention to submit 2016-2021 data from national coastal litter monitoring to EMODnet Chemistry, as the data will serve to populate the beach litter indicator included in the HOLAS 3. EMODnet Chemistry prepared a specific dataset using the dedicated web service from its marine litter data management system.

Read the full use case [here](#).



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Holistic Assessments

State of the Baltic Sea 2018 + 2010 Initial Holistic Assessment

Latest News

[\(21/03/2023\) HELCOM joins the UN 2023 Water Conference and pledges commitments for the Water Action Agenda](#)

[\(13/01/2023\) Thinking outside the box at the Baltic Stakeholder Conference 2023](#)

[\(06/03/2023\) FAQ: HELCOM and the "strategic pause" – what has been going on?](#)

• [See all news](#)

Holistic Assessments

HELCOM holistic assessments (HOLAS) give a comprehensive overview of the ecosystem health of an entire regional sea – the Baltic Sea. These major assessments assist the region's environmental managers and decision-makers, so that they can base their work on sound, up-to-date knowledge of the status of the sea.

HOLAS

2003-2007

In 2010, HELCOM completed the initial assessment (HOLAS) of the ecosystem health of the Baltic Sea – including the associated costs and benefits to the society. The assessment was based on data from 2003 to 2007.

[Read more](#)

HOLAS 2

2011-2016

The second HELCOM 'State of the Baltic Sea' holistic assessment (HOLAS 2) provides a comprehensive overview of the ecosystem health of the Baltic Sea based on data collected between 2011 and 2016.

[Read more](#)

HOLAS 3

2016-2021

HELCOM is currently carrying out the third holistic assessment (HOLAS 3) of the Baltic Sea, covering the period 2016-2021. The results are expected to be published in 2023.

©HELCOM website, showcasing the previous Holistic Assessments and the third one coming soon.



NODE



PHYSICS

USE CASE SECTOR

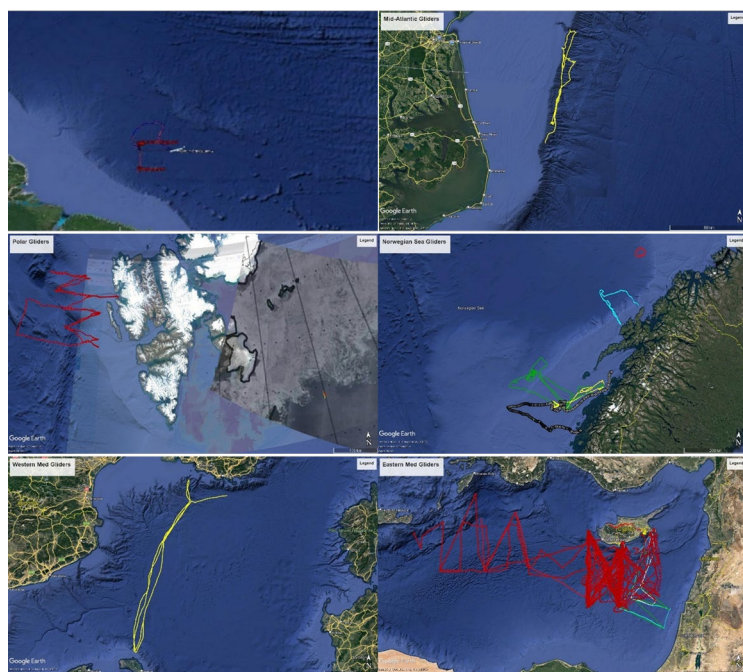
Research

2. Glider Mission planning with historical physical data

Cyprus Subsea Consulting and Services C.S.C.S. Ltd (CSCS), specialized in marine robotics and autonomous systems, serves the public and private sector with equipment maintenance, rentals and official resales, as well as data collection, analysis and reporting services. Cyprus Subsea team has over 15 years of glider operation experience with more than dozens of launches and successful recoveries representing several glider-years and tens of thousands of profiles.

CSCS carries out glider missions all over the world. Because the horizontal speed of Ocean gliders (around 25 cm/s) is comparable to Ocean currents, and the density stratification must be accounted for when preparing the gliders, local oceanographic data are critical to mission planning. CSCS relies on the access of Ocean observations of known quality from EMODnet Physics, to verify their calculations for density stratification and current magnitude and direction, before deploying the glider. The EMODnet *in situ* observations are combined with modelling and remote sensing data from other sources like Copernicus Marine Service, to allow for a more robust glider mission plan and risk assessment.

Read the full use case [here](#).



Glider missions carried out by Cyprus Subsea in (clockwise from upper left): Equatorial Atlantic, mid-Atlantic Bight, Norwegian Sea, Eastern Mediterranean, Western Mediterranean, and the Svalbard/Polar Front region. ©Cyprus Subsea Consulting and Services

NODE

HUMAN
ACTIVITIES

USE CASE SECTOR

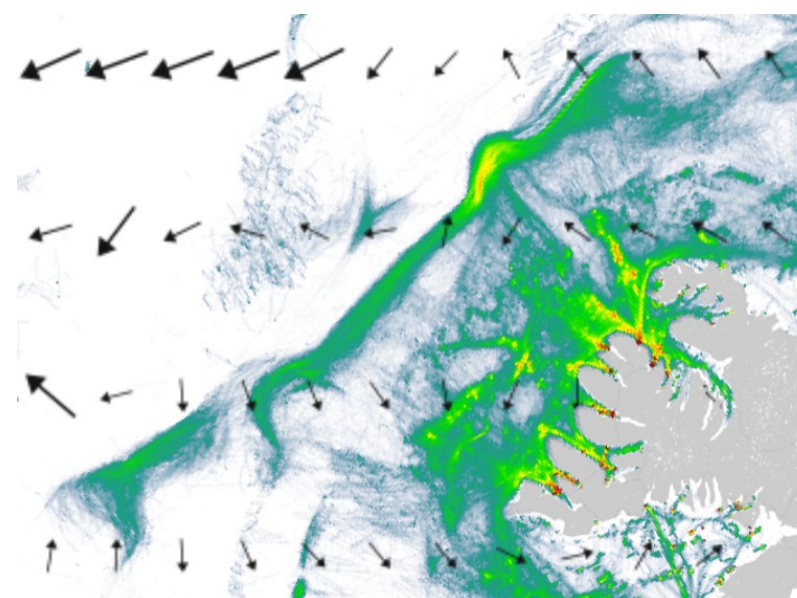
Policy Makers

3. Detection of abnormal vessel behaviour

[Frontex](#) is the European Border and Coast Guard Agency, and it promotes, coordinates and develops European border management in line with the EU [Charter of Fundamental Rights](#) and the concept of [Integrated Border Management](#). Frontex supports EU Member States and Schengen Associated Countries in managing the EU's external borders and fighting cross-border crime.

When it comes to monitoring sea borders, it is essential to be able to detect "abnormal vessel behaviour" as quickly as possible, so as to trigger an alert and have a closer look and potentially detect illegal immigration or cross-border crime. Therefore, Frontex regularly uses EMODnet Human Activities' vessel density maps, a data product showing the distribution of ships based on the instantaneous number of vessels per square kilometre in a month. Frontex applications combine EMODnet map services with other internal and external map services for supporting detection of abnormal vessel behaviour.

Read the full use case [here](#).



