EMODnet

European Marine
Observation and
Data Network

EMODnet

ANNUAL
REPORT 2023

Contents

About **EMODnet**

The European Marine Observation and Data Network (EMODnet) is a European Commission marine data service of the EC Directorate-General Maritime Affairs and Fisheries (EC DG MARE) and funded by the European Maritime Fisheries and Aquaculture Fund. Established in 2009, EMODnet plays a pivotal role as a trusted source of in situ marine environmental and human activities data and data products, serving a diverse user base across various sectors.

The EMODnet Portal (emodnet.ec.europa.eu) is a single access point to all EMODnet services, providing easy and free access to a wealth of marine data, metadata, and data products. Covering seven disciplinary themes – bathymetry, geology, physics, chemistry, biology, seabed habitats and human activities – EMODnet spans the entire marine environment from coast to open ocean, surface to deep seafloor, whilst also offering data and information on the Blue Economy operations, from vessel density and offshore platform sitings, to hosting EU Member State Maritime Spatial Plans.

In collaboration with over 120 partner organisations and stakeholders, EMODnet aggregates data into Findable, Accessible, Interoperable, and Reusable (FAIR) pan-European data layers, with data and accompanying metadata harmonized according to EU e.g., INSPIRE and International e.g., ISO standards. In addition, EMODnet experts produce unique data products such as EUSeaMap, a broad-scale seabed habitat map, the EU Digital Terrain Model for harmonized bathymetry, and the pan-European Marine Litter Database.

EMODnet caters to a broad user community, including the private sector and Blue Economy, national authorities and administrators, research and academia, non-governmental organisations, and citizen science initiatives. This dynamic network of experts continuously evolves EMODnet into the operational EU marine data service it is today.

EMODnet aims to enhance its societal relevance. This involves integrating data from citizen science initiatives, expanding data accessibility through platforms like the European Atlas of the Seas, and promoting ocean literacy and sustainable practices across Europe and beyond. The future vision of EMODnet is not just to serve as a data repository but as a catalyst for positive change in marine understanding, conservation, and innovation.

EMODnet has broadened its horizons to embrace a global perspective through collaborations with countries such as China and as a European regional contributor in the context of global ocean data initiatives such as the Ocean Data and Information System (ODIS) of IODE IOC/UNESCO, fostering international partnerships to advance marine data interoperability and open marine knowledge, for all.

THE EUROPEAN MARINE OBSERVATION AND DATA NETWORK - AT A GLANCE

EMODnet
European Marine Observation and Data Network

In 2023, EMODnet is an EC *in situ* marine data service of DG MARE, with over **120 organisations** assembling and making available FAIR* pan-European **marine data and data products.**

7 Thematic areas

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

1 EMODnet Portal - emodnet.ec.europa.eu
Gateway to all EMODnet data resources and tools allowing users to retrieve data layers from multiple themes

1 Ingestion Portal
facilitating submission of new datasets

EMODnet Secretariat

EMODnet Timeline

Phase I — 2009
- Limited sea basins
- 59 institutes

Phase II — 2013
- Low resolution all basins
- 120 institutes

Phase III — 2017
- Multi-resolution
- Over 150 institutes

Beyond 2020 — 2020
- Further increase volume, coverage & resolution of data resources
- All data & products made available directly via EMODnet Portal emodnet.ec.europa.eu
- Expand the network of data providers, users and associated partners
- EMODnet and Copernicus Marine Service for the EU marine data space and the European Digital Twin Ocean

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 produces pan-European integrated data layers and data products, as an open and free public service.

EMODnet is making a difference

From raw data to real-life applications

Marine Observations → Data → Information → Knowledge → Application
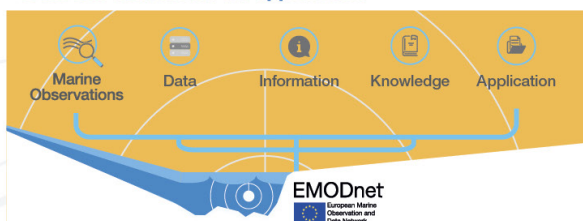
Who is EMODnet for?

Professionals from: Public Administration — Private Sector — Society — Research/Academia

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 ensures your data are harmonised and standardised into Findable, Accessible, Interoperable and Reusable (FAIR)* data and metadata, so data can be combined with other data to generate better value-added products and information to support diverse users, contributing to the global ocean data ecosystem

Introduction from the Head of the EMODnet Secretariat

One Ocean, One EMODnet

In Spring 2023 I took on the role of Head of EMODnet Secretariat, following many years of service by Jan-Bart Calewaert who remains a trusted advisor to EMODnet in his new role in the global ocean data domain. It is therefore my pleasure to recount the many achievements of EMODnet in the calendar year 2023. What a year 2023 was for EMODnet! In January 2023, **EMODnet launched its unified service**, with a single Portal, a common map viewer, central metadata catalogue and many more functionality and feature upgrades. This concluded months (if not years) or hard work behind the scenes, marking a new level of operational maturity for EMODnet. The centralisation of all seven thematics, with the respective portals being switched off, cemented EMODnet as an **operational *in situ* marine data service of the European Commission**, and one of the main Marine Knowledge initiatives of the European Union.

Kate Larkin
Head of the EMODnet Secretariat

This was an **immediate game-changer for the user**, with a **simplified user-interfac**e, further optimising access to multi-disciplinary marine data, for all. Users responded, with demand in 2023 reaching close to 140,000 unique visits, and > 200,000 sessions because of many returning customers – a number which continues to grow and diversify.

Today, the EMODnet service is not only available from a single Portal, it also **connected to global ocean data and metadata catalogues and initiatives**, such as via the **IODE of IOC-UNESCO Ocean Data and Information System (ODIS), the Group on Earth Observations System of Systems (GEOSS)** and more!

EMODnet's central role in the European Digital Twin Ocean

In Europe, the 2023 service unification was a crucial step enabling **EMODnet's key role in jointly delivering the backbone to the European Digital Twin of the Ocean**, working in close partnership with the Copernicus Marine Service. 2023 was a core year for these developments with EMODnet (led by Central Portal Coordinators, VLIZ) and Copernicus Marine Service (led by Mercator Ocean International) working together in the EDITO-Infra project with activities spanning from technical developments towards a common data lake to stakeholder communication and engagement, to bring the community together and onboard as the European DTO takes shape.

EMODnet's user-driven service gets a stress-test at the Open Sea Lab Hackathon, third edition

The first flagship EMODnet event in 2023 was the organisation of the third edition of the Open Sea Lab (OSL 3.0), taking place in March 2023 following the recently launched new EMODnet Portal, therefore giving an opportunity for EMODnet to receive valuable feedback from diverse users. At OSL 3.0, data and ICT experts, together with users from the private sector, policy, wider society and beyond joined forces to explore and stress-test EMODnet's unified services and resources, whilst developing innovative blue user-driven solutions based on EMODnet resources. The benefits of a virtual hackathon were clear with a total 165 participants from over the world, forming 39 teams.

New products and services: Seven thematics, hundreds of parameters.

In 2023, the seven diverse EMODnet thematics – each with their own expert teams - continued to push the boundaries of open data and innovation in marine data, data products and services. It was a productive year, with the ingestion and delivery of a lot of new data, updates to existing datasets and data products, as well as new data products. Some key highlights include the upgraded version of the EMODnet Bathymetry Digital Terrain Model (DTM); the continued steady increase in number of available occurrence records from

EMODnet Biology to approximately 37 million; the new marine litter maps produced by **EMODnet Chemistry**, visualising the spatial and temporal distribution of marine litter, including floating microliter; **EMODnet Geology**'s new data product on seabed erosion; the extension of the Marine Spatial Planning dataset created by **EMODnet Human Activities** resulting from the addition of the Marine Spatial Plans from Estonia and Spain; updates to several existing **EMODnet Physics** data products, including the Coriolis Ocean datasets for reanalysis and the dataset on Marine Mammals Exploring the Oceans Pole to Pole (MEOP); and last but not least the new release of **EMODnet Seabed Habitat**'s flagship product, EUSeaMap v. 2023.

During 2023 the total number of data submissions received by **EMODnet Data Ingestion** increased by about 200, pushing the total number of organisations providing data to EMODnet to over 1,500 at the end of 2023. Towards the end of 2023, over 1,400 of these received submissions were published 'as is', visible and available on the View Submissions service on the EMODnet Data Ingestion Portal, whilst the data continue to be integrated into EMODnet data layers.

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 >270maps, with content available in the 24 official EU languages. The Atlas Teachers' Corner and Atlas communities on the EC Maritime Forum were also revamped, together with concrete joint activities with the EU4Ocean European Ocean Literacy initiative.

A growing network, connecting new communities in Europe and globally

EMODnet continues to provide a user-driven service, utilised by a wide range of stakeholders that have further increased in number and diversity following EMODnet service unification. The **new use cases** published on the EMODnet Portal are testament to this. In 2023 we also welcomed **three new EMODnet Associated Partners**, namely e-BO Enterprises; Marine Centre Wales, School of Ocean Sciences at Bangor University; and Puertos del Estado. Increasing visibility was given to the EMODnet data providers who are crucial stakeholders in the EMODnet marine knowledge value chain. While the list mainly includes data aggregators, infrastructures and services, it already provides a snapshot of the > 600 intermediate data providers, acknowledging that serving these are many more hundreds and even thousands of in situ ocean observation, marine monitoring and data collection efforts.

In 2023, EMODnet organised an online '**EMODnet for Business' workshop** focusing on Marine Data

for the **coastal tourism secto**r, which provided the opportunity for cross-sectoral dialogue and sharing of experiences from key coastal tourism stakeholders regarding their in situ data needs and existing and emerging uses of EMODnet and wider open source marine environmental and human activities data for coastal tourism operations and applications. The message is clear that EMODnet welcomes collaboration with both public and private sector, with increasing numbers of Blue Economy stakeholders actively using EMODnet services as their go-to Portal for open access, trusted marine data and knowledge.

Highlights from the EMODnet Open Conference, Jamboree and Call to Action 2023

2023 culminated in the third EMODnet Open Conference and Jamboree Conference, attended by over 340 partners, associated partners, and wider stakeholders of EMODnet. With a line-up of over 75 Conference speakers, the event highlighted EMODnet's crucial role in the European Marine Data Ecosystem, focusing on a "Digital and Green Future". During the Closing Session of the EMODnet Conference on 30 November 2023, I had the honour of presenting the EMODnet Call to Action on behalf of the EMODnet Partnership. The Call to Action takes stock of EMODnet's evolution to-date into the operational European Commission in situ marine data service it is today. Read more about the Jamboree, Conference and Call to Action further in this report.

In summary, 2023 was a year of milestones, with the public launch of the new unified EMODnet Portal, following all the hard work behind the scenes in the months and years before. It was a year where the EMODnet 'ecosystem' further expanded in terms of data producers and providers, an increased number and diversity of users, and increased partnerships in Europe and worldwide. I would like to thank all the EMODnet Thematic, Data Ingestion and Central Portal Coordinators and technical experts, together with the full Secretariat team for their hard work and dedication to deliver the new unified EMODnet Portal, and for their continued efforts to continue evolving the EMODnet services in the months and years to come.

2023 at a glance

EMODnet completed its thematic unification and launches an external communication campaign 'One Ocean, One EMODnet'. The unified EMODnet Portal simplifies access to multi-disciplinary marine data and metadata and enhances the EMODnet user experience.

EMODnet Seabed Habitats experts played a key role in major update to the marine component of the EUNIS habitat classification, a comprehensive pan-European system for habitat identification.

EMODnet hosted the webinar "EMODnet Centralisation: One Ocean, One EMODnet" showcasing the newly unified EMODnet Portal, attended by > 160 participants.

EMODnet experts attended the first Annual Forum of the Mission: Restore our Ocean and Waters in Brussels, Belgium.

EMODnet Physics experts co-organised an ERDDAP workshop in Sweden to demonstrate the great advantages of this technology, and its use in EMODnet Physics and wider thematic services.

EMODnet led the Open Sea Lab 3.0 Hackathon, held online following ideation and team formation in February, with > 500 registered participants involved from over 80 countries.

Open Sea Lab 3.0 Hackathon Banner ©EMODnet Secretariat

EMODnet was endorsed as an Implementing Partner of the UN Decade of Ocean Science for Sustainable Development in recognition of its regional data service contribution to UN Ocean Decade objectives, themes, actions, collaborative centres and more.

JANUARY

FEBRUARY

MARCH

20

EMODnet hosted an online workshop on the added value and benefits of EMODnet Sea-basin Checkpoints (SBCPs), attended by > 50 SBCP, EMODnet and wider experts.

EMODnet Chemistry experts and ICES worked together to optimize marine litter data formats.
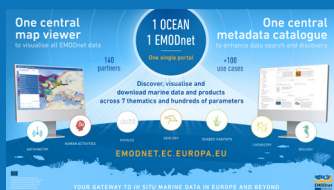
Centralisation Infographic ©EMODnet Secretariat

EMODnet's Geology and Human Activities data services were used by the Offshore Renewable Energy sector in Denmark to acquire insights in the geology of the Danish seas.

EMODnet published an updated Seabed Habitats map layer on Marine Strategy Framework Directive (MSFD) Benthic Broad Habitat Types (BBHT) to **inform EU MSFD reporting.**
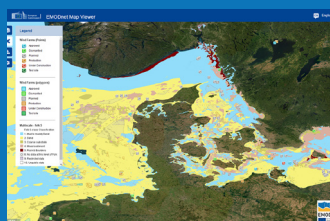
EMODnet Map Viewer showing Wind Farm information (EMODnet Human Activities) and the relation to the seabed substrates (EMODnet Geology).

EMODnet experts presented at the International Ocean Data Conference 2 (IODC-II) and attended the 27th session of the International Oceanographic Data and Information Exchange (IODE) of the Intergovernmental Oceanographic Commission (IOC) of UNESCO, both held in Paris, France.

EMODnet published **new Biology data products covering macrobenthos in the European Seas**, including on invasive macroalgae

The EMODnet Secretariat changed leadership, with Kate Larkin (Ph.D) becoming Head of Secretariat.
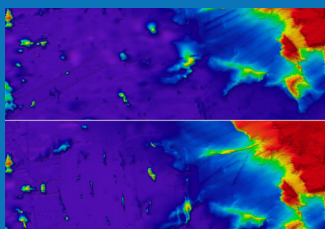
EMODnet Bathymetry experts released an updated Bathymetry Digital Terrain Model (DTM) 2022.The new DTM integrates data from even more data providers and diverse sources, delivering higher resolution, updated coastline and extended coverage, including the Caribbean arc.

Atlantic Ocean, Porcupine abyssal plane.
©EMODnet Bathymetry

EMODnet was showcased at European Maritime Day 2023 with the EMOD-network co-organising the workshop 'Benefiting from maritime data to drive marine innovation' in collaboration with the European Ocean Observing system framework and wider stakeholders.

EMODnet at European Marine Day 2023
©EMODnet Secretariat

EMODnet experts attended the **second Digital Ocean Forum (DOF) 2023 where EMODnet Portal hosts Flanders Marine Institute (VLIZ) showcased EMODnet and its key role in the EDITO-Infra project**, where **EMODnet and Copernicus Marine Service** are **jointly providing the backbone and common data lake of the European Digital Twin Ocean (DTO)**.

EDITO-Infra Logo ©EDITO-Infra. EDITO-Infra
Partners ©EDITO-Infra

22

APRIL

MAY

JUNE

EMODnet Ingestion experts completed an inventory of stakeholders involved in coastal and offshore licensing, monitoring and data collection efforts, with a focus on aquaculture and offshore energy, to inform a future workshop to increase data submissions into EMODnet.

The EMODnet 18th Steering Committee met in Brest, France, hosted by EMODnet partner Ifremer, with meetings held back-to-back with EMD 2023.

EMODnet Biology experts published data from **47 new datasets**, resulting in **35.7 million occurrence records from a total of 1,280 datasets**.

EMODnet 18th Steering Committee, Ifremer,
Brest, France ©EMODnet Secretariat

During the **Ocean Race Finale in Genoa, Italy, EMODnet Physics Coordinator ETT co-organised the Ocean Data Week**, gathering experts from the **EMODnet Secretariat, Physics, Chemistry, and Data Ingestion** along with representatives from the EC, IOC-UNESCO, EOOS and wider stakeholders to showcase the value of ocean observations and data.

EMODnet Geology visited Santo Domingo, Dominican Republic, to meet with Caribbean Sea geological organisations including from European Overseas Territories, to explore collaboration opportunities for sharing and harmonizing marine data, towards extending EMODnet Geology data and data products for the Caribbean region.

EMODnet Geology met with Caribbean Sea geological organisations ©EMODnet Geology

EMODnet launched a new release of the EMODnet Map Viewer, unveiling technical upgrades that improve marine data discovery and visualization, including new map projections and customized parameter exploration, with a more efficient and precise marine data exploration.

EMODnet Map Viewer with EMODnet Physics in situ platforms, Arctic projection (EPSG 3035) ©EMODnet Secretariat

EMODnet held its 2024 EMODnet for Business workshop "EMODnet marine data for coastal tourism", co-organised with EC DG MARE and held online, attended by over 40 coastal tourism experts from diverse sectors including research, policy and national administration, the private sector, marine data services and NGOs.

EMODnet exhibited at the I**CES Annual Science Conference 2023** in Bilbao, Spain, enabling dialogues with ICES stakeholders from across the NE Atlantic Ocean and European seas.

JULY

SEPTEMBER

20

AUGUST

The EMODnet Secretariat and EMODnet partner VLIZ met with the **Sustainable Blue Economy Partnership (SBEP)** in Oostende, Belgium.

EMODnet Chemistry and the Secretariat met with **Erasmus Maris, the EC's Joint Research Centre (JRC) and VLIZ** in Oostende, Belgium to discuss the latest state-of-the-art in **marine litter**, and collaboration areas including a future hosting of Erasmus Maris data in EMODnet

EMODnet experts together with EC DG MARE participated in an **EU-China Blue Partnership Forum for the Oceans** that took place in Shenzhen, China.

Commissioner Virginijus Sinkevicius Opening Speech at the EU-China Blue Partnership Forum, ©EEAS

2023 at a glance

The **EMODnet Seabed Habitats Coordinating institute** changed to **Syke, Finland**, as the thematic started a new Phase V (5).

EMODnet Chemistry released new aggregated, harmonised, and validated datasets for floating micro-litter, seafloor litter, and beach litter.

The third EMODnet Open Conference and Jamboree gathered over 340 partners, associated partners, and stakeholders in Brussels for a week-long flagship event.

Third EMODnet Open Conference 2023 Banner, ©EMODnet Secretariat

EMODnet Geology increased its offer with an extended seabed substrate map for the Caribbean Sea, and a new data product seabed erosion.

EMODnet signed the COP 28 Ocean Declaration which called upon the international community for more sustained ocean observation and marine knowledge for "the science we need for the ocean we want".

NOVEMBER

23 OCTOBER

DECEMBER

Ocean Best Practices Logo ©OBPS

EMODnet experts showcased its European marine data services and best practices at the **Ocean Best Practice Systems (OBPS) VII workshop**.

EMODnet and Copernicus Marine Service released a **joint communication on the *in situ* marine data** offer by European marine data services.

The EMODnet Call to Action 2023 was launched at the third Open Conference.

EMODnet Secretariat and Copernicus Marine Service representatives at the third EMODnet Open Conference, ©EMODnet Secretariat

EMODnet Chemistry released 16 new maps for marine microlitter and new contaminants maps of temporal distribution and concentration of 12 pollutants prioritised in the EU MSFD.

EMODnet announced three new Associated Partners, e-BO Enterprises; Marine Centre Wales, School of Ocean Sciences, Bangor University; and Puertos del Estado, advancing EMODnet's private-public partnerships.

EMODnet new Associated Partners in 2023, ©EMODnet Secretariat

EMODnet service: facts and figures

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

EMODnet Associated Partners by end 2023 **31**

109 **Use cases** by end 2023

Data & data product offer

4,004 entries in the EMODnet product Catalogue
689 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 2023

Total of **6,249** Twitter followers and

1,907 LinkedIn followers

Total of YouTube **259** subscribers, **3,705** views, **107** hours watch time.

EMODnet Portal Web traffic

139,594 visitors*

203,725 sessions**

387,593 page views

15% of returning visitors

* The number of unique visitors. Every visitor is counted once, even if they visit the website many times during the day.

** A session starts with the first event and ends 30 minutes after the last event (after the session is over).

Visitors and Sessions
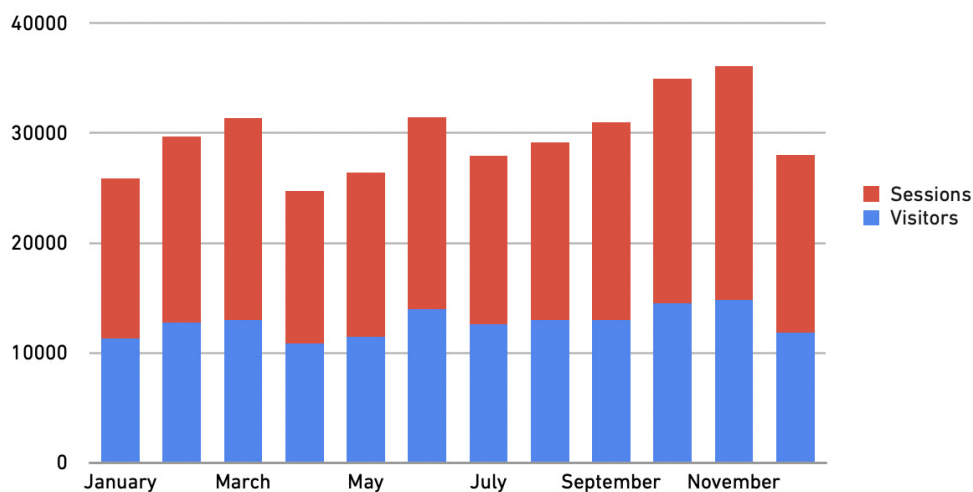
Benefits of centralisation: High increase in user demand for EMODnet data products, e.g. one year after centralis ation, EMODnet Bathymetry observed a 80% increase in downloads of Digital Terrain Model (DTM) tiles, a 660% increase in downloads of high-resolution DTM files, and a 1,047% increase in package downloads of Satellite Derived Coastlines.

One Year of EMODnet

EMODnet Central Portal

2023 key facts

The EMODnet Portal is coordinated by the Central Portal Technical Team which is composed of a small group of technical experts from VLIZ, the EMODnet Secretariat and DG MARE. The EMODnet Central Portal team conduct the day-to-day technical operational support of the EMODnet portal and services, with the support of the thematic lots.

A major milestone in 2023 was the launch of the unified EMODnet Portal in January 2023, resulting in the centralisation of all seven thematic data and data products and the shutting down of the individual thematic portals. This was a game-changer for users with a simplified data discovery, access, visualisation and download. As a result, EMODnet saw a high increase in visitors with the EMODnet Portal reaching a total of close to 140,000 unique visitors in 2023 – a 100% increase compared to unique visitors in 2022 pre-centralisation.

Going forward, the Central Portal Technical Team continues to manage and coordinate all aspects of the EMODnet Portal in collaboration with the EMODnet Technical Working Group. For this, a cohesive set of project management, bug tracking, and communication tools are utilised that bind the separate team members and the technical teams of the thematic lots into one EMODnet technical operations team. The EMODnet Portal continues to evolve and in 2024 this will include both maintenance and continued development of the EMODnet website, the common map viewer, the central metadata catalogue, and the EMODnet data services. In addition, during 2024 the technical team will complete the centralisation of the EMODnet Data Ingestion service into the EMODnet portal.

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 across all areas of EMODnet's activities, coordinating the governance, flagship events and partnership activities from European to Global, providing technical advice to the Central Portal Technical Team and wider technical network to guide the development of the EMODnet Central Portal, monitoring the progress of the seven thematics and data ingestion, producing pan-EMODnet communication resources, promoting EMODnet and disseminating results via the Portal, social media, News Digest and more. In addition, the Secretariat team fosters strong coherence, interaction and collaboration across the EMODnet partnership, conducts targeted activities to connect EMODnet with Europe's ocean observation community and supporting the EC Ocean Observation Initiative, and managing the technical and communication aspects of the European Atlas of the Seas, an EC web-based communication tool utilising open data from EMODnet and wider sources.

Since 2013, the EMODnet Secretariat is administered by Seascape Belgium and hosted at the InnovOcean Campus in Oostende (Belgium) with the support of the Flemish Government. Since 2018 (and ongoing), the core secretariat staff from Seascape Belgium has also been supported by three other organisations: Trust-IT for communication, website design and targeted technical activities, the European Marine Board to support European Ocean Observation stakeholder interactions, and Bilbomática for technical and development support for the European Atlas of the Seas and the Central Portal Map Viewer.

2023 EMODnet Secretariat contributions to key events

EMODnet Secretariat actively attend, present, and/or co-organise many EMODnet and external events, highlights of which are presented below for the year 2023. You can find more information on the events page of the EMODnet website: Events | European Marine Observation and Data Network (EMODnet) (europa.eu)

» Digital Twins in Atmospheric, Climate, and Sustainability Science, 1 February 2023, Online conference
» "EMODnet Centralisation: One Ocean, One EMODnet" webinar, 16 February 2023, Online webinar
» Mission Restore our Ocean and Waters Annual Forum, 17, February 2023, Brussels, Belgium, conference
» VLIZ Marine Science Day 2023, 2 March 2023, Ostend, Belgium, Conference
» European Ocean Observing System Strategy 2023-2027 Launch, 2 March 2023, Online conference
» International Ocean Data Conference – II, 20-21 March 2023, Paris, France, Conference
» Open Sea Lab 3 Hackathon, 27-29 March 2023, Online hackathon
» Biodiversity data for the Green Deal Data Space webinar, 3 May 2023, Online webinar
» European Maritime Day, 24-25 May, Brest, France, Conference
» Copernicus Marine General Assembly, 5-9 June 2023, Hybrid conference
» 2nd Digital Ocean Forum, 20 June, Brussels, Belgium, Conference
» ICES Annual Science Conference 2023, 11-14 September 2023, Bilbao, Spain, Conference
» EuroSea Final Symposium on Ocean Observing and Forecasting, 21 September, Paris, France, Conference
» G7 Future of Seas and Ocean Initiative (FSOI G7) Towards a global marine plankton observing network, 25-27 September 2023, Online conference
» EMODnet for Business workshop for coastal tourism, 26-27 September 2023, Online workshop
» Sustainable Blue Economy Partnership (SBEP) Ocean Observation workshop, 27 September 2023, Brussels, Belgium, Workshop
» Fish-X Hybrid Conference: "The digital transition: New technologies to support sustainable small-scale fisheries", 27 September 2023, Brussels, Belgium, and online, Hybrid conference
» 10th EuroGOOS International Conference, 3-5 October 2023, Galway, Ireland, Conference
» Ocean Best Practices workshops, 9-19 October 2023, Online workshop
» EurOCEAN, 10-11 October 2023, Vigo, Galicia, Spain, Conference
» Ostend Science Park 'big data' event, 17 October 2023, Ostend, Belgium,　　　Conference
» INSPIRE Conference, 28-29 November 2023, Brussels, Belgium, Conference
» 3rd EMODnet Open Conference and Jamboree, 27-30 November 2023, Brussels, Belgium, Conference

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 and the Caribbean Sea, depth contours, survey tracks, best-estimate satellite derived coastlines, national baselines, and various options to view, query, and download.

2023 Key Facts

Activities in the first months of 2023 were mostly dedicated to finalising the new EMODnet 2022 DTM, with subsequent release on the EMDOnet Portal. This was prepared using a common methodology by an experienced team of bathymetry experts as a composite of more than 21,000 datasets (focus on in situ bathymetry field data), selected from the EMODnet Bathymetry catalogues and processed to common standards and grid. The 2022 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.

In the following months of 2023, activities have been undertaken in preparation of the new 2024 DTM that is planned for release by end 2024. Data providers in 2023 brought together more than 1,000 new bathymetric datasets, bringing the total collections of EMODnet Bathymetry to 42,369 survey datasets and 279 composite Digital Terrain Models (DTMs) and Satellite Derived Bathymetry products. All data sets are available in the EMODnet Bathymetry catalogue services, based upon SeaDataNet.

Furthermore, activities were undertaken to improve the workflow for the DTM generation process. This included adding functionalities to the Globe software, which is used for processing, gridding, and generating local and regional DTMs from the bathymetry datasets. It also included optimising interpolation algorithms, using GPU processing, and adopting an online cloud-based Collaborative Virtual Environment (CVE) for

Part of the new 2022 Digital Terrain Model for European seas – Canary Islands region. ©EMODnet Bathymetry
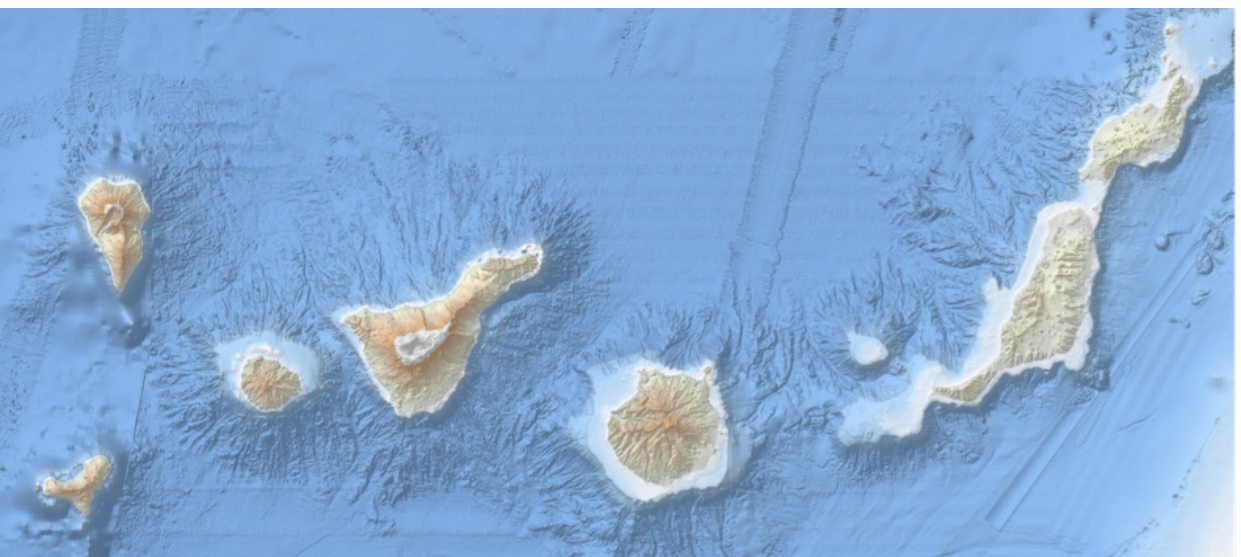
facilitating inspecting differences between different releases of the Regional DTMs on full scale and annotating anomalies that require further improvement.

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

In addition, 2023 saw the publication of a new set of satellite derived coastlines for Europe (2022 compilation) 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 an 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. In 2023, activities were undertaken for updating these coastlines, upgrading the approach for faster processing of satellite images at large spatial and temporal scales which concerns large volumes of satellite data.

Key stakeholder dialogues and engagement in 2023

The 2022 EMODnet Bathymetry full grid release, launched in April 2023, provided a good opportunity to reinforce the good relationships with the secretariats of the Regional Sea Conventions who are kept updated on EMODnet Bathymetry services and products, and where possible, are engaged in wider promotion and contributing to mobilising more potential data providers and product users. Representatives of the Regional Sea Conventions were also informed about the EMODnet progress and products during the successful third EMODnet Open Conference which was held from 29-30 November 2023 in Brussels, Belgium. Ever since the start of the EMODnet Bathymetry project there has been a strong relationship between various global bathymetric initiatives. EMODnet Bathymetry continues to be the main European data source for the GEBCO digital grid, produced yearly by the Seabed 2030 project. The EMODnet Bathymetry 2023 grid is fully incorporated in the GEBCO 2023 grid release. There is a strong representation of EMODnet Bathymetry as experts in the GEBCO community. EMODnet Bathymetry consortium partner GGSgc is the current elected Chair of the GEBCO Technical Subcommittee for Ocean Mapping (TSCOM) with partner CNR-ISMAR acting as Vice Chair, and partner Shom as member. Moreover, the current Vice Chair for the GEBCO Guiding Committee is performed by partner CNR-ISMAR. This way, EMODnet Bathymetry was presented in 2023 at various Seabed 2030 and GEBCO meetings around the world. There is a close collaboration with International Hydrographic Organisation (IHO), which has led to data contributions by several other national hydrographic services beyond the consortium. As part of the MoU between EMODnet and Copernicus Marine Service, a Call had been released for a global coastal bathymetry derived from satellite observations. This Call has been concluded with a winning proposal by a subgroup from the EMODnet Bathymetry consortium, which should guarantee tuning and fitness-for-purpose of results of the CopernicusCMEMS project for EMODnet Bathymetry.