Combination of vessel density and sea currents data in one single application. ©Frontex

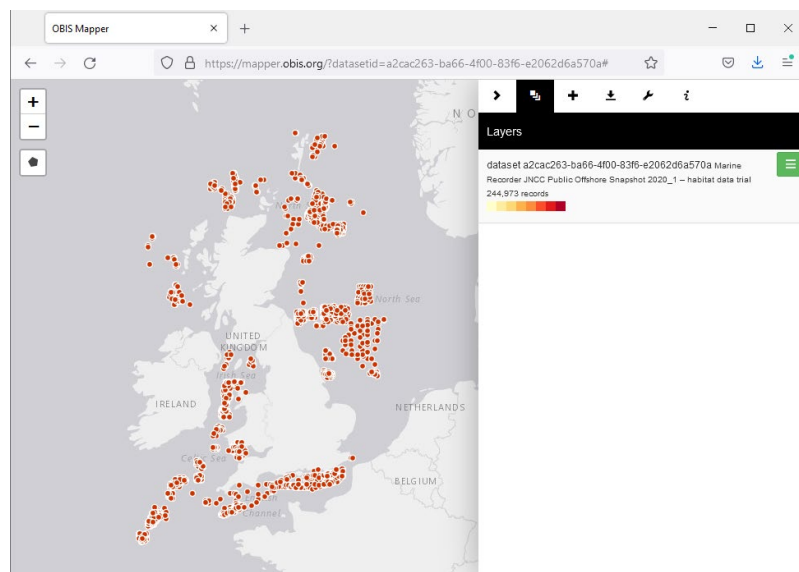


4. Holistic, standards-based access and interoperability for marine biodiversity data

There is a demonstrable need to provide access to combined species and habitat data and ensure low-friction aggregation at the larger spatial scales. Collaboration between EMODnet Biology, EMODnet Seabed Habitats and OBIS ([Ocean Biodiversity Information System](#)) has facilitated richer dataset publication and ensured the greatest volume of high-quality species and habitat data are available for reporting, assessments and informed decision making.

Leveraging developments to include additional “measurements and facts” within the Darwin Core Archive standard for biodiversity data exchange meant that the EMODnet Seabed Habitats and Biology teams could develop guidance and current best practice to support other organisations and individuals wishing to publish habitat and species biodiversity data together. The recommended [approach](#) is now featured in the manual for the global OBIS and the next step is for it to be discussed, developed and implemented at the global level.

Read the full use case [here](#).



OBIS Mapper showing Marine Recorder JNCC Public Offshore Snapshot 2020_1. ©OBIS

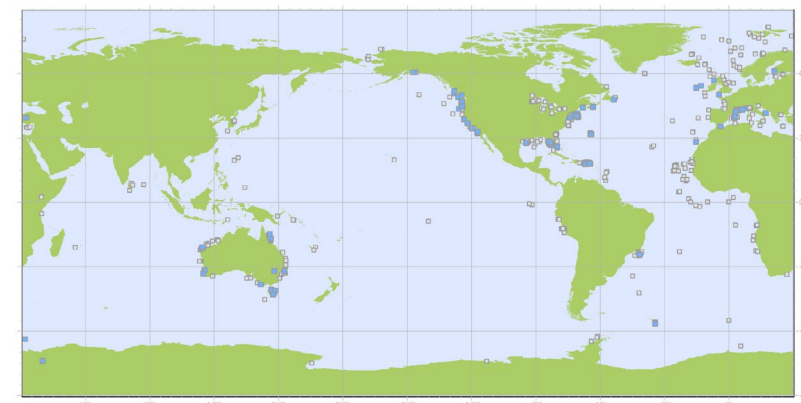


5. Support to the OceanGliders component of Global Ocean Observing System (GOOS)

The [OceanGliders program](#) brings together marine scientists from all over the world who use gliders to observe the long-term physical, biogeochemical, biological Ocean processes and phenomena that are relevant for societal applications. They are part of the [Global Ocean Observing System \(GOOS\)](#), and their goal is to assist in monitoring the global glider activity, develop and share the requirements, efforts and scientific knowledge needed for glider data collection and dissemination.

EMODnet Physics is a source of metadata for glider missions. It also provides a way to identify who is responsible for follow-up questions and for linking future missions as they happen. Thanks to EMODnet expertise, OceanGliders has made progress in identifying a more streamlined data flow from glider to operator to centralized portal, which then can be shown in EMODnet (if not uploaded directly). The EMODnet team has also assisted in the development of best practices for handling glider data and metadata for optimal accessibility and user-friendliness. One example is the development of the new NetCDF format OG1.0, which is one of the tasks of the OceanGlider Data Management Task Team.

Read the full use case [here](#).



OceanGliders

OceanGliders Deployments
Deployment locations of historical, yearly and monthly glider missions

December 2021



- Historical deployments of the OceanGliders program
- Deployments of the year
- Deployments of the month

Generated by ocean-ops.org, 2022-01-02
Projection: Plate Carree (150.0000)

Glider missions carried out globally in December 2021 (and prior). This map only includes missions for which operators have shared the mission metadata with OceanGliders.

Source: <https://www.ocean-ops.org/share/OceanGliders/Maps/>

EMODnet for Business

With its harmonised open data resources, the EMODnet Central Portal and its data services are central to the EU's efforts to support the sustainable blue growth based on marine knowledge. With the combined effort of over 120 partners, EMODnet concretely helps offshore and coastal businesses to reduce their costs and provides opportunities for small and medium-sized enterprises (SMEs) and consultancies to increase their range of products and services by providing easy access to existing marine data and by generating better information to plan and implement business activities.

THE BENEFITS

1 Save costs

Collecting marine data can be very costly. By providing access to already existing marine data, EMODnet improves offshore business' and operator's efficiency and saves costs in gathering and processing marine data for operational and planning purposes.

2 Develop new products and services

By providing harmonised open data and products, EMODnet offers the material from which innovative start-ups and companies can leverage new products and services, or improve existing ones.

3 Add value to your own data

Enrich your company's data with datasets available via EMODnet and generate better information to plan and implement your business activities.

4 Improve knowledge and reduce risks

EMODnet data resources are essential for your maritime investment decisions as they help to reduce uncertainty and improve our ability to forecast the behaviour of the sea. They also help you to understand and respond to the impacts that climate change may have on your business.

The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) 2021/1139 of the European Parliament and of the Council of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund and its predecessor, Regulation (EU) No. 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.



Benefits of using and sharing data with EMODnet. ©EMODnet

20-21 SEPT 2022

EMODNET Marine data for the offshore renewable energy sector in the Northeast Atlantic, North Sea and Baltic Sea

BY INVITATION ONLY #MarineData4OffshoreEnergy

20-21 OCTOBER 2022

EMODnet Marine data for the offshore renewable energy sector in the Mediterranean Sea and Black Sea

BY INVITATION ONLY #MarineData4OffshoreEnergy

In September and October of 2022, EMODnet and EC DG MARE co-organised two virtual workshops on the topic "Marine Data for the Offshore Renewable Energy (ORE) sector", focusing on different regional sea basins across European seas. The first workshop focused on the Northeast Atlantic, North Sea and Baltic Sea regions, and the second workshop focused on the Mediterranean Sea and Black Sea. EMODnet was well represented by thematic experts from Physics, Biology, Seabed Habitats, Bathymetry, Geology, Chemistry, Human Activities, Data Ingestion, the Central Portal and the EMODnet Secretariat. Combined, the two workshops brought together 145 offshore renewable energy experts with representatives from diverse sectors including research, industry, national authorities, policy makers and data service providers.

"The role of EMODnet in providing high quality marine data services to support the offshore renewable energy sector is critical. This event is crucial in showing this importance!"



– EC DG MARE

A key goal was for EMODnet to gather feedback from the various sea basins on which EMODnet data and data products are already being used by the offshore renewable energy sector, and to discuss emerging marine data needs and requirements in relation to the existing marine environmental and human activities data collection efforts of the offshore renewable energy sector, so that opportunities for data sharing could be identified and further discussed.