BATHYMETRY 2023 EVENTS

EMODnet Bathymetry was presented at several events, including:

» EMODnet Centralisation: One Ocean, One EMODnet, 16 February 2023, webinar

» GEBCO Technical Subcommittee on Ocean Mapping: Data Discovery and Identifying gaps, 28 February 2023, webinar

» European Maritime Day, 24-25 May 2023, Brest, France, conference

» Seabed 2030 South & West Pacific Regional Mapping Community Meeting 2023, 12-14 July 2023, Lima, Peru

» Map the Gaps symposium, 6-10 October 2023, Monaco,

» Meeting of the Marine Spatial Data Infrastructure Working Group (MSDIWG) of the Meso-American & Caribbean Hydrographic Commission (MACHC), 12 December 2023, Paramaribo, Suriname

» 24th conference of the Meso-American & Caribbean Hydrographic Commission (MACHC), 13 December 2023, Paramaribo, Suriname

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 term projects, monitoring or ad-hoc surveys, citizen science activities and literature review and covers not only recent but also historical data.

2023 Key Facts

In 2023, the EMODnet Biology portal was shutdown following the conclusion of the EMODnet centralisation process. This required a considerable amount of effort to ensure that EMODnet Biology data and data products were displayed and made available in a way that is compatible with the Central Portal systems, but also addressing our users' needs.
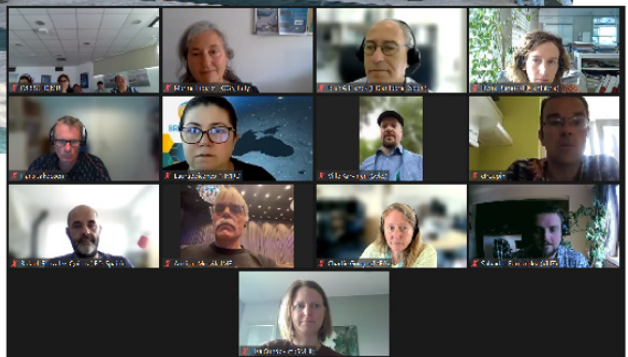
EMODnet Biology consortium at the Phase V kick-off meeting. (CC-BY)

The year 2023 was successful with the start of a new Phase in early May, the publication of 10.5 Million occurrence records, resulting in a ~20% increase in the total number of occurrences since the previous contract/phase and pushing latter to almost 37 Million. Seven new data products were also published, two of which in the form of R packages.

Two new use cases were published, relating to new types of data: occurrences identified via media and derived from DNA. Various deliverables were published, among which the "Feasibility Study on Ecological Traits and sampling devices/methodologies identification with text mining" and ""Launch" of the European MBON node (Phase IV)". The first deliverable reports all the information gathered during a study commissioned to extract traits and other information from text, and the second one provides a status overview of the European marine community landscape, including the reporting of a European MBON node and how the collaboration with EMODnet Biology is envisaged.

Key stakeholder dialogues and engagement in 2023

Aside from the various EMODnet events and meetings, EMODnet Biology joined other experts in organising the content and sessions for G7 FSOI-GOOS Plankton workshop which aimed at providing advice on how to overcome the data infrastructures, observing and forecasting systems current gaps and limitations. EMODnet Biology was also invited to join the Marine Strategy Framework Directive (MSFD) Expert Network on Marine Biodiversity meeting which focused on the Incidental Bycatch Threshold Values.

BIOLOGY 2023 EVENTS

EMODnet Biology was presented at several events, including:
» IODE Ocean Data Conference, 20-21 March 2023, hybrid
» EMODnet Ingestion annual meeting, 12-13 April 2023, Larnaca, Cyprus
» European Marine Board Spring Plenary, 28 April 2023, hybrid
» Green Deal Data Space (GREAT) Biodiversity webinar, 10 May 2023, online
» UN Global Compact Working Meeting on Net Biodiversity Positive Offshore renewables, 10,17,31 May 2023, online
» Green Deal Data Space (GREAT) Marine Data Task Force, 15 May 2023, online
» EMODnet for the Ocean Decade Coordination Implementation Group, 2 June 2023, online
» EMODnet Biology Phase IV final meeting, 7 June 2023, Heraklion, Crete
» EMODnet Biology Phase V kick-off meeting, 8 June 2023, Heraklion, Crete
» MSFD Expert Network on Marine Biodiversity meeting (Incidental Bycatch Threshold Values), 13 June 2023, online
» Digital Ocean Forum, 14-15 June 2023, Brussels, Belgium
» Networking Friday with SENACYT, 23 June 2023, online
» Green Deal Data Space (Marine Biodiversity Networking FridaysGREAT) Stakeholder Forum, 19 July 2023, online
» Marine Biodiversity Networking Friday: Celebrating Black Voices in Marine Science, 8 September 2023, online
» MARCO BOLO & GOOS BioEco Panel meeting, 18 September 2023, Paris, France
» G7 FSOI-GOOS Plankton Workshop, 25-28 September 2023, online
» EuropaBON Webinar: Stakeholder consultation, 13 November 2023, online
» EuropaBON workshop, 14,16 November 2023, online
» MSFD Expert Network on Marine Biodiversity meeting (Incidental Bycatch Threshold Values), 8 December 2023, online

BIOLOGY

Thematic node:
EMODnet Chemistry

CHEMISTRY

EMODnet Chemistry pursues 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 marine regions are covered.

To this end, EMODnet Chemistry firstly collects and validates data and makes them freely available and interoperable. Secondly, EMODnet Chemistry generates and publishes standardised, harmonised and quality-controlled data collections and reliable derived products, e.g. to visualise the distribution and density of sampling stations and the concentration 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 and the Maritime Spatial Planning Directive. In particular, EMODnet Chemistry contributes to descriptors 5 (eutrophication), 8 (chemical pollution) and 10 (marine litter) of the MSFD. This is also ensured through ongoing co-operation with the Regional Sea Conventions and the International Council for the Exploration of the Sea (ICES).

2023 Key Facts

The EMODnet Chemistry portal was shut down in January 2023 and the partnership continued to work together to deliver the specific objectives of centralisation, i.e. to develop a more coherent, effective, efficient, integrated and fit-for-purpose EMODnet and to promote its use by industry, policy makers and scientific data users.

The quantity and quality of data and products has increased. The number of data records has risen from around 1,000,000 to around 1,271,000. They are available in the EMODnet Chemistry CDI Data Discovery and Access Service of SeaDataNet and in the Products Catalogue as collections of harmonised, standardised and validated data. The data collections are produced for eutrophication (nutrients, chlorophyll and oxygen), ocean acidification (alkalinity and pH), contaminants (heavy metals, hydrocarbons, antifouling agents, polychlorinated biphenyls, pesticides and biocides, and radionuclides) and marine litter (beach litter, seafloor litter and microlitter). It is worth noting that the latest EMODnet Chemistry data products for eutrophication and pollutants have also been requested by and provided to the European Commission Joint Research Centre (EC-JRC). This has further strengthened EMODnet Chemistry's support to the MSFD reporting. 9. A new QC questionnaire for contaminant and eutrophication data has been developed to improve transparency of data quality, reliability, and comparability.

Animated map showing the type of litter per net over the years in the EMODnet Map Viewer. In 2023, EMODnet Chemistry created 16 maps for microlitter for the first time. ©EMODnet Chemistry
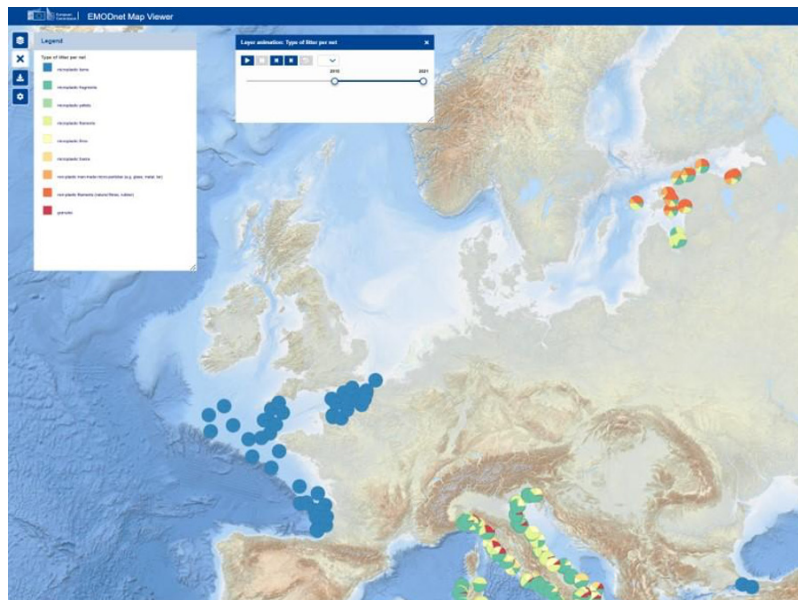
The questionnaire contains a record of field and laboratory information for chemical parameters submitted by a data producer. Forty-two questionnaires were received from 21 institutes and 18 countries. Twenty-five new maps for contaminants and 19 for marine litter were created based on the data collected. For marine litter, this version includes for the first time 16 maps for floating micro-litter in all European sea basins and beyond, as well as three new maps for seafloor litter. The Chemistry webODV Explorer and Extractor Service for online interaction with the harmonised and validated data collections for eutrophication, ocean acidification and contaminants has been extended and 5 new maps are published as OGC WMS-WFS service. Finally, at the end of July, EMODnet Chemistry received the best feedback yet from the European Commission: the confirmation of the same partnership at the helm of EMODnet Chemistry for the next two years. This means that the 44 institutes acting as partners, subcontractors and advisors, will continue to lead EMODnet Chemistry. It will be supported by experts from the Regional Seas Conventions and the MSFD..

### Key stakeholder dialogues and engagement in 2023

EMODnet Chemistry maintained a mutually beneficial dialogue between the partnership and the various external stakeholders in a variety of ways: Participation and organisation of a series of online and face-to-face meetings, collection of user feedback via a centralised helpdesk service, email exchanges, and publication of communication material. An example is the stakeholder consultation organised by EMODnet Chemistry on 10 March 2023, which allowed the Consortium to collect positive feedback and further proposals for cooperation by EC-JRC, the Black Sea Convention, the Helcom convention, the EEA, the Copernicus Marine Service, PANGAEA, and ICES WG on marine litter.

Another example is the involvement in the activities of the MSFD TGs on Marine Litter, Contaminants and Eutrophication; of the dedicated UNEP Ecosystem Approach Correspondence Group on Monitoring; of the International Marine Litter Data Harmonisation initiative led by the Japanese Ministry of Environment (MOEJ); of the CoP Chemicals Dimension of the Global Partnership on Plastic Pollution and Marine Litter (GPML); and of UNESCO for SDG 14.3.1. to discuss metadata and vocabulary for ocean acidification data.

CHEMISTRY 2023 EVENTS

EMODnet Chemistry was presented at several events, including:

» ICES Workshop on the revision of the litter data format for the Database on the Marine Environment (DOME), 17- 20 January 2023, Copenhagen, Denmark
» Meeting with the board of MSFD experts to present the latest maps for eutrophication, contaminants and marine litter, 27 January, 30 June and 8 September 2023, Online
» Second round BRIDGE - Black Sea Living Lab workshop, 28 February 2023, Constanta, Romania
» First Mobilisation and Mutual Learning (MML) workshop organised in the framework of DOORS Black Sea Project, 6 March 2023, Constanta, Romania
» Advanced Master in Sustainable Blue Economy, 17 March 2023, Trieste, Italy
» Annual webinar of the operators of the French beach litter monitoring programme, 17 March 2023, online
» Second International Ocean Data Conference (IODC-II), 21 March 2023, hybrid event UNESCO Headquarters, Paris, France
» MOEJ analysis of GPML Data Harmonization Matrix, 23 March 2023, online
» Science Open Day event by the Romanian Ministry of Research, Innovation and Digitalization (MCID), 18 May 2023, Bucharest, Romania
» Blue Cloud 2026 webinar on 1) biogeochemical data quality control and 2) FAIR data principles, 19 June 2023 and 26 September 2023, online
» The Ocean Data Week during The Ocean Race Finale, 27-30 June 2023, Genoa, Italy
» Seafloor Images Workshop organised by EC JRC, 21 September 2023, Catania, Italy
» Trieste Next Science Festival, 23 September 2023, Trieste, Italy
» Second national event 'Black Sea Blue Policy' by Batumi Shota Rustaveli University, Ministry of Education and Science of Georgia and the Ministry of Education and Science of Ajara, 20 September 2023, Batumi, Georgia
» HE EUROqCHARM project final conference, 11-12 October 2023, Brussels, Belgium
» Ocean Best Practices System (OBPS) Workshop VII, 12 October 2023, online
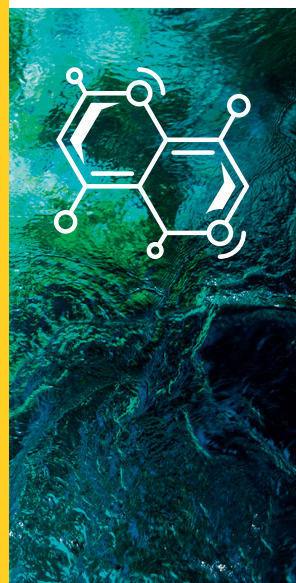
Thematic node:
EMODnet Geology

GEOLOGY

The geology of Europe's seafloor is diverse, ranging from hard rock outcrops to glacial sediments that can be 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 offers key information on marine geological features by providing access to data and data products covering seabed substrate, seafloor geology, coastal behaviour, sediment accumulation rates, geological events and probabilities, and mineral occurrences, as well as submerged landscapes. The data products span not only the European Seas but extend to the Caspian and the Caribbean Seas.

2023 Key Facts

In early 2023, the focus was mainly on preparing marine geological data products and updates for publication on the EMODnet Portal, launched in January 2023, featuring data products from all seven thematic projects. Then by the end of September 2023, EMODnet Geology had finalized its centralization phase contract, uploading completely new or updated data products to the EMODnet Portal. These included, for example, the release of the first erosion index layer including information on erosional studies in European seas, the implementation of hierarchical mapping of stratigraphic terms, performance enhancements of map layers (Quaternary geology) through geodata optimisation, and the delivery of products related to Geological Events and probabilities at all available scales. The most significant expansion in a real coverage was achieved with the addition of a new seabed substrate map covering the Caribbean Sea, encompassing about 2.7 million km^2, in practice the whole Caribbean Sea.

In 2023, EMODnet Geology also strengthened its collaboration in maritime areas beyond Europe. EMODnet Geology lead GTK signed in January 2023 a subcontract with a new partner in Azerbaijan to collect and harmonise data from the Caspian Sea, which resulted in successful submission of various marine geological data products from the Azerbaijani sea areas of the Caspian Sea.

EMODnet Geology Caribbean meeting was held in July 2023, Santo Domingo, the Dominican Republic. ©SGN

Data releases from the Caribbean Sea in September 2023 primarily consisted of partner data or such third-party data that had been collected and harmonised early enough to be published at that time. To further involve third parties from the Caribbean Sea area, EMODnet Geology had an EMODnet promotion meeting organised by the Servicio Geológico Nacional República Dominicana (Geological Survey of Dominican Republic) in Santo Domingo in July 2023, aimed at engaging

geological surveys from the Caribbean Sea. The meeting proved successful, leading to an agreement for Instituto Geológico y Minero de España (IGME) to act as a Caribbean Sea subtask leader for EMODnet Geology during the 2023-2025 contract renewal period, thereby enhancing coverage and quality of the map products in the region.

In September 2023, EMODnet Geology embarked on a two-year renewal period for the contract. During the contract renewal period EMODnet Geology will follow the original technical tender and all work packages have decided upon main focus points of activities. With the centralisation phase of EMODnet complete, EMODnet Geology now focuses on collecting and incorporating data from the Caribbean Sea data into the geology data layers on the EMODnet Portal. Additionally, efforts are being made to provide new data products relating to the geotechnical properties of the seabed and coastal vulnerability, among others.

EMODnet Geology held its renewal phase kick-off meeting in November 2023 back-to-back with the EMODnet Jamboree and Open Conference that were organised in Brussels, Belgium. The partner meeting was followed by active cross-thematic discussions as part of the Jamboree.

Key stakeholder dialogues and engagement in 2023

Main data providers for EMODnet Geology include marine geology departments and teams of the national geological surveys, as well as research institutes from European maritime countries, participating in the project as project partners or subcontractors. Some additional data are collected nationally by the project partners and incorporated into our various data products. These data products are widely used in maritime spatial planning, coastal zone management and environmental impact assessments, and particularly among the rapidly growing community of actors in offshore renewable energy sector.