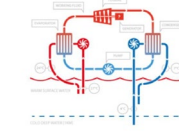
EMODnet for Business and the Blue Economy: Offshore Renewable Energy



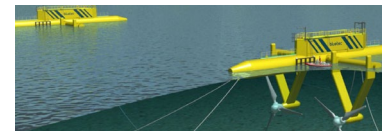
Offshore wind energy comes from the deployment of wind farms sited in bodies of water (fixed or floating platforms) *Image credit: © balipadma - stock.adobe.com full article on EMFF projects on offshore renewable energy* <https://webgate.ec.europa.eu/maritimforum/en/node/7330>



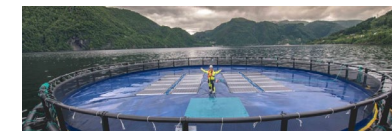
Wave energy captures kinetic energy from waves (surface or sub-surface). *Image credit: The European Marine Energy Centre Ltd* <https://www.emec.org.uk/about-us/wave-clients/corpower-ocean/>



Ocean Thermal Energy Conversion (OTEC) uses the difference between cooler (deep) and warmer (shallow) seawaters. *Image credit: Deltares* <https://www.deltares.nl/en/issues/sustainable-energy-water-subsoil/energy-from-temperature-differences/>



Tidal energy generates power by exploiting ocean tides and currents. *Image credit: BlueWater Energy Services* <http://www.bluewater.com/new-energy/bluetec/>

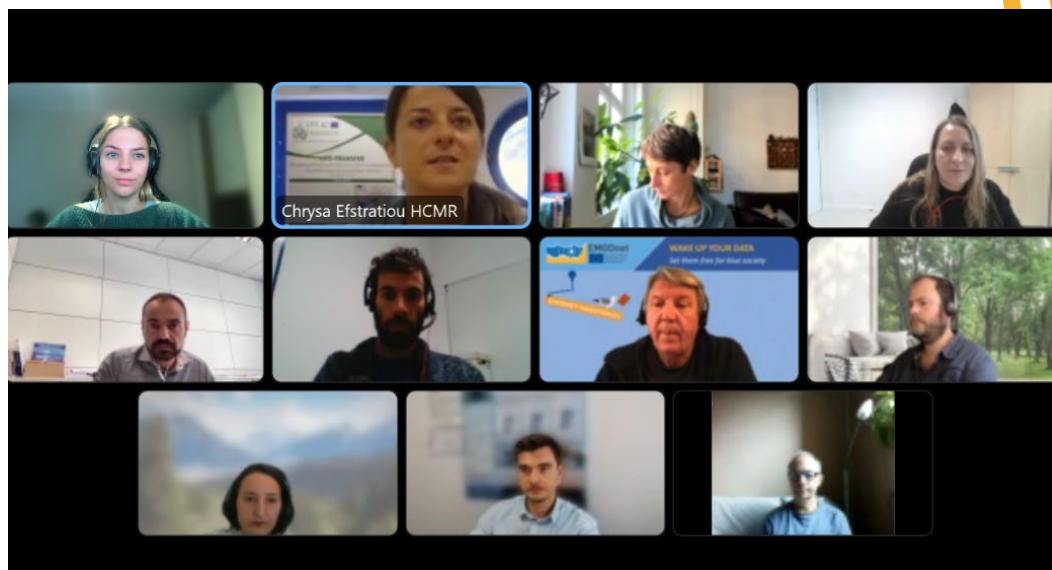


Floating solar *Image credit: Norwegian Solar Energy Cluster* <https://www.solenergi.klynngen.no/>

.....and more.....

Examples of key Offshore Renewable Energy platforms and types. ©EMODnet Secretariat

The workshop facilitated interactive and inter-sectoral dialogue, with breakout sessions and plenary discussions producing a number of interesting outcomes. Participants recognised the value of EMODnet's centralisation and noted this would facilitate the offshore renewable energy sector, which often requires multidisciplinary marine environmental and human activities data, including for Maritime Spatial Planning. Recommendations included how EMODnet could work closer with the ORE sector to address and overcome challenges and barriers to data sharing, including the opportunity for EMODnet to acknowledge data providers more visibly, and to promote the simplicity of sharing data with EMODnet Data Ingestion and the win-win benefits.



Breakout group discussion. ©EMODnet Secretariat

Representatives from various companies and institutions presented how EMODnet and other open source marine data have supported their work in the offshore renewable energy sector. Van Oord, Ørsted and Marine Power Systems all use EMODnet data for various purposes, such as micro-siting wind farms and finding optimal locations for combined floating wind and wave energy systems.

The Geological Survey Ireland (GSI) highlighted the use of EMODnet Geology data for offshore energy development and **Marine Spatial Planning in the Irish Sea**. Hellenic Centre for Marine Research (HCMR) explored a study on wave energy resources in the North Aegean Sea, demonstrating how open data can aid optimal wave energy farm siting. AZTI Tecnalia highlighted that they have developed VAPEM (Ecological Assessment and Marine Spatial Planning) tools to support ecological assessment and maritime spatial planning, all made possible by EMODnet data access.

BirdLife International and AZTI Tecnalia presented case studies on how the use of marine data can impact the offshore renewable energy sector, whilst the Renewable Grid Initiative (RGI) and GSI presented case studies on existing activities and reports focused on ORE sector data gaps and needs. BirdLife International's study identified data gaps for at-risk seabirds in the North and Baltic Seas. It was suggested that it would be an added benefit to produce sensitivity maps from these data, including a variety of methods so that all the available data can be used. Renewables Grid Initiative (RGI) presented a study which reviewed biodiversity data needs in the offshore renewable wind energy sector, using the Baltic Sea and North Sea as case studies. A key finding was that there is a lack of clarity on the best monitoring methods. AZTI presented a report on mapping the environmental impact of Offshore Energies. GSI's seabed data (that are shared with EMODnet Geology) has value for Offshore Renewable Energy placement and spatial planning, but data gaps exist. Recommendations to address the data gaps include acquiring high-resolution data and creating a shared stakeholder program between public and private sectors involved.



"EMODnet is one of the main (marine) data sources for European wind farms that we use in the early phases of development!"

– Ørsted



"All model tools that we produce would not be possible if we did not have access to the data and data products provided by EMODnet!"

– AZTI



"Having the ability to access long time data series with a high resolution was incredibly vital to the development of our multi-MW demonstration project site!"

– Marine Power Systems



"Using EMODnet could help with our initial analysis on the climate impact and social impact of our offshore renewable energy projects. It will be a very good opportunity for us to use EMODnet in the future."

– Wavepiston



"We rely on public/open source data to optimize the routing of cables and the positioning of the monopiles."

– Van Oord

Rediscover the EMODnet for business events!

- » More information on the programme, speakers, presentations and workshop report of the [first ORE workshop](#).
- » More information on the programme, speakers, presentations and workshop report of the [second ORE workshop](#).

See what EMODnet can do for your Business:

- » Explore EMODnet's wealth of marine data: <https://emodnet.ec.europa.eu/en>
- » Follow us on Twitter and take part in the conversation: @EMODnet / #EMODnetForBusiness
- » Share marine data with EMODnet: <https://www.emodnet-ingestion.eu>
- » Become an associated partner: <http://www.emodnet.eu/emodnet-associated-partners>
- » Share a use case: <http://www.emodnet.eu/use-cases>

EMODnet partnerships: Europe and beyond

EMODnet is itself a network of over 120 organisations. This involves a large “ecosystem,” of experts in *in situ* marine data collection, data management and service provision, spanning research institutes and associations, universities, hydrographic offices, national data centres, private companies and more.

In addition, EMODnet is actively connected to other key actors in the European marine and maritime landscape to achieve its goals and increase interoperability and advance data services across the EU marine data space. These include strategic partnerships at coordination and operational levels, spanning across the marine knowledge value chain from Ocean observation, marine monitoring and data collection to data services and intermediate and end users. The following section provides an overview and highlights from EMODnet’s partnership activities in Europe during 2022, with much more information available through the EMODnet Central Portal News and in the [monthly news digests](#) that are available on archive.



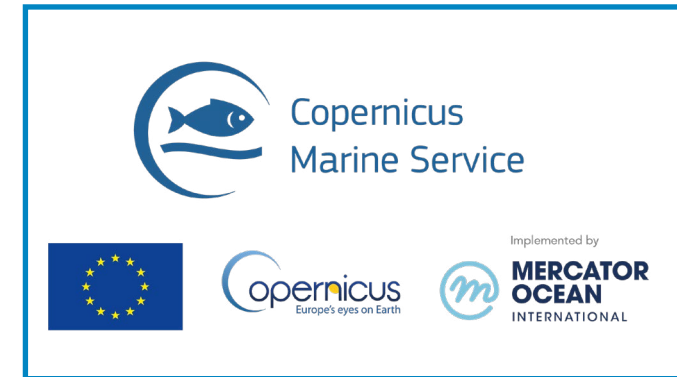
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Copernicus Marine Service

EMODnet and Copernicus Marine Service have a long-standing collaboration at coordination and operational levels for some time, as two key, long-term marine data initiatives of the European Union. Copernicus Marine is coordinated through EC DG DEFIS (formerly DG GROW) and its implementation is entrusted through Mercator Ocean International (MOI). EMODnet is funded through EC DG MARE with funding through the European Maritime Fisheries and Aquaculture Fund for the seven thematic, data ingestion, Central Portal and the Secretariat. As a focal point for *in situ* marine environmental and human activities data, EMODnet provides *in situ* marine data to Copernicus Marine Service which is used to validate satellite-derived data, models and as input to forecast modelling. In turn, some Copernicus Marine Service model outputs are used by EMODnet, e.g., bottom-water current model outputs to help define EMODnet Seabed Habitats. Read more about the Memoranda of Understandings and partnerships [here](#).