These themes are also apparent in the use cases published in the EMODnet Portal in 2023. For example there are use cases about planning of wind farms in Denmark and marine habitat mapping of the Croatian part of the Adriatic Sea. In 2023, there was a noticeable demand for data related to the planning of offshore wind farms, particularly for geotechnical data. Consequently, EMODnet Geology has begun investigating the types of geotechnical data it can provide to users, with plans to further this initiative over the next two years. It is worth mentioning that several EMODnet Geology partners are involved in the HORIZON 2.5 - Climate, Energy and Mobility project Geological Service for Europe (GSEU), facilitating synergy and direct feedback between the two projects. The GSEU project will utilize EMODnet Geology both as a data/information source and as a platform for disseminating GSEU-generated new data/information. In summary, 2023 saw significant progress and collaboration in the field of marine geology, with EMODnet Geology playing a pivotal role in providing essential data and fostering engagement among stakeholders across various maritime regions.

GEOLOGY 2023 EVENTS

EMODnet Geology was presented at several events, including:

» EMODnet Geology and Seabed Habitats joint meeting, 12 January 2023, online
» HE Trident kick-off meeting, 17-19 January 2023, Porto, Portugal
» EuroGeoSurveys 50th National Delegates Meeting, 30 January 2023, Brussels, Belgium
» EuroGeoSurveys Earth Observation and Geohazards Expert Group meeting, 2 February 2023, Brussels, Belgium
» Congress of Italian marine geologists, 14-15 February 2023, Rome, Italy
» IODC-II Conference and 27th Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE), 20-24 March 2023, Paris, France
» EGU General Assembly, 24-28 April 2023, Vienna, Austria
» GeoHab conference, 9-11 May 2023, Reunion Island & online
» Finnish seminar on Marine Wind Energy, 5 June 2023, online
» HE Trident project workshop "Assessing the environmental impacts from potential resources extraction", 9 June 2023, Limerick & online
» XXI INQUA congress, 14-20 July 2023, Rome, Italy
» EMODnet-GSEU meeting, 24 July 2023, online
» EMODnet Geology promotion meeting, 25-27 July 2023, Santo Domingo, the Dominican Republic & online
» Baltic Sea Science Congress, 21-25 August 2023, Helsinki, Finland
» GeoBerlin2023 conference, 4 September 2023, Berlin, Germany
» HE S34I General Assembly, 27 October, Espoo, Finland
» Estonian GIS Cartographic conference, 27 October 2023
» International Conference on Gas in Marine Sediments, 23-27 October 2023, Cadiz, Spain

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.

2023 Key Facts

Over time the Human Activities' data portfolio has been expanded regularly with the addition of new datasets. The year 2023 was no exception, with two more datasets that were added to complement the "Environment" data theme. These are marine protected areas under the Emerald Network - an ecological network made up of Areas of Special Conservation Interest designated under Recommendation No. 16 (1989) and Resolution No. 3 (1996) of the Standing Committee to the Bern Convention - and marine protected areas established under the framework of the Regional Sea Conventions.

More work went on behind the curtain, with datasets that are not yet visible to the public. Through participation in workshops and bilateral meetings, the Human Activities team laid the foundation for new datasets on coastal tourism and on fishing opportunities, which hopefully should see the light in 2024.
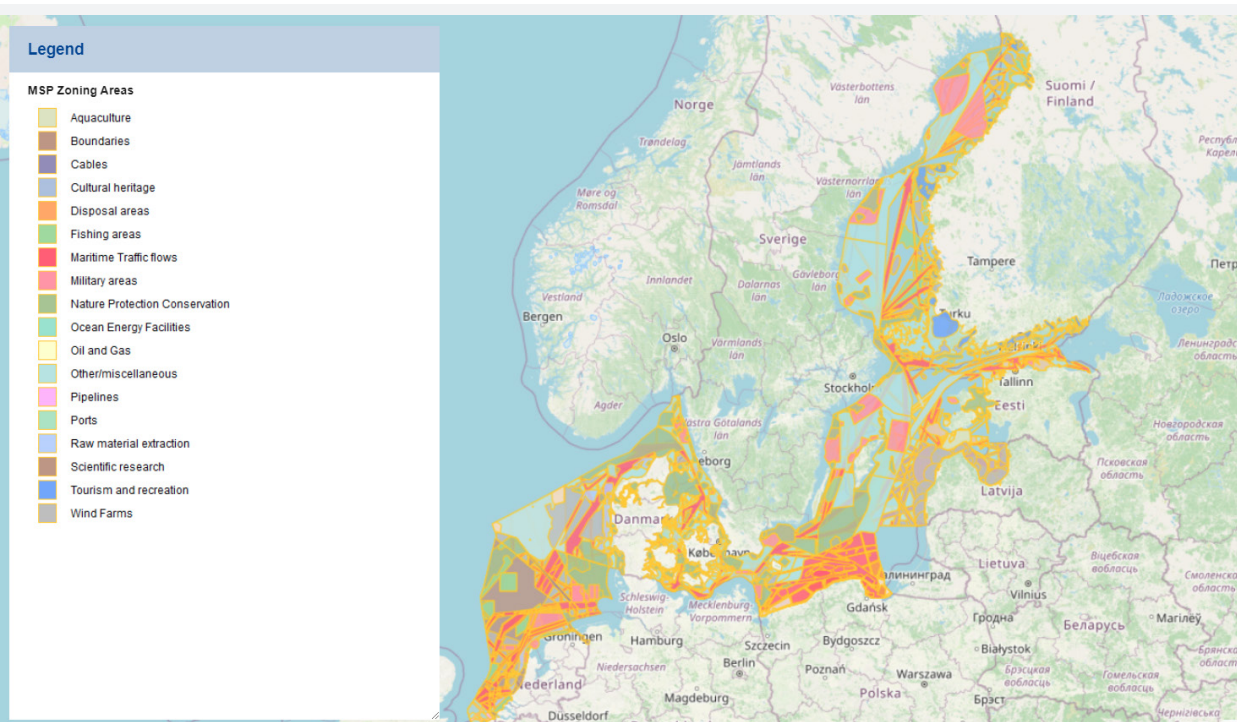

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The vessel density maps remained Human Activities' most downloaded data product by far. The method to produce them received an update and was given a DOI by the Publications Office of the European Union. The method is being increasingly cited in scientific literature and has now become a de facto standard.

Work on making available harmonised maritime spatial plans also progressed well, with Latvia, Spain and the Netherlands now included in the dataset. However, there are still difficulties in obtaining access to some Member States' plans.

Key stakeholder dialogues and engagement in 2023

EMODnet Human Activities is in constant dialogue with Regional Sea Conventions and their Secretariats. Meetings, be it in person or online, take place every year to exchange views, explore paths for cooperation, and generally improve the respective data flows.

The International Council for the Exploration of the Sea (ICES) joined the EMODnet Human Activities team at their annual meeting which took place in Brussels in November 2023, and stronger cooperation will be sought in the future with a view to expanding the fishery-related data portfolio.
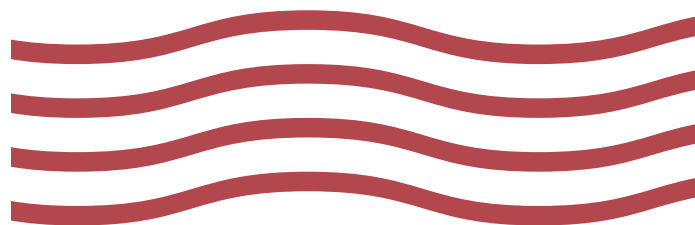
HUMAN ACTIVITIES

HUMAN ACTIVITIES 2023 EVENTS

EMODnet Human Activities was presented at several events, including:

» IODC-II International Ocean Data Conference II, 21 March 2023, online conference
» Technical Expert Group on Data for MSP, 18 April 2023, online meeting
» UN Global Compact Working Meeting on Net Biodiversity Positive Offshore Renewables, 17 May 2023, online workshop
» EMODnet Workshop for Coastal Tourism, 26-27 September 2023, online workshop
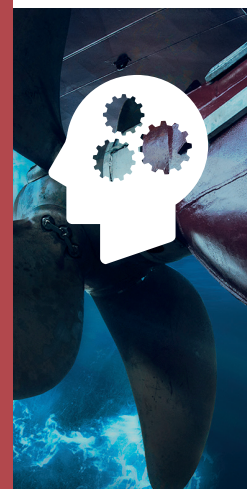
Thematic node:
EMODnet Physics

PHYSICS

Ensuring continual and immediate access to the physical characteristics of the ocean, such as its circulation, heat and salt distribution, and other water properties, is essential for providing accurate ocean forecasts, early warnings, climate projections, and assessments. A comprehensive understanding of these properties is essential for informed climate predictions and assessments, contributing to the preservation of ocean health and the responsible utilisation of its abundant advantages.

EMODnet Physics serves as a centralised platform for collecting and publicly disseminating ocean physics data and data products, adhering to common standards. It integrates data from key European oceanographic repositories and marine infrastructures, offering a wide range of parameters, including temperature, salinity, current profiles, sea level trends, wave characteristics, wind speed and direction, water turbidity, underwater noise, river flow, and sea-ice coverage. The available data products consist of in situ data collections, reanalysis and trend analyses for various parameters, as well as space-time aggregated in situ data and model outputs.

2023 Key Facts

At the beginning of 2023, EMODnet Physics achieved a significant milestone by being fully integrated into the EMODnet Portal, enhancing the overall user experience on a unified platform for comprehensive oceanographic data. This integration ensures efficient and collaborative management of crucial marine information. The EMODnet Portal now features new datasets and observing platforms, including approximately 18,045 ARGO, 25,957 drifting buoys, 2,197 tagged sea mammals, 466 tide gauges, 956 river gauge stations, 711 unmanned vehicles (gliders, sailing drones, etc.), 139 vessels (including fishing vessels, ferrybox, and data from ocean race ships), and over 5,000,000 CTD profiles under the EMODnet Physics section. It's important to underline that this result was possible thanks to the close collaboration with OCEANOPS, EuroGOOS task teams, the Copernicus Marine INS TAC team, PANGAEA, ICES, and GOOS OGC teams.

Operational platforms like ARGO, drifting buoys, moorings, tide gauges, river stations deliver data regularly, contributing to thematic collections. Some collect a single parameter, while others contribute to multiple collections. River outflow data, sea level meteorological data at sea level, and data from ships, as well as underwater noise data collections, have been significantly updated and expanded. EMODnet Physics has initiated and analyzed methods to manage new data flows from citizen science, fostering dialogue and development in this area.

The team at EMODnet Physics has been proactive in organising thematic workshops, engaging with new communities, and

Antonio Novellino (ETT S.p.A.) presenting EMODnet Physics during the Ocean Data Week at The Ocean Race
- The Grand Finale. ©ETT S.p.A

expanding the network of data providers and users. Their participation in over 100 events, including initiatives focused on cost-effective technologies and citizen science (e.g., European Marine Days, Ocean Data hours – The Ocean Race villages, etc.), has proven invaluable in filling marine data gaps and enhancing the time and spatial resolution of coastal areas.

Key stakeholder dialogues and engagement in 2023

EMODnet partners, particularly EMODnet Physics, have amassed valuable experience in organising and processing data to create validated and aggregated collections, addressing key data gaps identified in the Marine Strategy Framework Directive (MSFD). Specifically, EMODnet Physics plays a crucial role in filling gaps related to data availability for MSFD Indicator 7 (Alteration of hydrographical conditions) through river data and Indicator 11 (underwater noise). As an integral part of the EMODnet community, there is direct communication with GES assessment experts from DG Environment, EEA, and Regional Sea Conventions, including OSPAR, HELCOM, UNEP-MAP, and the Black Sea Commission. This communication is facilitated through regular participation in European Technical Groups (e.g., TG NOISE), aiming to engage stakeholders, assist EU Member States in fulfilling reporting obligations, maintain compatibility with European initiatives like the European Open Data Portal, EOSC, Digital Earth, and other EU-wide endeavours. EMODnet Physics actively contributes to various events, workshops, and documents promoting common standards and open data, such as EuroSEA, European Marine Days, Copernicus Marine Service, EuroGOOS DataMEQ, among others. Moreover, the collaboration between EMODnet Physics and the Southern Ocean Observing System (SOOS) is highlighted as a key enabling factor. Understanding the Southern Oceans is deemed essential for comprehending the behaviour of Global Oceans, and EMODnet Physics actively contributes to SOOS, supporting significant contributions to IPCC and COP26/27 reports. The data available on the SOOSmap, powered and maintained by EMODnet Physics, serves as a crucial resource for SOOS reports.

PHYSICS

PHYSICS 2023 EVENTS

EMODnet Physics was presented at several events, including:

» Ocean Race, January-June 2023, international cities where the regatta stopped (Alicante-Spain, Cape Town-South Africa, Itajai-Brasil, Newport-USA, Aarhus-Denmark, The Hague-Netherlands, Genoa-Italy)

» EMODnet Physic for Sweden - SMHI (Sveriges meteorologiska och hydrologiska institute) workshop, 20 January 2023, Gothenburg, Sweden

» Ocean data management in Europe with an overview on the major European Marine data integrators, GOOS OGC Workshop, 24 February 2023, Cape Town, South Africa

» European Marine Day, 24-25 May 2023, Brest, France

» Mission Restore workshop - Ocean Race, 26 June 2023, Genoa, Italy

» Ocean Data Week at the Ocean Race - The Grand Finale, 27-30 June 2023, Genoa, Italy

» Southern Ocean Observing System (SOOS) Symposium, 14-18 August 2023, Hobart, Australia

» Trieste Next, 23 September 2023, Trieste, Italy

» 10th International EuroGoos Conference, 4 October 2023,

Thematic node:
EMODnet Seabed Habitats

SEABED HABITATS

EMODnet Seabed Habitats deliverables, datasets, and models can be used to inform effect 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.

2023 Key Facts

Throughout the year, the compilation of spatial data and products from around Europe on European seabed habitats has continued to grow. In 2023, 127 new habitat maps from surveys, 23 Essential Fish Habitat (EFH) models, nine new composite products, six new broad-scale mapping products and over 32,000 new point observations of habitats from surveys were made available online and via webservices.

An updated version of the Seabed Habitats flagship product EUSeaMap was published, and for the first time extended to the Caribbean and Caspian Seas. This included creating a new habitat classification for the Caspian Sea and production of relevant environmental background layers for this new geographical extent.

The Essential Ocean Variables (EOV), including live hard coral cover, macroalgal canopy cover and seagrass cover in Europe, were updated and a new EOV product for Mangrove cover and composition was introduced. A new coastal wetlands product for Europe, Caribbean and Caspian Seas was published.

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) and the first habitat point data were submitted via this method in 2023.
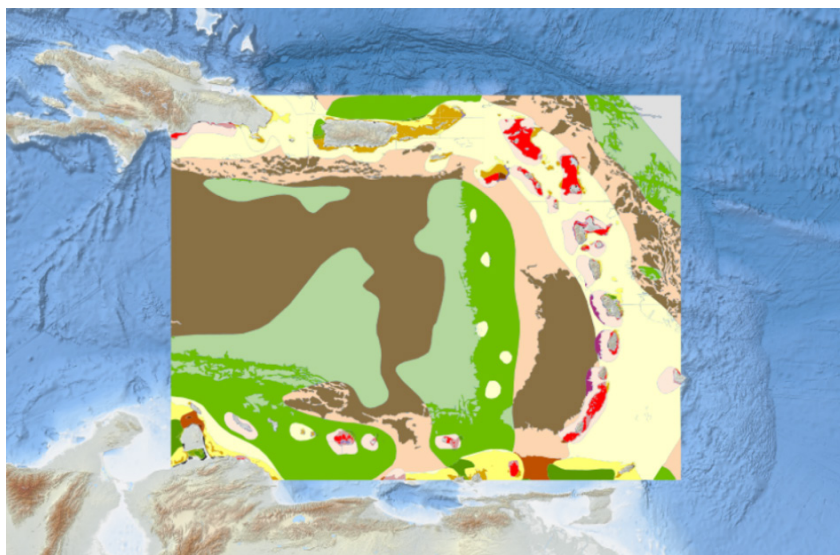
CaribbeanSeaMap, the broad-scale seabed habitat map for the Caribbean Sea. ©EMODnet Seabed Habitats

Key stakeholder dialogues and engagement in 2023

In May 2023, EMODnet Seabed Habitats and subcontracted partner, SAERI, organised a kick-off meeting with the Anguilla Government in the Caribbean. This kept MAERI informed on the EMODnet Seabed Habitats project and discussed plans for on-island training to be delivered later in the phase. It was anticipated that this training would build MAERI's capacity in spatial data management and engaging with stakeholders in the region. There were further meetings in June and July 2023 to provide updates on the work that SAERI were progressing in the Caribbean and to start planning for the on-island visit. In August, EMODnet Seabed Habitats engaged directly with Anguilla National Trust (ANT), Government of Anguilla Department of Natural Resources (DNR), and the Fisheries and Marine Management Unit. Stakeholders were informed of, and invited to participate in, a six-day external data submission and training course for marine habitat data in the Caribbean, which was held in September 2023.