In 2022, key collaborations and joint activities between EMODnet and Copernicus Marine Service include:

- » An online **coordination meeting** on 18 March 2022 which brought together the Secretariats and Management teams of EMODnet and Copernicus Marine Service, and DG MARE, DG DEFIS and the European Climate, Infrastructure and Environment Executive Agency (CINEA);
- » A joint **webinar satellite event of the UN Ocean Decade Laboratory 6 'An Accessible Ocean'** on 11 May 2022, co-organised by EMODnet and Copernicus Marine Service in collaboration with the AANCHOR initiative, with support from the European Commission. During the webinar 'EU Marine Data Services for the All-Atlantic and Global Ocean Data Spaces: Services and benefits offered by EU Marine Data Services COPERNICUS Marine and EMODnet', EMODnet and Copernicus Marine Service and the wider community called upon all stakeholders to increase efforts to coordinate data collection; increase the sharing of data with national, regional and international data services; and build upon existing partnerships to expand the cross-regional dialogue to share best practices, know-how and work towards a global community of connected and interoperable regional marine data services, to serve the All-Atlantic and Global Ocean Data Spaces;
- » The **second joint thematic workshop on coastal issues** on 22 September 2022 (Brussels, Belgium), co-organised by the EMODnet Secretariat, the Copernicus Marine Service (administered by Mercator Ocean International), and Copernicus Marine Service INSTAC. The meeting built on the first joint workshop on coastal issues of 16 June 2020, and aimed to bring together EMODnet, Copernicus Marine, and inter-DG representation to discuss marine data and data products and information on Coastal behaviour. Objectives included assessing existing capabilities and emerging areas for collaboration across EMODnet themes and between EMODnet and Copernicus Marine, in particular with a regional focus, and defining concrete joint contributions to European (e.g. EU DTO, Green Deal) and global (UN Ocean Decade) initiatives/strategies. Download the meeting report [here](#).



Second workshop on coastal issues. ©EMODnet Secretariat

Close collaboration with Copernicus Marine Service has led to greater interoperability across services and cross-validation of satellite and *in situ* datasets, user-driven data products and complimentary developments to further add value to the user-experience. This continued partnership with Copernicus is also, in many cases, in collaboration with other key European initiatives including research infrastructures (e.g., EuroARGO, European Multidisciplinary Seafloor and water column Observatory (EMSO), European Marine Biological Resource Centre (EMBRC), Eurofleets, Integrated Carbon Observation System (ICOS), JERICO, LifeWatch, International Centre for Advanced Studies on River-Sea Systems (DANUBIUS)), Ocean observing networks (e.g., the European Global Ocean Observing System (EuroGOOS)), data infrastructures (e.g. SeaDataNet and SeaDataCloud), and wider organisations, networks and initiatives (e.g., European Marine Board, European Environment Agency), Regional Sea Conventions and EC services (e.g., Joint Research Centre).

In addition, EMODnet continues to actively engage in European funded international and basin-scale research projects (e.g., Horizon 2020 iAtlantic, Mission Atlantic, AtlantECO, TRI-ATLAS, ODYSSEA, INTEGRATED Digital Framework FOR Comprehensive MARITIME DATA AND INFORMATION SERVICES (ILIAD), EuroSea, Blue-Cloud and more), and actively contribute to basin-scale programs (AtlantOS) and partnerships with EU and other regional marine data repositories and services (e.g., Copernicus Marine Service, PANGAEA), international data initiatives (e.g., International Council for the Exploration of the Sea (ICES), Ocean Biodiversity Information System (OBIS), Seabed 2030) and more to maximize the EMODnet offer. Such collaborations have been – and continue to be – crucial to move towards full interoperability and complementarity to the continued success, and evolution, of EMODnet.

EMODnet also engages with stakeholders across the marine knowledge chain, including the Ocean observation, monitoring and wider data collection communities. Building on a dedicated community EC workshop in 2021 on 'Ocean Observation – Sharing Responsibility', EMODnet has continued the community dialogue via its roles in the European Ocean Observing System (EOOS) Steering Group, Operations Committee, Advisory Committee and Resource Forum. Through these fora, EMODnet actively contributes together with EuroGOOS, European Marine Board (EMB), Copernicus Marine Service, JPI Oceans, Marine Research Infrastructures, Global Ocean Observing System (GOOS) focal points and more to collectively identify ways to optimise the coordination of Ocean observation and marine data from National to regional and European levels, to discuss the latest methodologies for assessing marine data adequacy, gaps and requirements e.g., EMODnet Sea-basin Checkpoints and to seek areas for innovation e.g., in the areas of Ocean observation technology, smart sensors and data transfer at events including the EOOS Technology Forum 2022.



EOOS Technology Forum 2022. ©EMODnet Secretariat

EMODnet global partnerships

2022 key highlights

EMODnet has an ever-expanding global outlook. As a key contributor to the global Ocean data ecosystem, it has an increasing number of datasets and products from all thematics available through the EMODnet services covering seas and the Ocean beyond European waters. In a dedicated effort since 2022, all EMODnet thematic assembly groups are systematically extending their geographic coverage and resolution of integrated marine environmental and human activities data and data products to neighbouring countries around the Caspian Sea and to the Caribbean Sea. The international user base is also growing from Africa to China, together with increasing interest from international Blue Economy industries.

At the overarching level, EMODnet collaborates with other European and international data initiatives including the Copernicus Programme, in particular the Marine Environment Monitoring Service (Mercator Ocean International), the International Council for the Exploration of the Sea (ICES), the Global Earth Observation System of Systems (GEOSS), the International Oceanographic Data and Information Exchange (IODE) of the Intergovernmental Oceanographic Commission (IOC), and the National Marine Data and Information Service (China) through EMOD-PACE (EMODnet PARTnership for China and Europe). Since 2022, all EMODnet thematic portals and the EMODnet Central Portal are registered on the [IODE Ocean Data and Information System \(ODIS\) catalogue](#). Additional records will be added from the [EU-China EMOD-PACE marine data project](#).

At the thematic level, we also have seen an increase in global partnerships and collaborations. For example, EMODnet Physics has further strengthened its collaboration with the Southern Ocean Observing System (SOOS) community, providing a tailored SOOSmap interface for the Southern Ocean Observing community to assemble and integrate their data in one place. EMODnet Physics is a partner of the Polar Data Forum data group that is very active on Arctic Data. EMODnet Physics were renewed as an external member of the Deep Ocean Observing Strategy (DOOS), an officially endorsed UN Ocean Decade Programme. They are also member of the Advisory Board of the "Implementing a Deep Ocean Observing Strategy" (iDOOS), which is a U.S.A. project to support DOOS, to work and facilitate international cooperation.

EMODnet Bathymetry provides a large European contribution to the international Seabed2030 initiative, having signed a MoU in 2019 to further strengthen collaboration. EMODnet is the third largest contributor of bathymetry to Seabed 2030, worldwide, and EMODnet is also within the top three data contributors to the GEBCO data grid. And EMODnet Biology has been a key contributor to the global Ocean Biodiversity Information System (OBIS) for a very long time. In 2022, the thematic published 3,582,253 species occurrence records from 69 datasets, representing about 28% of the number of new records that were added in OBIS in 2022.