EMODnet Seabed Habitats had ongoing engagement with ICES via participation in SCICOM and ICES working groups throughout the year. Both EMODnet Seabed Habitats and Chemistry co-chaired the EMODnet for EU Policy Townhall session at the EMODnet Open Conference in November 2023 which was well attended. A broad spectrum of policy makers, data users and providers were engaged via this forum. The outputs from this session were collated and presented during the Conference.

SEABED HABITATS 2023 EVENTS

EMODnet Seabed Habitats was presented at several events, including:

» EMODnet Sea-Basin Checkpoint (SBCP) Workshop, 26 January 2023, Online

» MPA Europe Kick-off Meeting, 01 March 2023, Bodo, Norway

» H2020 DOORS Project ('Developing Optimal and Open Research Support for the Black Sea') Workshop, 06 April 2023, Constanta, Romania

» EMODnet Ingestion Annual Meeting, 12–13 April 2023, Larnaca, Cyprus

» EMODnet Seabed Habitats Caribbean Kick-off Meeting (with Anguilla Government), 03 May 2023, Online

» EPROCAN Project Workshop ('Development of research strategy for deep water ecosystems of Bay of Biscay'), 08-10 May 2023, Donostia, Spain

» Ambiacva Project - Excellence Research Workshop (Summer School), 14-17 May 2023, Jurilovca, Romania

» BIOCONTAM ('Marine food webs and biological mechanisms of CONTAMINANT transfer') Workshop, 05-09 June 2023, Online

» Oceans 23 Conference and Exhibition, 06-08 June 2023, Limerick, Ireland

» ICES SCICOM Meeting (ASC), 09 October 2023, Bilbao, Spain and Online

» Hydro 2023 Hydrographic Conference, 07-09 November 2023, Genoa, Italy

» EMODnet For EU Policy Townhall Session, 29 November 2023, Brussels, Belgium

Portal:
EMODnet Data Ingestion
emodnet-data-ingestion.eu

DATA INGESTION

Many data collected by public authorities, researchers and private operators of coastal or offshore facilities still do not arrive to national or regional repositories and are thus unavailable to potential users. This limited data access creates costly redundant work for those who collect marine observations and reduces the reliability of marine research. There is therefore the need to streamline the data ingestion process so that data holders from public and private sectors can easily release their data for safekeeping and subsequent distribution through EMODnet or other means.

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

2023 Key Facts

During 2023 the Data Submissions service achieved a steady increase of submissions from 1,308 to 1,548. The number of completed submissions went from 1,176 to 1,411, with submissions being published for discovery and downloading by users via the View Submissions service. The number of further elaborated datasets went up from 536 to 639. These datasets have been curated by assigned data centres from the EMODnet Ingestion network to common formats and are made available through the EMODnet Portal and serve as input for EMODnet data products.

In 2023, dedicated activities took place to improve and document the availability of coastal and offshore licensed data with a focus on renewable energy and aquaculture. Potential stakeholders were identified, an inventory of data collections and licensing processes in each country was developed and a database was set up to track the availability of license data in each participating country. A workshop was planned in February 2024 with invited stakeholders aiming to promote common management and sharing practices for datasets as collected as part of national license procedures.

The (semi-)automatic coupling as established in 2019 between SEANOE and EMODnet Ingestion again performed 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. In 2023, 39 SEANOE submissions have been processed and published.
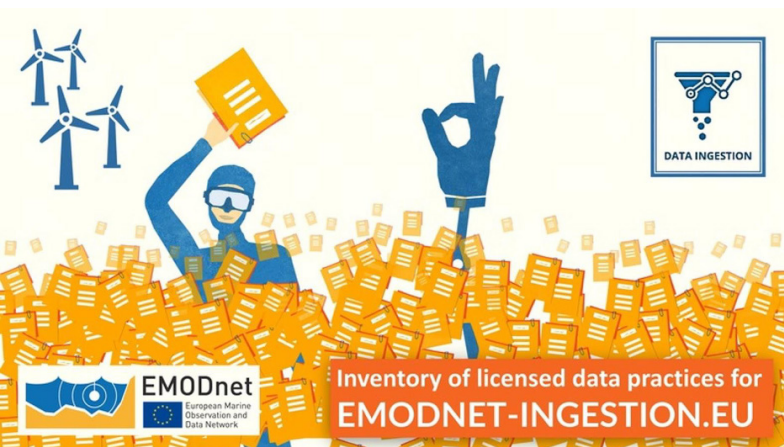
EMODnet Data Ingestion together with EMODnet Physics also reaches out to operators of Near Real Time (NRT) and Real Time (RT) oceanographic monitoring sites, consisting of fixed or moving platforms. In 2023, again several oceanography operators and platforms were motivated and given guidance for connecting 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.

EMODnet Chemistry's collaboration with

Inventory of different types of stakeholders responsible or involved in the offshore licensing process, EMODnet Ingestion 2023, Deliverable 4.4. ©EMODnet Ingestion

the MSFD Technical Group on Marine Litter, which encourages Member States to make use of EMODnet Ingestion for providing Marine Litter datasets, and other submissions from Citizen Science projects, led to the publication of 14 marine litter datasets in 2023 of which seven are fully elaborated.

The cooperation with H2020 Eurofleets+ project was continued. The project supports young researcher with shiptime at European research vessels, promotes open data exchange and is using EMODnet Ingestion portal for open data sharing, further elaboration and inclusion in the European marine and ocean data exchange, such as inclusion in EMODnet thematic portals. In 2023, this has resulted in 30 published data submissions of which 13 are fully elaborated.

EMODnet Ingestion still operates with their own portal, while all thematic portals have been de-activated and migrated to the new central EMODnet Portal, which was launched early January 2023. EMODnet Ingestion will also be integrated into the EMODnet Portal for which developments have made great progress. Finalization and launch is planned in 2024.

Key stakeholder dialogues and engagement in 2023

In 2023, EMODnet Data Ingestion engaged in the EMODnet Marine Data for the Coastal Tourism workshop, promoting its services and guiding coastal tourism sector to share and make their data Findable, Accessible, Interoperable and Reusable (FAIR).

Significant preparatory activities were also undertaken to engage with stakeholders from coastal and offshore activities to improve and document the availability of licensed data from renewable energy and aquaculture sectors, towards a workshop in 2024.

EMODnet Data Ingestion joined EMODnet's discussions with Citizen Science groups and initiatives (Erasmus Maris) about the exchange of marine litter data, focusing on data collection efforts, metadata protocols and data flow to EMODnet through EMODnet Submission service.

DATA INGESTION 2023 EVENTS

EMODnet Data Ingestion was presented at several events, including:

» Ocean Race, Workshop, 13 January 2023, Alicante, Spain
» Voice of the Ocean, workshops, 19 January 2023, Gothenburg, Sweden
» iving Labs Workshop in the framework of the EU Horizon 2020 project BRIDGE-BS, 17 & 28 February 2023, Varna, Bulgaria.
» Advancing EOOS - the foundation of European ocean knowledge, launch event, 2 March 2023, online
» Science-Industry Workshop - Data Sharing for Improved Ocean-Climate modelling, organised by HUB-Ocean in the context of UN Decade, 9 March 2023, Paris, France
» IODE – II conference - International Ocean Data Conference 2023 - The Data We Need for the Ocean We Want, 20-21 March 2023, Paris, France
» 54th International Liège Colloquium on Ocean Dynamics - Machine Learning and data analysis in Oceanography, 26 April 2023, Liège, Belgium
» Oceanography bootcamp, 8-12 May 2023, Malta (UoM: https://www.um.edu.mt/courses/studyunit/GSC5508)
» The Ocean race: Ocean Data hour, 27-30 June 2023, in Newport US, Aarhus Denmark, the Hague Netherlands and Genova Italy (https://theoceanracegenova.com/)
» MyCoast and IBIRoos meeting, 14 June 2023, Lisboa, Portugal
» Southern Ocean Observation System (SOOS) Symposium, 14-19 August 2023, Hobart, Tasmania, Australia
» Global Ocean Observation System (GOOS) - Low-cost technology Technical Working Group, 28 August 2023, Online
» NAUTILOS Summer School, 4 September 2023, Oslo, Norway
» EuroSEA Annual Assembly and Workshop, 19 September 2023, Paris, France
» Ocean Predict Task Team, Workshop, 27 September 2023, Toulouse, France
» Researchers' Night and Science in the City, 29 September 2023, Riga, Latvia and Floriana, Malta
» EuroGOOS Conference 2023, 3 October 2023, Galway, Ireland
» NAUTILOS General Assembly, 27 November 2023, Faro, Portugal

EMODnet in practice

Use cases

Users are at the centre of EMODnet's strategy. EMODnet's pan-European data and data products across all seven thematics (including hundreds of parameters) are widely used across sectors including research and academia, policy and administration, the private sector including the blue economy, non-governmental organisations and society. EMODnet's 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 find, use and 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 support 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 2023, 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 EMODnet component/thematic and by case type (i.e. Business/Private Sector, Government/Public Sector, Research/Academia and Society). The free text search field allows further filtering on specific terms.

EMODnet proactively works with the user community to produce use cases to exemplify the value and benefits of EMODnet for applications in the Ocean, coastal and land-sea interface. If you have developed an application using EMODnet data and/or data products, please share it with us by contacting secretariat@emodnet.ec.europa.eu.

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European Marine Observation and Data Network (EMODnet)

About ⌄   Data Services ⌄   Solutions ⌄   Themes ⌄   Community Pages ⌄   Atlas of the Seas ⌄   EU-China ⌄   News & Events ⌄   FAQ Downloads

Home > Solutions > Use Cases

Search options

EMODnet component

- Any -

Case Type

Search text:

2023

Refine results

Clear all

Use Cases

Biology

10 Jan 2024

Facts and figures on the importance of UNESCO World Heritage Marine Sites for marine biodiversity

UNESCO and IUCN used EMODnet Biology data to compile an assessment on the status and trends of species within UNESCO World Heritage Sites.

SOCIETY (CIVIL SOCIETY, CITIZENS, ETC.)

Continue reading

THEMATIC | **BATHYMETRY** | **HUMAN ACTIVITIES** | **USE CASE SECTOR** | Government/Public Administration, Business/Private Sector and Society

1. Characterization of the potential Spanish offshore wind energy landscape through an EMODnet data-driven dynamic dashboard

The research group in Landscape Analysis & Management of the Department of Geography of the University of Girona (Udg; Spain) is a leading research group in basic and applied research in regional planning and management. Its core research activities include management of coastal areas, ecological connectivity, landscape policy design, GIS-based modelling, and remote sensing.

The Department of Geography is carrying out the fellowship of the project Blue-Paths - Addressing Sustainability Transition Pathways in the Blue Economy, which aims to foster sustainable use of the marine socio-ecological systems (SES) through the development of an innovative Sustainable Transition Framework (STF), that will investigate the pathways of pervasive ocean technologies (OTs) transformations in the most important sectors of the Blue Economy e.g. Ocean Renewable Energy (ORE) Systems, coastal tourism, shipping, nature protection. The study area is the Spanish sea space.

The **Blue-Paths project made use of various open-source geospatial datasets from EMODnet Bathymetry and EMODnet Human Activities for the design of a dashboard demonstrator and the development of indicators**. The dashboard has dissemination purposes to highlight the spatial conditions and interaction of the **high potential areas for offshore wind energy** with other human activities.

Read the full use case here.

©Blue-Paths
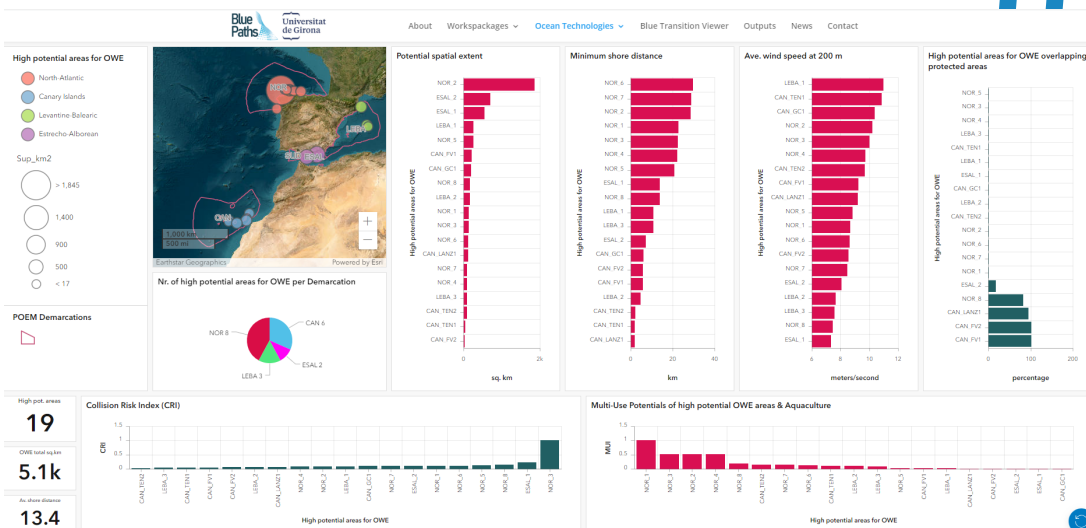
GEOLOGY

THEMATIC   **BATHYMETRY**   **HUMAN ACTIVITIES**

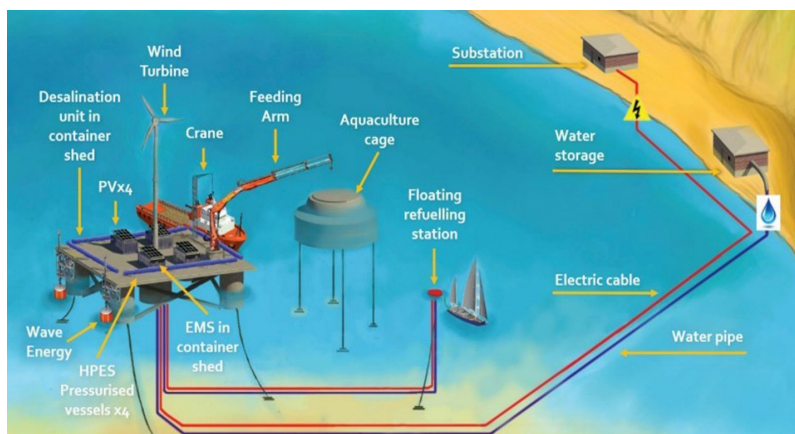**USE CASE SECTOR**   **Research/Academia and Business/ Private Sector**

2. Utilizing marine data for the design of a floating multiuse renewable energy platform

The University of Aegean – UAEGEN (Greece), consists of a network of "academic ports of studies and research" successfully established in six campuses spread across the Aegean Archipelago, providing a unique natural, cultural and human environment. With the long nautical tradition of Chios, the Department of Shipping, Trade and Transport (STT) has succeeded to emerge as an extrovert international Centre of Excellence in University shipping studies.

The Multiple Use of Space for Island Clean Autonomy (MUSICA) project has developed a replicable smart multi-usage of space (MUS) platform for the concurrent use of three types of renewable energy – wind, Photovoltaic (PV) and wave – at small islands. The MUS will also contribute to the advancement of a successfully tested multi-use platform (MUP), which was previously developed by UAEGEAN and the private company EcoWindWater. The MUS will offer a one-stop decarbonising shop for the islands that includes on-site energy storage, modelling and forecasting, desalination, and so-called green services to support aquaculture.

The MUSICA project used EMODnet map services and data from EMODnet Bathymetry (e.g. Bathymetric contours), EMODnet Geology (e.g. Seabed Substrate) and EMODnet Human Activities (e.g. Cables & pipelines, Aquaculture facilities, Environment, Ports, Military areas, etc.) to identify areas of potential constraints in siting offshore multi-use renewable energy platforms e.g. use of marine space by other users, marine protected areas, etc. The available data products are very useful for preliminary siting through synthesis and visualization of the different thematic layers, allowing further processing, and are used as an initial source of information, identifying the most suitable areas for the establishment of the multi-use platform, avoiding constraints, and limiting in situ investigation only in appropriate areas.

Read the full use case here.

GEOLOGY

SEABED HABITATS

THEMATIC   **BATHYMETRY**   **HUMAN ACTIVITIES**

USE CASE SECTOR   **Business/Private Sector**

3. EMODnet Geology data services used by the Offshore Renewable Energy sector

Energinet is an independent public enterprise owned by the Danish Ministry of Climate, Energy and Utilities. Energinet 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 develops offshore wind farms and energy islands in the Danish marine territory pursuant to the Danish Act on the Promotion of Renewable Energy.