UN Decade of Ocean Science for Sustainable Development – the Ocean Decade

As a flagship long-term marine data service in Europe, EMODnet is a key contributor to the United Nations Decade of Ocean Science for Sustainable Development's vision and mission by delivering a truly transparent and accessible Ocean whereby all nations, stakeholders and citizens have:

- » Simplified access to Ocean data, information and knowledge, through user-driven interfaces and online data discovery and access services based on machine-to-machine communication;
- » Trust in the provenance of the data (through standardized, rich metadata) to increase the uptake and use; and
- » The capacity and knowledge to use marine data services and web-based collaborative spaces/digital ecosystems where marine data can be utilized for solution-oriented applications and informed decisions.

The engagement and commitment of EMODnet to the Ocean Decade was further enhanced in 2022 with several concrete contributions:

- » Throughout 2022, the EMODnet Secretariat's Head acted as Co-Chair of the UN Ocean Decade Data Coordination Group contributing EMODnet recommendations and principles for supporting the Data Vision under the UN Ocean Decade and developing the Decade's Data and Information Strategy;
- » EMODnet thematic coordinators & Secretariat technical team contributed to the IODE Intersessional Working Group Strategy on Ocean Data and Information Stewardship (IWG-SODIS);
- » Contributions and representation at multiple UN Ocean Decade Actions including DITTO on Digital Twins of the Ocean (Steering member); CoastPredict (Advisor role); Ocean Best Practices (EMODnet referenced); JERICO-CORE (Steering member);
- » EMODnet also contributed to a range of demonstrations and training in Ocean data and information stewardship, including the organisation of:
 - » Two satellite events for the UN OD Laboratory on "A transparent and accessible Ocean" (May 2022): EU marine data services, All Atlantic Workshop and Expanding Data Interoperability between Europe and Asia.
 - » A side event at the UN Ocean Conference 2022 on 29 June 2022 (Lisbon, Portugal), on Marine Data Interoperability, co-organised by EMODnet, Copernicus Marine Service, IOC-UNESCO, Fugro, IODE/IOC, VLIZ and the Intertidal Agency, in collaboration with the EC and the UN Ocean Decade Data Coordination Group for which EMODnet is a co-chair. The programme, introduction presentation and summary of key messages from the workshop are available on the EMODnet Central Portal;

- » Active support to IOC-IODE's Ocean Decade activities by contributing as a European focal point and technical advisor for the IOC Ocean InfoHub project and supports ODIS developments at strategic and implementation level; participation in Third Session of the IODE Steering Group for the Ocean InfoHub Project and ODIS Steering Committee (Ostend, August 2022);
- » Application for EMODnet to become a Decade Implementing Partner (DIP);
- » The creation of an internal "EMODnet for Ocean Decade Coordination and Implementation Group" (E4D-CIG) in 2022 to coordinate, consolidate and enhance contributions from the EMODnet partnership to the Decade.

Indeed, central to the coordination and strengthening of the EMOD-network's contributions to the Ocean Decade is the informal working group 'EMODnet for the Ocean Decade Coordination and Implementation Group' (E4D-CIG). The E4D-CIG is an inclusive group, open to all partner organisations (contractual and associated) of EMODnet, created to keep oversight of ongoing and planned activities of the network in light of the UN Ocean Decade so as to align the work plans with the Data and Information Strategy of the Ocean Decade, amongst other activities.



Third session of the IODE Steering Group for the Ocean InfoHub Project. ©IODE Steering Group

EMOD-PACE

After 34 months of intense collaboration, the EU-China collaborative Ocean data pilot projects **EMOD-PACE** (EMODnet Partnership for China and Europe) and **CEMDnet** (China-EU Marine Data Network Partnership) came to their end on 31 December 2022. The projects successfully connected EMODnet with the Chinese National Marine Data and Information Service (NMDIS) to provide interoperable access to shared data resources and generate new products and insights through various technical and scientific assessments, among others in relation to Ocean circulation modelling, ecosystem resilience, habitat mapping and coastal adaptation.

Among the many achievements, the collaborative effort succeeded in deploying technical data interoperability solutions between the European and Chinese data hubs, and in providing discovery, access, visualization and download services to an ever-growing range and volume of open European and Chinese data resources. To achieve data brokering for the multitude of data and products made interoperable and accessible, GeoDAB and ERDDAP were used to facilitate easy access to the resources.

Other great achievements were the extensive assessment of different approaches for validation and modelling, and the development of over 100 informative data products available as **map layers in the EMODnet Map Viewer**. Experts from Europe and China performed an extensive assessment of different approaches for validation and modelling, such as evaluating the strengths and weakness of applying the European Nature Information System (EUNIS) and Environmental Carrying Capacity (ECC) methods in several sea regions. In addition, inter-comparison analysis yielded interesting results, which can only be of benefit to the scientific and engineering research communities. Finally, several important data products on coastal adaptation were co-developed; products available for display and retrieval include sea-level layers for the maritime route between Europe and China, also known as the European Chinese Sea Route (ECSR), and several others on Ocean reanalysis, seabed habitat mapping, ecological vulnerability and coastal zone adaptability, together with reports on the methodologies applied.

The EMOD-PACE – CEMDnet partnership was showcased at several events throughout 2022:

- » On 11 May 2022 the partnership was presented in a **webinar satellite event** of the UN Ocean Decade Laboratory 6 'An Accessible Ocean'. The webinar, titled 'Expanding Data Interoperability between Europe and Asia', was co-organised by the EMODnet Secretariat, NMDIS and VLIZ. It aimed to inform interested marine knowledge providers, users and stakeholders about the EMOD-PACE project and its sister project CEMDnet. Discussions focused on the developments in the Asia region, as well as the potential to expand the EMOD-PACE – CEMDnet Partnership with a view to the promotion of interoperable open data and information access. The discussions also explored options to co-develop relevant data products based on open data resources.
- » On 22 and 23 November 2022, colleagues from both projects gathered together with representatives from the European Commission DG MARE and the Chinese Ministry of Natural Resources (MNR) for an **open final workshop and meeting** to celebrate the achievements of the very productive collaboration and showcase and promote the impressive results to other interested experts, users and stakeholders.

To learn more about the EMOD-PACE and CEMDnet projects, watch the final project video on the EMODnet [YouTube channel](#).

The collaboration and interconnected services provided by EMODnet and NMDIS will be maintained and this has - to large extent - been made possible by the dedicated cooperation efforts during the course of the projects, which were solidified through the signing of a Memorandum of Understanding between EMODnet and NMDIS in 2021. EMODnet looks forward to expanding the connection to other regional data services to promote international Ocean data exchange and interoperability in 2023.



EMOD-PACE final project video. ©EMOD-PACE partnership



Mr. XIANG Wenxi, Deputy DG of NMDIS and Mr. Jan-Bart CALEWAERT, Head of the EMODnet Secretariat signing the MoU. ©EMODnet Secretariat

European Atlas of the Seas

The European Atlas of the Seas is a user-friendly interactive web-map viewer aimed at the general public, non-expert professionals and schools. First launched in 2010 by the European Commission, Directorate-General for Maritime Affairs and Fisheries (EC DG MARE), it presents marine data in a comprehensive and visual way, making it a great tool for Ocean Literacy, formal and non-formal education, marine policy and the Blue Economy.