Based on decisions in The Danish Parliament (The Energy Agreement 20181, and The Climate Agreement 2022) Energinet has been imposed to implement preliminary studies of the seabed prior to the development of new offshore windfarms and energy islands in the Danish waters. It carried out several seabed investigations to establish preliminary models of the subsurface in the selected areas prior to the possible establishment of offshore wind farms. In this case, **Energinet repeatedly used EMODnet Geology data products, including the Seabed Substrate map as baseline seafloor data and information to avoid unsuitable areas such as mud basins in the (micro)siting of offshore renewable energy platforms**. Energinet uses the Index Map to get an overview on available geological knowledge for the Danish seas and are guided to the relevant geoscience organisations for further details. The access to the EMODnet portal helps Energinet in the development of new offshore energy installations and constitutes an asset to minimize costs in the planning process. **The map services and data from other thematics also helped provide information to highlight areas of potential constraints, e.g. vulnerable habitat areas**.

Read the full use case here.
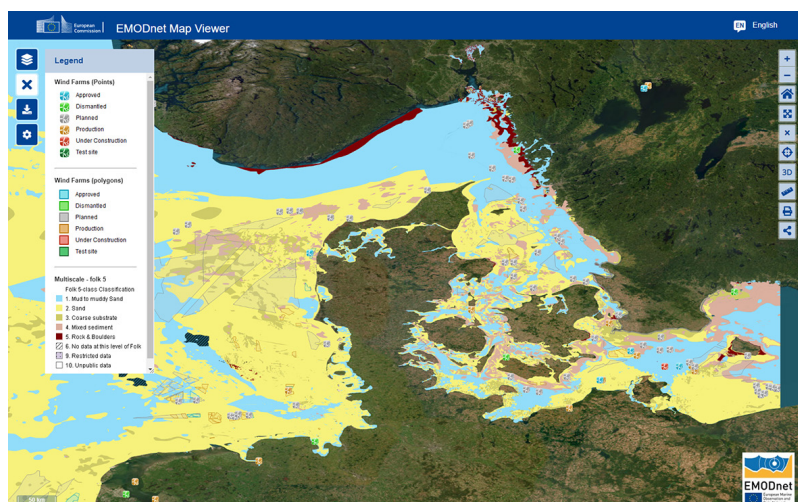
EMODnet Map Viewer showing Wind Farm information (EMODnet Human Activities) and the relation to the seabed substrates @EMODnet Geology.

EMODnet for business

With its harmonised open data resources, the EMODnet Portal and its data services are central to the EU's efforts to support the Blue Economy with trusted and high quality marine data and knowledge. With the combined effort of over 120 partners, the EMODnet service provides open and free access to pan-European marine data, data products and information that offshore and coastal businesses and operators use as an evidence-base to inform platform sitings, de-risk their platforms, reduce their costs in data collection, and enables climate-smart decision making based upon the combination of marine environmental and human activities data, including national Maritime Spatial Plans. The EMODnet service also provides opportunities for small and medium-sized enterprises (SMEs) and consultancies to build on top of EMODnet's baseline FAIR data layers and products, promoting the innovation of new applications and services that the private sector and public-private partnerships develop for targeted stakeholders, thereby driving forward research and innovation in the Blue Economy.

EMODnet for Business workshop for Coastal Tourism sector. ©EMODnet Secretariat

EMODnet for Business: Marine Data for the coastal tourism sector

ONLINE EVENT   #MarineData4CoastalTourism

EMODnet for Business is an important component of EMODnet's partnership engagement, with many private sector organisations using EMODnet services as intermediate and end-users, and increasingly submitting data to EMODnet. For this reason, EMODnet conducts dialogues, demonstrations and events specifically aimed at the Blue Economy and business. Building on the success of previous events for Aquaculture (2020-2021) and Offshore Renewable Energy (2022), the 2023 event was dedicated to the Coastal Tourism sector.

On 26-27 September 2023, EMODnet together with EC DG MARE organised an online workshop on "EMODnet marine data for coastal tourism". The workshop was attended by over 40 coastal tourism experts with representatives from diverse sectors including research, policy, marine data services and non-governmental agencies. EMODnet was well represented by many thematic experts, including from geology, human activities, physics, Data Ingestion, Central Portal and the EMODnet Secretariat. The agenda included a demonstration of the latest EMODnet services, use cases of how the coastal tourism sector use EMODnet data and data products, and dialogues on data requirements and data sharing. A key goal was for EMODnet to gather feedback on which EMODnet data and data products are already being used by the coastal tourism 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 coastal tourism sector, so that opportunities for data sharing could be identified and further discussed.

"Having access to harmonized environmental data is very useful. We currently utilize EMODnet data products spanning from physics, human activities, and geology for both marine and coastal areas." – Plan Bleu

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.

The workshop facilitated interactive dialogue, with breakout sessions and plenary discussions producing several interesting outcomes. On day one, it was noted that coastal tourism stakeholders need training on how to gather marine data and how to share it with EMODnet. Sailors, divers, kayakers, aquafarmers, etc. also need education and ocean literacy on data gathering and interpretation. In addition to the use cases already presented in the plenary, stakeholders noted that they use a wide range of EMODnet data and data products, spanning the marine environment (particularly physical, bathymetrical, geological and seabed habitats data, together with data on human activities at sea). It was underlined that EMODnet's marine data could usefully support eco-tourism. Citizen science was highlighted as an emerging sector where EMODnet could increase its dialogue to increase awareness and use of EMODnet data and data products, e.g. in the planning and implementation of citizen science projects, and via the European Atlas of the Seas for education and ocean literacy.

For the day two breakout sessions, it was noted that whilst EMODnet collects data from research, the private sector and some governmental institutes, the network could investigate other sources of data, e.g. from coastal tourism municipalities. Participants noted that very few of them are collecting marine environmental data up to now, although some do gather human activities data, e.g. visitor numbers or hotel stays. Encouragingly, many breakout group participants said they are starting to collect marine data and want to share it with EMODnet. Some barriers to data sharing that were identified during the workshop included region-specific barriers, commercial sensitivity and lack of capacity building and training.

The workshop agenda, presentations, and workshop reports can be found and downloaded on the EMODnet Portal and on the EC Maritime Forum.

EMODnet for Business and the Blue Economy: Coastal Tourism

Seafood tourism (1)

Coastal/Beach Hotels & Resorts (2)

Other water sports (3)

Coastal and Marine Wildlife & Cultural Heritage Tourism (4)

Nautical tourism and recreational boating (5)

Examples of key coastal tourism sectors.
©EMODnet Secretariat

(1)Recreational fishing, Credit: YuriArcursPeopleimages on https://elements.envato.com/ (2) Alex Tihonov (3) Snorkeling, Credit: Bastian Riccardi on https://unsplash.com/photos/atvc-Ci_qdc(4) Cultural Heritage, Credits: Peristera Underwater museum Municipality f Alonissos on https://museum.alonissos.gov.gr/en/photo-gallery/ (5) Recreational sailing, Credit: nd3000 on https://elements.envato.com/.

EMODnet Associated Partners

The EMODnet Associated Partnership (AP) Scheme is a free and flexible network for stakeholders who are not funded by EMODnet to join the EMODnet community for closer dialogue with EMODnet experts and to develop win-win collaboration in the domain of marine data. The EMODnet AP Scheme is open to both the private and public sector, including public-private partnerships. In 2023, the EMODnet AP Scheme was strengthened to 31 members with three new EMODnet Associated Partners, namely Puertos del Estado, e-BO Enterprises and Marine Centre Wales, School of Ocean Sciences, Bangor University.

EMODnet Associated Partners, December 2023 ©EMODnet Secretariat

What are the benefits of joining the EMODnet Associated Partnership Scheme?

» If you are a stakeholder that would like closer dialogue with EMODnet experts, but you prefer a light and flexible status without contractual obligations or complicated application/exit procedures, then the EMODnet AP Scheme is for you;

» An EMODnet Associated Partner is formally recognised as a member of the EMOD-network without any associated contractual obligations i.e. without receiving funding and without the need to be a contractual partner in one of the projects;

» In dialogue with the EMODnet Secretariat and wider partners, each AP needs to show both motivation and concrete activity that is win-win for EMODnet e.g., use case development, data sharing, best practice exchange;

» EMODnet APs receive regular updates from EMODnet on service updates, wider marine data landscape developments in Europe and beyond and invitations to speak at EMODnet events, including information not publicly shared in the EMODnet monthly newsletter;

» EMODnet APs can have closer dialogue with EMODnet experts to see how EMODnet can serve your organisation's needs, opportunities for data sharing, sharing of best practices, EMODnet's service evolution;

» EMODnet works with APs to explore win-win collaboration opportunities that are tailored to an APs needs, whether it is raising visibility of the EMODnet APs data sharing achievements and the company's impact for the European and Global Ocean Data Ecosystem, to exchanging on the European data space and digital twin ocean developments, solving technical queries on how to optimise the use of EMODnet for Blue Economy planning and operations, or being invited to speak at flagship high visibility EMODnet events e.g., EMODnet Open Conference series to present use cases and company perspectives and more;

» EMODnet APs have the opportunity to explore future funding possibilities, and some evolve to become funded partners of EMODnet, in dialogue with EMODnet Thematics and Data Ingestion.

Further information on EMODnet for Business, its Associated Partnership Scheme and more:

» Explore EMODnet's wealth of marine data services for the Blue Economy and beyond:
https://emodnet.ec.europa.eu/en

» Explore how EMODnet can support you to ingest your data for high impact:
https://www.emodnet-ingestion.eu/

» Apply to become an EMODnet Associated Partner:
http://www.emodnet.eu/emodnet-associated-partners

» Share a use case: http://www.emodnet.eu/use-cases

» Follow EMODnet on social media @EMODnet on LinkedIn, Twitter/X

» Contact the EMODnet Helpdesk with your questions: secretariat@emodnet.ec.europa.eu

EMODnet partnerships: Europe

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 Portal News and in the monthly news digests that are available on archive.

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European Ocean Observing

In 2020, EC DG MARE launched the 'EC Ocean Observation – sharing responsibility' initiative with a key objective to stimulate European Member States to increase their levels of coordination and efficiency in Ocean observation, marine monitoring, and data collection. To support these endeavours, EMODnet conducts activities to strengthen the connection and dialogue with the European Ocean observation community and stakeholders across the marine knowledge value chain, and is a member of the European Ocean Observing System (EOOS) governance boards and dialogues. In 2023, activities included further activities related to the legacy and added value of the EMODnet Sea-basin Checkpoints (see below) and a targeted assessment focusing

on the coordination of ocean observation/monitoring and marine data at European regional sea-basin level, including dialogue with the four European Regional Sea Conventions (RSC), and ICES. This preliminary study will be further expanded in 2024.

EMODnet Sea-basin Checkpoints

Although the EMODnet Sea-basin Checkpoint (SBCP) projects ended in mid-2018, the EMODnet-network continued recognizing the value of the methods and outputs by widely communicating these at conferences and events on European and international level and discussing methodologies with key EU actors including the European Marine Board, EuroGOOS and Copernicus Marine Service and EU projects e.g., EuroSea in the context of EOOS.

In 2023, EMODnet published the results of a community study, including a stakeholder workshop and consultation, on the added value of the EMODnet SBCPs. The key findings were summarized in a report, providing insights in the feedback and recommendations from the stakeholder consultations on the SBCP methodology/approach, the geographical coverage and engagement with the private sector. The study also included a re-evaluation of the status of EMODnet marine data adequacy compared to the status in 2018. It was noted that the EMODnet SBCPs methodologies provided information on the adequacy for particular data for user applications (challenge topics) at a particular time that could be used to inform the ocean monitoring community on the assessment of data gaps to help prioritize planning of resources for future ocean observation, marine monitoring and data collection efforts and design, towards a fit-for-use European ocean observation and marine knowledge pipeline to users.

EMODnet and 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 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 thematics, 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 2023, key collaborations and joint activities between EMODnet and Copernicus Marine Service include:

» **Two online coordination meetings** on 2 February and 20 October 2023 respectively, 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);

» Regular dialogues between EMODnet and Copernicus Marine Service experts on **operational oceanographic *in situ* marine data flows,** as part of the **Marine In Situ Collaboration Inter-service Working Group (MIC WG)**;

» The release of a **joint communication on the EU *in situ* marine data landscape**. The statement explains the complementarity between the two EU marine knowledge assets, and explains how the services work together, following a high-level agreement between DG DEFIS and DG MARE and the signature of Memorandum of Understanding (MoU) in 2016;

» **Increased collaboration in the context of EDITO-Infra** to create the EMODnet – Copernicus Marine Service infrastructure backbone and common data lake for the **European Digital Twin Ocean** (see below).

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, 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.

EMODnet for the European Digital Twin Ocean

EMODnet has a key role in the European Digital Twin of the Ocean (EDITO). EMODnet, as it is instrumental in the success of EDITO providing the diverse in situ marine data and data products into the EDITO platform to complement the operational oceanographic in situ data and satellite-derived data of Copernicus Marine Service.

At the centre of EDITO's technical advancements lies the establishment of a comprehensive data lake. The main aim of the "EU Public Infrastructure for the European Digital Twin Ocean (EDITO-Infra)" project is to build the "backbone" public infrastructure for the EU Digital Twin of the Ocean. This innovative feature seamlessly integrates data products of both EU marine services EMODnet and Copernicus Marine Service. Leveraging cutting-edge Open-Source technologies from the cloud computing industry, the data lake offers robust and scalable object storage, coupled with high-performance computing (HPC) resources. This combination is pivotal for enabling on-demand data analysis and the creation of sophisticated 'what-if' scenarios.

By providing fast and scalable access to EMODnet and Copernicus Marine data products, EDITO aims to become a cornerstone for Digital Twins of the Ocean. This integration offers a significant opportunity for the EMODnet community to incorporate products into international digital twin initiatives, expanding the scope and reach of our work. Furthermore, the EDITO platform will be accessible to the EMODnet user community, providing access to state-of-the-art technologies and data resources that can be utilized to develop and enhance their research.

©EDITO project

EMODnet partnerships: Global

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 many thematics available through the EMODnet services covering seas and the ocean beyond European waters e.g., Caribbean Sea, Caspian Sea, and in some cases global coverage e.g., EMODnet Physics and Biology.

At the overarching level, EMODnet collaborates with other international data initiatives including 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). In 2023, thanks to the centralisation of the EMODnet Portal and the central metadata catalogue, EMODnet products are connected to global ocean data and metadata catalogues and initiatives such as the IODE of IOC-UNESCO Ocean Data and Information System (ODIS) catalogue, in the OceanInfoHub (OIH) catalogue and the Group on Earth Observations System of Systems (GEOSS).

Whilst EMODnet's core mandate remains the delivery of pan-European coverage for multi-disciplinary marine data, many thematics already offer a global coverage in partnership with other key initiatives. In 2023, the thematics also focused on extending the coverage in other regions worldwide, e.g., the Caribbean Sea and the Caspian Sea, among others. For example, **EMODnet Bathymetry**'s upgraded version of the Digital Terrain Model (DTM), which was released in early 2023, is a further upgrade to the previous DTM v2020 as it integrates bathymetric data from even more data providers and diverse sources to deliver several key upgrades including higher resolution and updated coastlines of European seas, coupled with extended geographical coverage, including the Caribbean arc. In addition, **EMODnet Geology** updated existing data products with new data from wider regions, resulting in an extension of the geographic coverage to the Caribbean Sea, also thanks to increased partnership in the region, including with the Mexican Geological Survey.

UN Decade of Ocean Science for Sustainable development (UN Ocean Decade)

In March 2023, EMODnet became an official implementing partner of the UN Ocean Deade. As a flagship regional marine data service in Europe contributing to the global ocean data ecosystem, EMODnet seeks to deliver high quality marine data, information and knowledge as a contribution to a truly transparent and accessible global 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 2023 with several concrete contributions:

» Endorsement of EMODnet as a Decade Implementing Partner (DIP) in March 2023. Since December 2023, EMODnet DIP has also been primarily attached to the Decade Coordination Office for Ocean Data Sharing to further enhance its support to the global data sharing initiatives;
» Throughout year 2023, Jan-Bart Calewaert (Senior Advisor; former Head to EMODnet Secretariat until April 2023) continued co-chairing the UN Ocean Decade Data Coordination

Group, which completed the drafting the Ocean Decade Data and Information Strategic Plan released in early 2023, contributing EMODnet recommendations and principles for supporting the Data Vision under the UN Ocean Decade;

» The informal "EMODnet for Ocean Decade Coordination and Implementation Group" (E4OD-CIG) heled 2 online meetings in 2023, and actively contributed to the mapping of EMODnet partners in different OD actions. The E4OD-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;

» Attended official Global Decade Implementing Partner meetings organised regularly by the Ocean Decade Coordination Unit (DCU);

» Attended informal meetings for European DIPs organised by the European Marine Board;

» 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);

» Supported IOC/IODE in its Ocean Decade underpinning actions and projects, among others as a member of IOC's ODIS (Ocean Data and Information System) and Ocean Infohub project Steering Committees to advise on the technology/architecture and connecting EMODnet resources to these global data and information platforms, positioning EMODnet as a core European service node.

Other relevant contributions to a range of relevant global initiatives, events and projects

» EMODnet was present at the second International Ocean Data Conference (Paris, France, 20-21 March 2023);

» Coordinating EMODnet inputs on the topics of EMODnet for Marine Spatial Planning and EMODnet for Business (focus Offshore Renewables) to the UN Global Compact Marine Spatial Planning Offshore Wind Working Group (MSP-OFW) to a report launched at COP28 in December 2023;

» Jan-Bart Calewaert, EMODnet Senior Advisor Global Partnerships and Chair of the EMODnet Steering Committee, participated in September 2023 as a speaker in a session on Blue Economy at the EU-China Blue Partnership Forum for the Oceans in Shenzhen, China, where he presented on the EU-China ocean data partnership collaboration between EMODnet and NMDIS which is contributing to shape the global digital ecosystem in support of sustainable ocean management and the blue economy.

EMODnet catalogue retrieved through the GEOSS portal, ©GEOSS

EMODnet Open Sea Lab 3.0 Hackathon

The EMODnet Open Sea Lab (OSL) is a Hackathon series led by the EMODnet community in collaboration with wider marine data services, with the principal aim to raise awareness of EMODnet and to promote the use of EMODnet data/data products and services to users across Europe and beyond. Following the first and second editions of OSL in 2017 and 2019 respectively, the third edition of OSL (3.0) took place early Spring 2023, specifically timed so that users could test the newly launched unified EMODnet Portal, including its simplified user-interface, and feature and functionality upgrades. The third edition of EMODnet's hackathon invited the community to explore and exploit the advantages brought by having a common cross-thematic map viewer and new, expanded functionalities and features, and a central metadata catalogue.

As in previous editions, EMODnet OSL 3.0 was organised in collaboration with others with the third edition co-organised with EC DG MARE, Copernicus Marine Service, ICES, VLIZ, IMEC, and Marine at UGent. The hackathon presented six challenges to which participants could use open marine data for societal solutions.

The third edition of the OSL hackathon took place online, with a kick-off and warm-up sessions in February – March 2023 and the 2-day hackathon taking place on 27-28 March 2023. Through the Event Tornado platform, participants collaborated, engaged with mentors, and connected with lead mentors. The event attracted over 500 registrations from 80+ countries, reflecting its global appeal and emphasizing virtual connectivity and inclusivity. This successful virtual format facilitated diverse participation and supported the primary goal of expanding the user base of the EMODnet network.

The winning teams of EMODnet OSL 3.0 presented their innovations during the European Maritime Day (EMD 2023) on 24-25 May 2023. A short video of Open Sea Lab 3.0 has been produced to accompany the report, including winning team pitches and wider activities at EMD 2023.

OPEN SEA LAB 3.0 HACKATHON REGISTER NOW   Agenda ideation   Terms and conditions

Challenge #1

PROTECTING AND RESTORING MARINE & FRESHWATER BIODIVERSITY.

How might we leverage EMODnet to evolve a true trans-European nature network that protects our sea areas; to restore rivers or to scale up nature-based solutions that improve the resilience of coastal communities?

Challenge #2

ELIMINATING POLLUTION OF OUR OCEANS, SEAS, AND WATERS.

How might we leverage EMODnet to reduce microplastics and plastic litter at sea or to reduce the use and risk of chemical pesticides, through innovative solutions or improved international governance?

Challenge #3

MAKING THE BLUE ECONOMY CARBON-NEUTRAL AND CIRCULAR.

How might we leverage EMODnet to eliminate or sequester greenhouse gas emissions from maritime economic activities; develop zero-carbon and low impact aquaculture; promote low-carbon, multi-purpose use of the marine and water space;

OPEN SEA LAB 3.0 HACKATHON REGISTER NOW   Agenda ideation   Terms and conditions

Challenge #4

CONTRIBUTING TO THE UN DECADE OF OCEAN SCIENCE FOR SUSTAINABLE DEVELOPMENT.

How might we leverage EMODnet to advance a digital knowledge system that supports international collaboration towards better understanding, monitoring, forecasting and protecting the

Challenge #5

EMPOWERING SOCIAL INNOVATION.

How might we leverage EMODnet to inspire and support social innovation practices or participatory governance approaches that empower citizens to co-design and co-implement solutions to restore our Ocean and Waters by 2030?

Challenge #6

WILD CARD: HACK THE OCEAN!

How might we leverage EMODnet data for the change that you would like to see in our relationship with the Ocean?

OSL3.0 Challenges, ©EMODnet Secretariat

OPEN SEA LAB 3.0 HACKATHON Virtual

EMODnet European Marine Observation and Data Network

Registrations and participation data.

Registrations
511
Countries
80
Starting participants
165

From North America: 24
From Central and South America: 6
From Europe: 94
From Africa: 8
From Asia: 25
From Oceania: 3

Registered teams
39

Teams in Challenge 1: 10
Teams in Challenge 2: 11
Teams in Challenge 3: 3
Teams in Challenge 4: 4
Teams in Challenge 5: 7
Teams in Challenge 6: 4

OSL 3.0 participation metrics, ©EMODnet Secretariat

EMODnet Open Conference and Jamboree 2023

Between 27-30 November 2023, over 340 partners, associated partners and wider stakeholders of EMODnet gathered in Brussels, Belgium, for the third edition of the EMODnet Open Conference and Jamboree. The EMODnet Open Conference and Jamboree is a flagship EMODnet event series, with the previous (second) edition having taken place fully online

Powering the European Marine Data Ecosystem

For a digital and green future

EMODnet
European Marine Observation and Data Network

OPEN CONFERENCE

29-30 November 2023
Brussels | NHow

#EMODnetConference2023

in June 2021, due to ongoing Covid restrictions. The 2023 edition was a fully in-person event with a week of activities spanning Jamboree partner meetings to the fully public 1.5 day Open Conference, offering a wide range of networking opportunities, meetings, interactive dialogues and plenary sessions, also including a physical exhibition.

Third Open Conference group picture, @Serena Vittorini

A two-day EMODnet Jamboree kicked of proceedings, where the >120 EMODnet partner organisations and associated partners met for thematic and data ingestion consortia meetings and for cross-thematic dialogues, spanning topics from EMODnet for the coastal zone to EMODnet and citizen science, demonstrations of the EMODnet Central Map Viewer and Portal and more. Partner meetings set the stage for the public Open Conference, which took place on 29-30 November 2023.

Journalist Karen Coleman served as the Conference Master of Ceremonies, with over seventy speakers and panellists taking the stage for the 1.5-day event. Under the Conference title "**For a Digital and Green Future**," participants discussed the critical and expanding role of EMODnet in powering the Marine Data Ecosystem in Europe and beyond.

The Conference was timely for the EC marine data service, following the unification of EMODnet thematic services into one Portal in January 2023.

Presentations and debate were spread over seven sessions and four interactive Townhall meetings. The EMODnet Open Conference 2023 took stock of EMODnet's evolution to-date into the operational European Commission in situ marine data service it is today, a flagship initiative funded by the EC DG MARE, and one of the main Marine Knowledge assets of the European Union. Charlina Vitcheva, Director-General of DG MARE opened the Conference noting "I have seen it [EMODnet] grow from a network of marine communities to a single point of access supporting sustainable marine policies. It is now an integral part of the Green Transition, establishing good practices by providing good data. ", followed by a welcome from Kate Larkin, Head of the EMODnet Secretariat. The 7 thematic Coordinators of EMODnet then presented the latest EMODnet service offer, a public portal serving users with pan-European data and data products across hundreds of parameters spanning the marine environment (bathymetry, biology, chemistry, geology, physics and seabed habitats) and human activities at sea. Finally, a Panel including wider stakeholders discussed the value of EMODnet, including perspectives from the Copernicus Marine Service, Regional Sea Conventions, the private sector, EU Member States, EMODnet associated partners and the winner of the EMODnet Open Sea Lab 3.0 Hackathon, and more.

Opening the Conference, **Charlina Vitcheva, Director-General for the European Commission Directorate-General Maritime Affairs and Fisheries (EC DG MARE)**, stated "*I have seen EMODnet grow from a network of marine communities to a single point of access supporting sustainable marine policies. To understand the planet, we need marine data and a better understanding of the marine environment.*"

Opening Speech by Charlina Vitcheva, @Serena Vittorini

Kate Larkin, Head of the EMODnet Secretariat, noted "*EMODnet has seen significant and rapid evolution in the last few years to make it the EC marine data service it is today.*" She added that "*EMODnet's unified service [achieved in January 2023] is an immediate game changer for the user....and also delivers global impact.*"

Opening Speech by Kate Larkin, Head of EMODnet Secretariat, @Serena Vittorini

EMODnet's key role in the European and wider marine knowledge value chain was the subject of a session which included stakeholders from EMODnet Thematics, Data Ingestion and Sea-basin Checkpoints, Copernicus Marine Service, the European Ocean Observing community, European Commission and more. The EMODnet user community was also well-represented by diverse stakeholders, presenting use cases of EMODnet for EU Policy, EMODnet for the Blue Economy, EMODnet for Research/Academia and more.

Presentation by Dick Schaap, MARIS, EMODnet Data Ingestion, @Serena Vittorini

The event was also a chance to celebrate existing partnerships, with a panel discussing EMODnet's contribution to global ocean best practices, interoperability, and efficient data sharing for the global ocean data ecosystem and the UN Ocean Decade, and a second panel exploring EMODnet's existing and emerging partnerships worldwide, including with NMDIS, China, with whom EMODnet has a long-standing collaboration via the EU-China EMOD-PACE and CEMDNET projects.

Representatives from NMDIS, Chain and the EMODnet Secretariat, @Serena Vittorini

An EMODnet Call to Action was launched in the closing session, which calls upon key actors to work with the EMODnet community to help shape EMODnet's future evolution, setting the stage for an EMODnet vision to 2035 that will be developed by the end of 2024.

Besides a physical exhibition, attendees had the chance to explore the updated EMODnet virtual exhibition through an interactive session and the presentation of a short "fly-through" video. This online hub is packed with resources and updates on EMODnet's thematic and data ingestion services, showcasing important partnerships spanning various sectors, from business to ocean observation, both at the EU and global levels, hosting EMODnet videos, communication materials, the European Atlas of the Seas highlights and updates and over 50 community posters.

Virtual Exhibition, @Charles Henniker-Heaton and Jodi Phillips

Rediscover the EMODnet Open Conference and Jamboree 2023 resources!

» Download the EMODnet Conference 2021 Report;
» Relive the moment and watch the EMODnet Open Conference 2023 video;
» Read the EMODnet **Call To Action**;
» Read the full news article on the EMODnet Portal;
» Discover the EMODnet Open Conference 2023 Virtual Exhibition;
» More information on the programme, speakers and panelists can be found on the EMODnet Portal;
» The EMODnet Open Conference 2023 was also communicated on social media (Twitter/X) using the hashtag #EMODnetConference2023.

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, educators and students. First launched in 2010 by the European Commission Directorate-General for Maritime Affairs and Fisheries (EC DG MARE), it presents marine information 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.

With its constantly evolving catalogue of more than 270 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. In 2023, the Atlas also gained its first Citizen Science map with water temperature information collected directly by schools and by means of miniboats built by schools in the framework of the Miniboats Programme, in collaboration with the Education for Climate coalition and with contributions of Partnership for Observation of the Global Ocean (POGO) and Educational Passages.
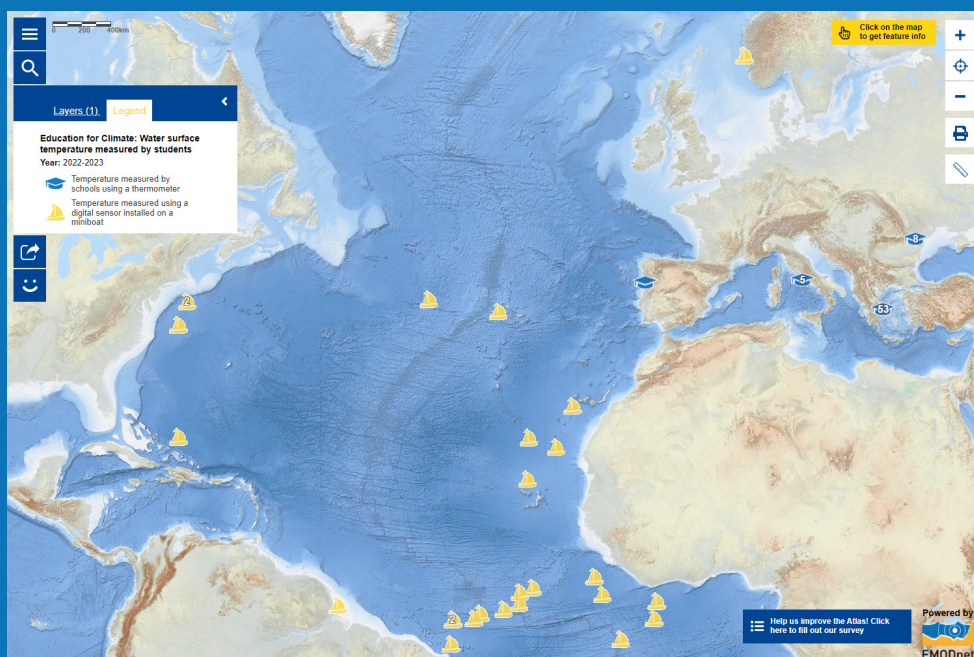

The first citizen science map in the Atlas resulting from the Education for Climate challenge "Be a scientist! Mapping climate change at seas & waterways".

The Atlas provides several functionalities that enable users to find and understand natural and socio economic information on the marine and coastal regions of Europe and make use of interactive maps in teaching resources and online media. The Atlas allows to search for and combine maps on different topics, navigate and interact with maps to find more information, print, share and embed maps on websites, find geographical coordinates of any location as well as calculate distances and areas.
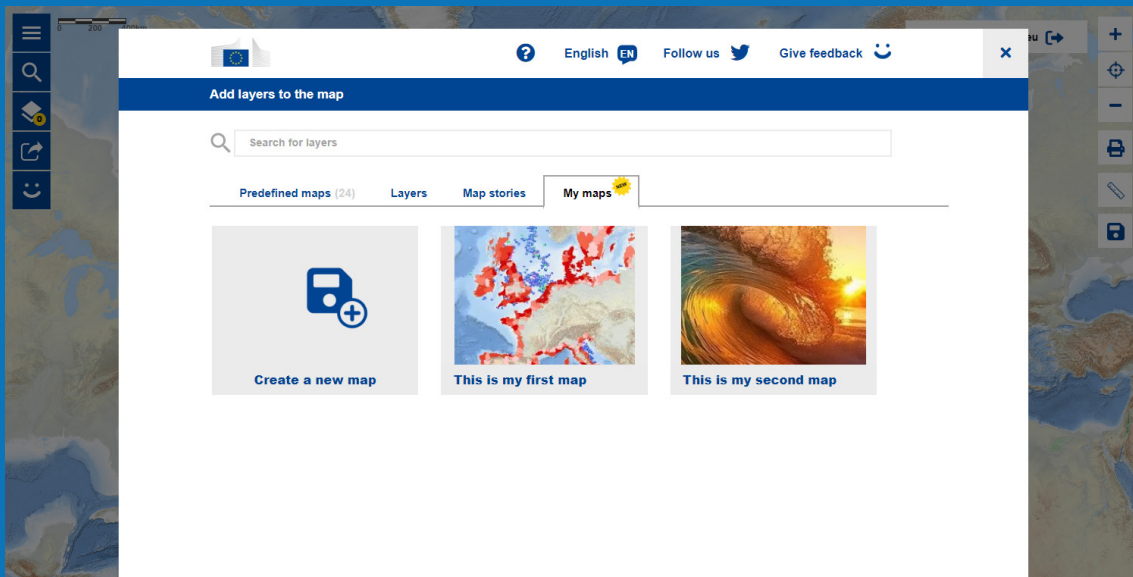
The My Maps tool enables users to save custom combinations of map layers with a title, description, and image in their own space.