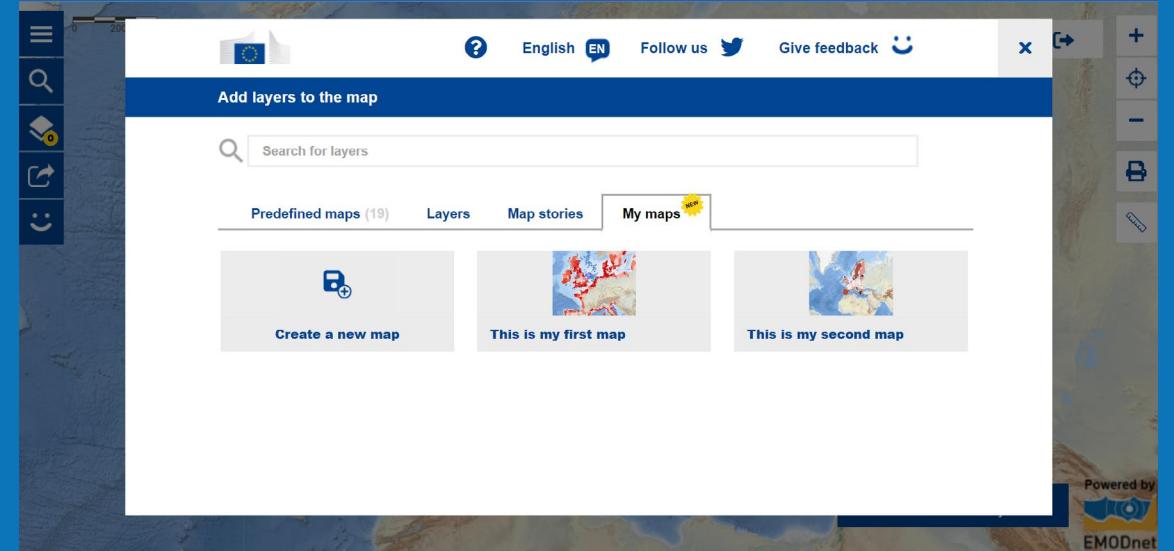
Thanks to its constantly evolving catalogue of more than 275 map layers, the Atlas hosts a wealth of information about Europe's marine environment and related human activities, covering topics such as nature, tourism, security, energy, transport, sea bottom, sea level rise, fisheries, aquaculture, and much more. This information is provided by a wide range of authoritative marine data sources including the European Commission and its agencies, EMODnet, Copernicus (Marine and Land Services), Eurostat, the European Environment Agency (EEA), the Joint Research Centre (JRC), etc. Map layers are regularly updated with new data and new map layers are added.

The Atlas provides a number of functionalities that enables users to find information and make direct use of map layers for teaching and use in media, for example. This also helps all users gain a better understanding of natural and socio-economic features in the marine and coastal regions of Europe. These functionalities include searching for map layers, adapting the order of the map layers and the transparency of map layers for better readability of the maps, clicking on the map to find more information, zooming in on particular areas, sharing maps on social media, embedding maps on websites, and printing maps, finding the geographical coordinates of any location, or a location from its geographical coordinates and calculating distances between two locations as well as the surface area of polygons using the measure tool. The latest development is the addition of the 'My Maps' feature, currently in its pilot phase. With this new functionality, it is possible for users to have their own working space in the Atlas where they can save their preferred selection of map layers and customise them with a title, description and picture. This also lays the groundwork for more advanced customisation of the maps, like adding locations and tags to maps, in future developments. A survey was launched to collect feedback from teachers during the pilot phase of the 'My Maps' feature, so that it can be further improved to meet their needs. Thanks to the integrated interactive help tool available in 24 languages, users can gain a rapid understanding of how the Atlas works and have an overview of all of the available features and ways they can use the Atlas. In addition, teachers can access the Teachers Corner from the Atlas menu and thereby access ready-to-use map-based exercises in English, French, and Portuguese for students of different age groups, as well as fun activities such as a Treasure Hunt and Virtual Boat Races.

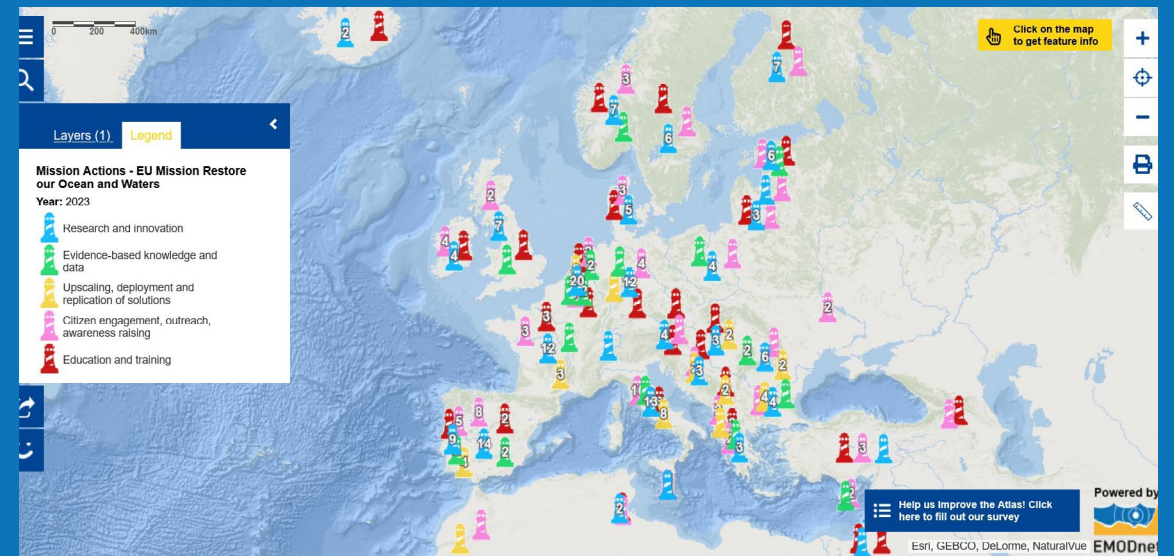
european-atlas-of-the-seas.eu

Teachers Corner: <http://Learn.european-atlas-of-the-seas.eu>

@EuropeAtlasSeas



Example of the new 'My Maps' functionality interface (currently in the pilot phase). ©European Atlas of the Seas



Example of a new map added in the Atlas in 2022 - Map of the Mission actions submitted by stakeholders across Europe to achieve the three objectives of the European Union Mission "Restore our Ocean and Waters by 2030". ©European Atlas of the Seas

Key achievements/facts in 2022

275
map layers



Published **50** maps of the week
and **12** maps of the month



Over 2,600
Twitter followers by the end of 2022



83,000
visits in 2022



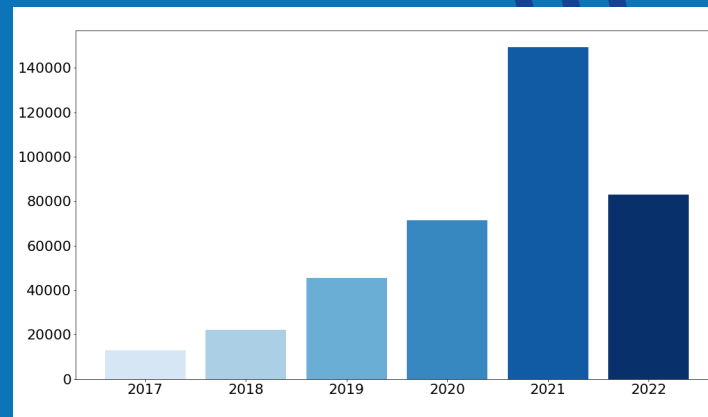
» The Atlas catalogue content underpins its use for education. In December 2022, the Atlas catalogue contained 276 map layers. In 2022, a total of 6 map layers were added, including the map layer 'European Maritime Day in My Country Events 2022', four map layers on 'Dissolved inorganic nitrogen concentration' and the map layer 'Mission Actions – EU Mission Restore our Ocean and Waters'. Furthermore, all map layers were reviewed to determine if updates were available and 69 map layers were updated with the latest data from across the EMODnet thematic portals as well as EUROSTAT, JRC, DG MARE and EU4Ocean communities.

» Exciting partnerships with the Directorate-General for Maritime Policy (DGPM) in Portugal, driving the project Escola Azul as well as the aquarium Nausicaá in France and collaborations with the EU4Ocean Coalition for Ocean Literacy and other education initiatives were pursued in 2022 to promote the value of the Atlas as an education tool, nurturing a more Ocean literate society. In addition, through a collaboration with the Education for Climate Coalition, an important step forward took place in 2022 that allowed for schools to not only be users of the Atlas but also to become data providers through the challenge titled "Be a scientist! Mapping climate change at seas & waterways". Schools across Europe were invited to measure surface water temperature in the sea, rivers, lakes or ponds and to submit their data online to contribute to a new map in the European Atlas of the Seas. The data collection process ended on 31 March 2023. This map will be produced in the coming months. It will be the first citizen science map in the Atlas.

» Promotion efforts have increasingly strengthened the visibility of the Atlas. These include the participation in four in-person and five online conferences and events (please refer to the list below), online publication of the Map of the Week every Friday on the Maritime Forum and regular activity on the Atlas Twitter account.

» The Teachers' Corner was updated with ten new educational resources including new map-based exercises in English and in French on fisheries, beach litter, algae and Posidonia oceanica, two virtual boat races and workshop presentations.

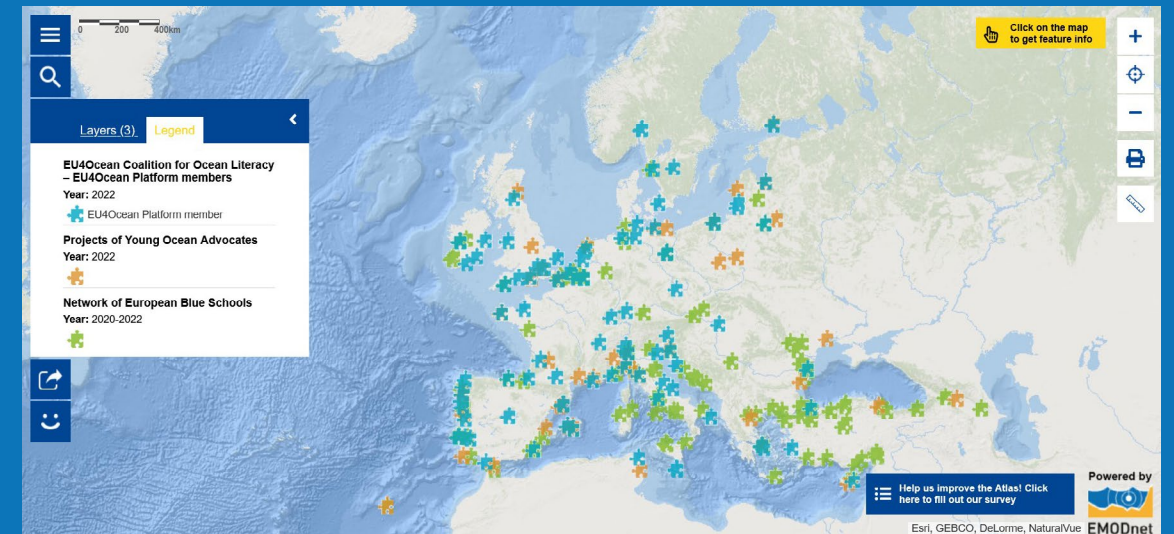
» These new developments accompanied by structured promotion and outreach activities have led to a total of approximately 83,000 visits in 2022, further exposing EMODnet data and products to a growing audience across Europe and the World.



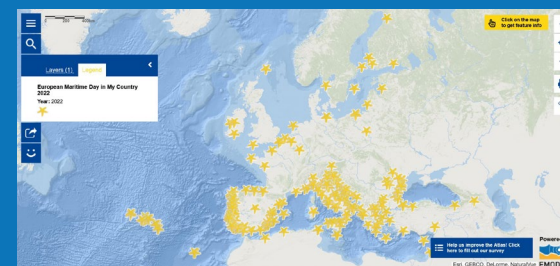
European Atlas of the Seas - Substantial increase in yearly visits in the past five years (©Europa Analytics)

The European Atlas of the Seas was promoted at several events in 2022, including:

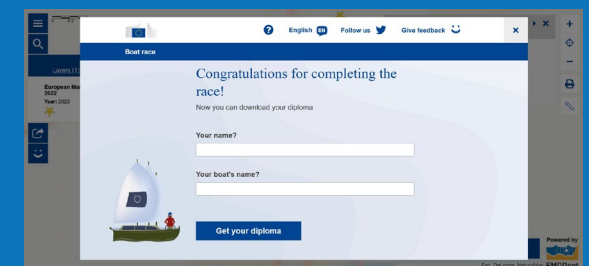
- » Let's listen to the Arctic Ocean - A Festival for Ocean Literacy, 4-8 April 2022, online event
- » Education for Climate Policy and Practice Forum, 5 May 2022, online event
- » EU4Ocean Summit, 19-22 May 2022, Ravenna, Italy
- » Education for Climate challenge 'Be a Scientist! Mapping Climate Change at Seas & Coast', 10 June 2022, online workshop
- » Education for Climate challenge 'Be a Scientist! Mapping Climate Change at Seas & Coast', 21 June 2022, online workshop
- » Education for Climate challenge 'Be a Scientist! Mapping Climate Change at Seas & Coast', 7 September 2022, online workshop
- » European Marine Science Educators Association (EMSEA) Conference, 25-28 September 2022, Palma de Mallorca, Spain
- » 4th Scientix International Conference, 18 November 2022, online conference
- » CommOcean 2022, 30 November - 1 December 2022, Sète, France



Updated 2022 map showing the EU4Ocean Platform members, the Young Ocean Advocates projects and the Network of European Blue Schools. ©European Atlas of the Seas



Example of a new map added in the Atlas in 2022 – European Maritime Day in My Country 2022. Two virtual boat races are proposed in this map using instructions published in the Atlas' Teachers Corner. ©European Atlas of the Seas



When passing the finish line in the virtual boat races proposed in the European Maritime Day in My Country 2022 map layer, players can download their diploma. ©European Atlas of the Seas

Budget

The figures below represent the budget committed in thousands of Euro.

Theme & Project	Preparatory Actions ¹	Maritime Policy Fund ²	European Maritime and Fisheries Fund ³							European Maritime, Fisheries and Aquaculture Fund ⁴		Grand Total (k€)	
	2008-2010 (k€)	2011-2013 (k€)	2014 (k€)	2015 (k€)	2016 (k€)	2017 (k€)	2018 (k€)	2019 (k€)	2020 (k€)	2021 (k€)	2022 (k€)		
Central services		520		4,565		155	1,420	1,000	1,420	138	2,665		11,883
Data Ingestion				4,045			1,000				1,340		6,385
Secretariat		520		520			1,420		1,420	138	1,325		5,343
Secretariat Support						155							155
Sea-basin Checkpoints		1,695	4,175										5,870
Arctic			906										906
Atlantic			1,590										1,590
Baltic Sea			784										784
Black Sea			895										895
Mediterranean		1,095											1,095
North Sea		600											600
Observation				4,000									4,000
Argo				4,000									4,000
Studies	230	450			52	250						300	1,282
Costs and benefits		450											450
Current status	230												230
Evaluation							250						250
Observationbenefits						52							52
Ocean data and knowledge for EU policy making												300	300
Thematic Groups	6,350	16,350	1,194	4,917	13,483	7,098	4,671	5,737	7,074	4,237	6,810		77,921
Bathymetry	2,175	2,000		4,917				3,720		2,800		2,800	18,412
Biology	750	1,700					1,770	1,770		1,500		2,000	9,490
Chemistry	700	4,000					2,805		1,399		2,234		11,138
Coastal mapping			1,194										1,194
Geology	925	4,200					4,500		1,770		2,420	2,420	16,235
Human Activities		2,060					1,608	1,608		1,437	1,437		8,150
Physics	1,000	1,000					1,400		950		1,050	1,020	6,420
Seabed Habitats	800	1,390					1,400		552		1,370	1,370	6,882
Grand Total (K€)	6,580	19,015	5,369	13,482		13,690	8,768	5,671	7,157	7,212	6,902	7,110	100,956

1 As defined in article 54 of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union

2 Regulation (EU) No 1255/2011 of the European Parliament and of the Council of 30 November 2011 establishing a Programme to support the further development of an Integrated Maritime Policy

3 Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund

4 Regulation (EU) 2021/1139 of the European Parliament and of the Council of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund

EMODnet at 2022 and a vision for the future

One Ocean, One EMODnet in practice

In 2023, the integration of the EMODnet ingestion facility into the Central Portal will complete the centralisation process and further **consolidate EMODnet as the EU operational service for open and FAIR access to in situ observations, data and products**, and as the key contributor to the marine data space in Europe and beyond. By providing a single-entry point to all EMODnet data resources, the new portal offers services more suited to today's data driven world and supports next generation Ocean data and information management. The centralisation entails a major upgrade in the interoperability of EMODnet marine data, and will facilitate EMODnet's role as a cornerstone to the **backbone infrastructure for the European Digital Twin of the Ocean**. In this regard, EMODnet and Copernicus Marine technical experts will be working closely together in 2023 to advance the EU Public Infrastructure for the European Digital Twin Ocean via the EDITO-Infra project and support other related initiatives and projects such as the EU-Horizon projects [Iliad](#) and [DTO-Bioflow](#) to name just a few.

The Central Portal will not only provide access to all thematic data services, but will also continue to be animated with relevant news, blogs, use cases, communication material from all EMODnet projects and activities and much more. The information, resources and services of the [EMODnet Data Ingestion](#) facility will also be integrated in the EMODnet Central Portal in 2023, and its current website will be discontinued.

In 2023, we will dedicate significant attention to **promoting and exposing the unified portal and all its new features** to a wide range of potential users, providing training and onboarding to enlarge the userbase and ensure the services are used to their full potential.

A new phase and shared vision for EMODnet

The launch of the unified EMODnet portal fully integrated into the Europa.eu domain marks a new phase for EMODnet. It is therefore timely to reflect on the longer-term future of EMODnet with a view to revisit and consolidate the strategy and vision objectives for the coming decade. To this end, in 2023, the EC DG MARE, CINEA and the Secretariat will facilitate dialogues with the network and with the wider marine knowledge community to collect input and work towards a shared vision and strategy for EMODnet to 2030 and beyond.

The results of this process will be presented at the third EMODnet Open Conference and Jamboree taking place from 27 November to 1 December 2023 in Brussels (Belgium). The Conference and Jamboree will provide an excellent opportunity to reflect on the progress and achievements of the EMODnet family, further strengthen the partnership ties and co-design the next phase based on a shared vision for EMODnet 2030. It will also offer a moment for EMODnet to present its future activities to strengthen marine business, research, education and policy, and to listen to the user community on the value of EMODnet data, data products and services and how to further optimize the user experience.

Before that, EMODnet will take part and contribute to **key external events** including the [International Ocean Data Conference 2023](#), [European Maritime Day 2023](#) and many more.

In 2023, the EMODnet Secretariat will also continue to provide support to EC DG MARE's activities related to Ocean observation, and in particular the [EC Ocean Observation – Sharing Responsibility initiative](#) launched in 2020, to explore the options, viability and effectiveness of using the instruments at the disposal of the European Commission to strengthen coordination at national level across marine and coastal data collection efforts.

Exciting developments are planned in 2023 to further improve and promote the **European Atlas of the Seas**. For one, the 'My Maps' tool will be further developed to provide more advanced options to allow users to customize the Atlas to their own use case and make it their own Atlas. The Atlas team will also shift more efforts towards updating and consolidating the existing map layers and look at ways to optimise and automate the process of updating maps. Considerable attention will be dedicated to grow the Atlas audiences, combining online communication, social media activity, promotion of the Atlas at events and cooperation with other actors, e.g. via the co-development of educational material for the Teachers Corner.

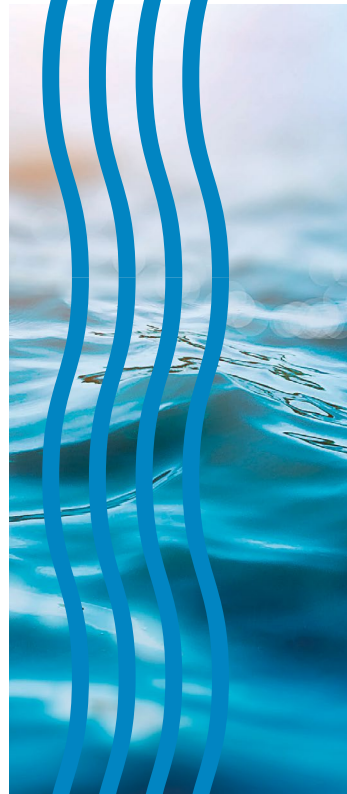
Extending EMODnet's European and global partnerships

In 2023 we aim to strengthen the dialogue and collaboration with **National Oceanographic Data Centres and other national marine data organisations and experts**, and to continue to engage with **Marine Research Infrastructures** to optimise the connection with EMODnet. We also plan to strengthen the ties with the **Regional Sea Conventions (RSCs)** and **MSFD actors** (EEA, JRC, ...) with a joint workshop later in 2023. In a similar way, communication with the **European Environment Agency (EEA)** and the newly formed European Topic Centres e.g., for Biodiversity and Ecosystems will be more proactive, to assess data flows and increase the connection and use of EMODnet data/data products for Member States environmental assessments.

In relation to the **Coastal – land-sea interface**, we will continue contributing to the JPI Oceans **Knowledge Hub on Sea Level Rise**, highlighting the wealth of existing EMODnet data and data products useful for Sea Level Rise (SLR) assessments and to increase the submission of related data to EMODnet, increasing the offer (resolution, geographical coverage, parameters) of data and data products related to SLR. This will also entail further discussions complementarity and **joint efforts between EMODnet and Copernicus Marine Service** to develop relevant services to address coastal issues, in addition to the ongoing collaborations related to marine data infrastructures to underpin the future EU Digital Twin Ocean. Our work to support the **Maritime Spatial Planning (MSP)** communities in Europe will also continue, including by providing technical advice for the harmonisation of MSP data and facilities to share and host digital MSP plans via the efforts of EMODnet Human Activities.

At the **global level**, EMODnet will continue, and where possible increase, its contributions to **international developments and initiatives**, among others in support of the **UN Decade of Ocean Science for Sustainable Development** and the **IODE programme of IOC-UNESCO**. Central to the coordination and strengthening of the network's contributions to the Ocean Decade as a Decade Implementing Partner, an informal working group '**EMODnet for the Ocean Decade Coordination and Implementation Group**' (E4D-CIG) will pick-up its activities in 2023, mapping ongoing and planned activities of the network and aligning the work plans with the Data and Information Strategy of the Ocean Decade, amongst other activities.

And while the EU-China pilot projects EMOD-PACE and CEMDnet have ended, the excellent collaboration **between EMODnet and the Chinese National Marine Data and Information Service** will be maintained and even strengthened as agreed via a Memorandum of Understanding. All of the outputs produced by the projects, including hundreds of data layers, will remain available via the EMODnet Central Portal. We look forward to expanding the connection to other regional data services to promote international ocean data exchange and interoperability in 2023 and beyond.



EMODnet Team

EU MARE
Policy Officer



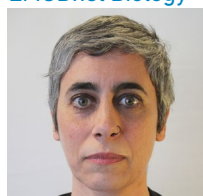
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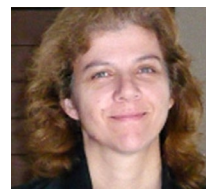
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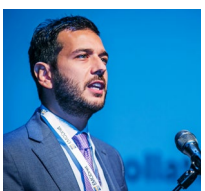
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Seabed Habitats



Helen Lillis

Coordinators of the EMODnet Partnership in 2022.

EMODnet Publications

A list of peer reviewed and non-peer reviewed publications, (co-)authored by the EMODnet thematic lots and Data Ingestion, can be consulted at emodnet.ec.europa.eu/en/reports/publications-list-2022.

For a more comprehensive overview of publications referring to/making use of EMODnet data and/or data products, please consult online reference services e.g., Google Scholar, Web of Science.

The screenshot shows the EMODnet website interface. At the top, there is a search bar and a navigation menu. The main content area is titled "Publications List 2022" and provides an overview of publications published in 2022. Below this, there are sections for "Publications" and "EMODnet Biology".

Publications

EMODnet Bathymetry

(Co-)Authored peer-reviewed publications					
Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No

EMODnet Biology

(Co-)Authored peer-reviewed publications					
Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
20/01/2022	Paper	Beauchard O, Mestdagh S, Koop L, Ysebaert T, Herman PMJ	Online ISSN: 1616-1599	https://doi.org/10.3354/meps13928	No



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