In 2023, the Atlas gained the My Maps tool. This new functionality allows users to have their own space in the Atlas where they can save custom selections of map layers and enrich them with a title, description, and picture. Teachers in particular can use the My Maps functionality to prepare lessons and work in the classroom. A video tutorial with some examples of how you can use the My Maps tool is available on the EMODnet YouTube channel. While this is a major milestone for the Atlas, it is only the beginning. This first phase of the My Maps tools lays the foundations for more advanced map customization options. Throughout 2023, feedback from Atlas users and teachers was collected and based on the 100 responses, the My Maps tool will be expanded with functionalities requested by the Atlas users like the ability to annotate maps and add your own data to the map.
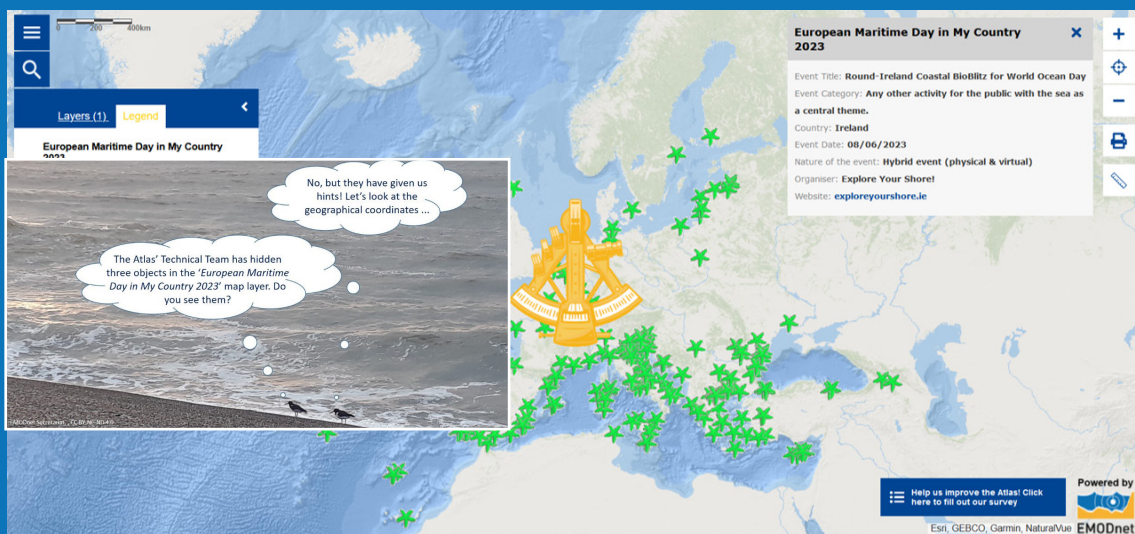
The geocaching game is a fun interactive way to learn how to use the European Atlas of the Seas and find out about European Maritime Day in My Country events.

Through its availability in 24 languages and the integrated interactive help tool, users from across Europe can gain a rapid understanding of how the Atlas works and have an overview of all of the available features and ways to 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 the Geocaching game developed in association with the EMD in My Country 2023 map layer.
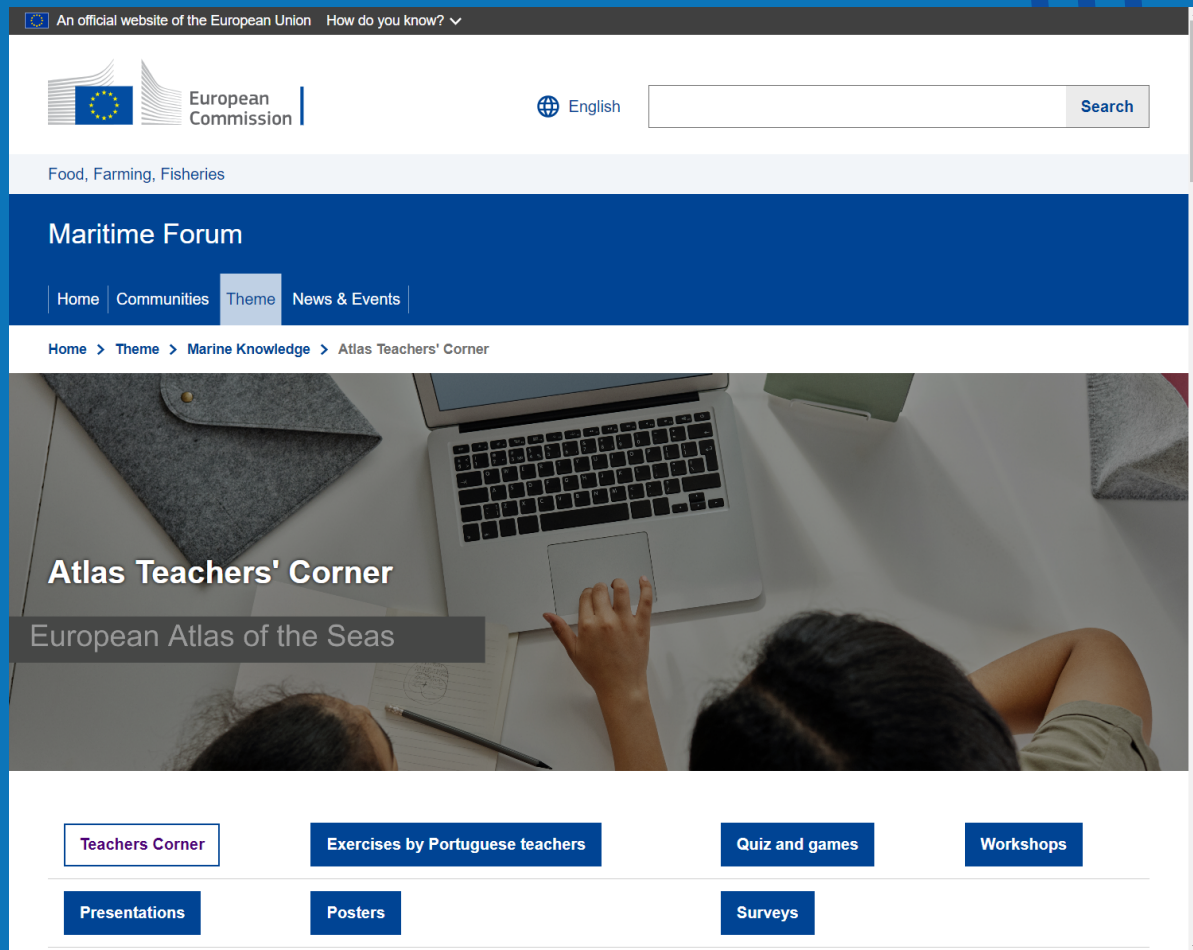
The front page of the revamped Atlas Teachers' Corner on the Maritime Forum.

Key achievements in 2023

» The Atlas catalogue contains over 270 map layers. In 2023, 64 map layers were updated and two new map layers were added, including the map on the 'European Maritime Day in My Country Events 2023' and the 'Education for Climate: Water surface temperature measured by students' map;

» Five new thematic predefined maps were released in the Atlas, combining map layers on the topics of marine data, biodiversity, food from the ocean, clean energy, and climate change;

» The My Maps tools was released, allowing users to make the Atlas their own, by saving custom combinations of map layers with a title, description, and image;

» Promotion efforts have strengthened the visibility of the Atlas. These included the participation in three workshops and promotion of the Atlas at seven events, online publication of the Map of the Week every Friday on the Maritime Forum, a map of the month in the DG MARE newsletter and regular activity on the Atlas Twitter account;

» The Teachers' Corner was revamped to make it more attractive and user-friendly. Several new exercises and games were added, including a geocaching game, an educational quiz and a map-based exercise on marine biodiversity co-developed with marine biologist and diver Martina Gaglioti, as well as materials from workshops and events;

» An article was published in the Science in School journal (February 1, 2023 | Issue 61: 'The European Atlas of the Seas: an interactive tool for ocean literacy');

» Content in the European Atlas of the Seas 'room in the EMODnet Virtual Exhibition was updated;

» These new developments accompanied by structured promotion and outreach activities have led to a total of up to 90,000 visits in 2023, further exposing EMODnet data and products to a growing audience across Europe and the World.
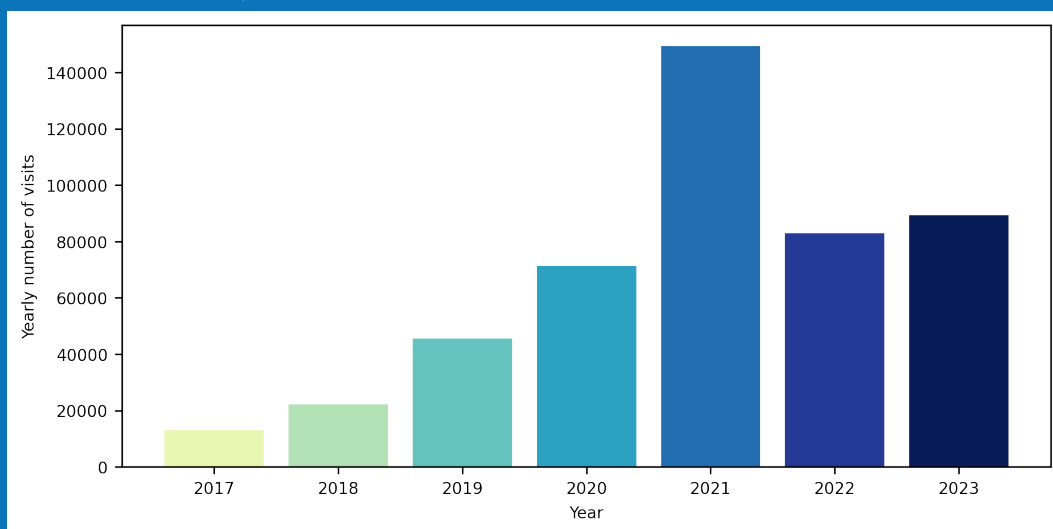
Yearly visits to the European Atlas in the Seas in the past six years (Credits: Europa Analytics)

Atlas: www.european-atlas-of-the-seas.eu

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

Twitter: @EuropeAtlasSeas

Budget

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

	Preparatory Actions[1]	Maritime Policy Fund[2]	European Maritime and Fis			
Theme & Project	2008-2010 (k€)	2011-2013 (k€)	2014 (k€)	2015 (k€)	2016 (k€)	2017 (k€)
Central services		520		4,565	155	1,420
Data Ingestion				4,045		
Secretariat		520		520		1,420
Secretariat Support					155	
Sea-basin Check-points		1,695	4,175			
Arctic			906			
Atlantic			1,590			
Baltic Sea			784			
Black Sea			895			
Mediterranean		1,095				
North Sea		600				
Observation				4,000		
Argo				4,000		
Studies	230	450			52	250
Costs and benefits		450				
Current status	230					
Evaluation						250
Observation benefits					52	
Ocean data and knowledge for EU policy making						
Thematic Groups	6,350	16,350	1,194	4,917	13,483	7,098
Bathymetry	2,175	2,000		4,917		3,720
Biology	750	1,700			1,770	1,770
Chemistry	700	4,000			2,805	
Coastal mapping			1,194			
Geology	925	4,200			4,500	
Human Activities		2,060			1,608	1,608
Physics	1,000	1,000			1,400	
Seabed Habitats	800	1,390			1,400	
Grand Total (K€)	6,580	19,015	5,369	13,482	13,690	8,768

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

...sheries Fund[3]			European Maritime, Fisheries and Aquaculture Fund[4]			
2018 (k€)	2019 (k€)	2020 (k€)	2021 (k€)	2022 (k€)	2023 (k€)	Grand Total (k€)
1,000	1,420	138	2,665		2,665	14.548
1,000			1,340		1,340	7.725
	1,420	138	1,325		1,325	6,668
						155
						5,870
						906
						1,590
						784
						895
						1,095
						600
						4,000
						4,000
				273		1,255
						450
						230
						250
						52
				273		273
4,671	5,737	7,074	4,237	6,810	4,816	71,111
	2,800		2,800		2,582	18,412
	1,500			2,000		7,490
1,399		2,234			2,234	11,138
						1,194
1,770		2,420		2,420		13,815
	1,437		1,437			8,150
950		1,050		1,020		5,400
552		1,370		1,370		5,512
5,671	7,157	7,212	6,902	7,083	7,481	103,594

EMODnet at 2023 and a vision for the future

EMODnet service evolution

The energy and momentum created at the EMODnet Open Conference and Jamboree 2023, together with the EMODnet Call to Action launched at the event, has set the stage for an **EMODnet Vision to 2035**, to be developed during the course of 2024, focusing on the service evolution of EMODnet. This will be a community effort, co-designed by a Drafting Group of representatives from across the EMOD-network and involving stakeholder consultation not only with the > 120 EMODnet partners and associated partners, but also the wider community. This community vision will be the first of its kind, providing key recommendations of how EMODnet could continue to evolve over the next decade.

In the meantime, EMODnet services will also continue to evolve, powered by the EMODnet Central Portal Technical Team and Twchnical Working Group, with new releases planned of the common Map viewer, optimization of the back-end and front-end metadata catalogue to further improve data discovery and access and interoperability with European and Global ocean data and metadata initiatives. Users can report bugs, provide feedback on services and suggest improvements via the EMODnet survey and Helpdesk. In 2024, EMODnet Data Ingestion **will also complete its centralisation into the EMODnet Portal**, fully completing the unification of all EMODnet services (following the unification of the seven thematics in 2023).

The continued evolution and upgrade of EMODnet and its concrete activities and connectivity across the marine knowledge value chain also supports **EMODnet's ongoing contribution to a coordinated and streamlined European Ocean Observing System and EC Ocean Observation Initiative**. Work in 2024 will continue targeted assessments on the regional coordination of ocean observation and marine data pipeline to EMODnet, with activities contributing also to the European Ocean Observing System activities.

EMODnet will also seek to **strengthen partnerships with other EU services** including the European Blue Economy Observatory, together with increased dialogue with the European Commission (DG MARE, DG ENV, DG RTD), the European Environment Agency and others to exchange on **EMODnet's support and contribution to EU Integrated Maritime Policy**, particularly for the Maritime Spatial Planning Directive and Marine Strategy Framework Directive, among others. EU partnerships will also be further strengthened at events including the **European Ocean Days** in Brussels in early March 2024, **European Maritime Day 2024** at the end of May 2024 in Svendborg, Denmark, at European expert group and technical group meetings for EU policy.

As a **UN Ocean Decade implementing partner**, EMODnet will actively present at the UN Ocean Decade Conference in Barcelona in April 2024, and evolution of EMODnet's service to include more coverage across Overseas territories and other regions worldwide will also continue.

Promoting data sharing and ingestion of *in situ* **marine data into EMODnet will also remain a priority** in 2024. One of the first upcoming activities towards this direction will be the "EMODnet for Horizon Europe and EU Mission: Restore our Ocean and Waters projects" webinar, taking place on 28 February 2024, aimed at Coordinators, partners, policy makers and wider representatives of European Horizon Europe and EU Mission Ocean projects collecting **in situ** marine data that do not yet have an established pipeline.
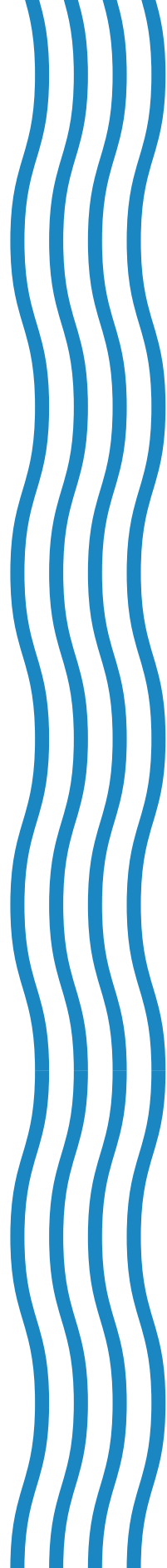
EMODnet's activities in private-public data sharing will also continue, with a further EMODnet for Business event planned, in addition to EMODnet presenting at industry-led events such as Oceanology International 2024 and attending BlueInvest, both in March 2024.

EMODnet's key contribution to the European Digital Twin Ocean (DTO) will also continue with the completion of the initial EDITO-Infra project, and a demonstration of the pilot infrastructure at the next Digital Ocean Forum in Brussels in June 2024.

EMODnet will also continue to power the EC digital information and communication tool the **European Atlas of the Seas (EU Atlas)**, bringing EMODnet and wider open source data to society. In 2024, the use of the European Atlas of the Seas on mobile devices will be optimized, and the user-experience will be further developed, including improvements to the print tool to allow the creation of Atlas maps in High Definition, for printing of posters or creating graphics for presentations, together with expanding the existing "My Maps" tool, to allow users to add their own data and to annotate maps, among other emerging features.

Thank you to the EMOD-network for the year just gone, and the year(s) to come!

All of the incredible achievements, progress and plans for the continued evolution of EMODnet are down to one thing, and one thing alone: The people that make up the EMOD-network. The >120 organisations and hundreds of experts implementing EMODnet, and the many wider stakeholders, infrastructures and networks that collect ocean observations and provide data management services, to enable the operational EMODnet service that we have today.

2024 is set to be another bumper year for EMODnet, with several key developments across multiple pillars of activity. So visit **emodnet.ec.europa.eu**, see what EMODnet can do for you and watch out for the stakeholder consultation in 2024 to have your say in EMODnet's evolution!
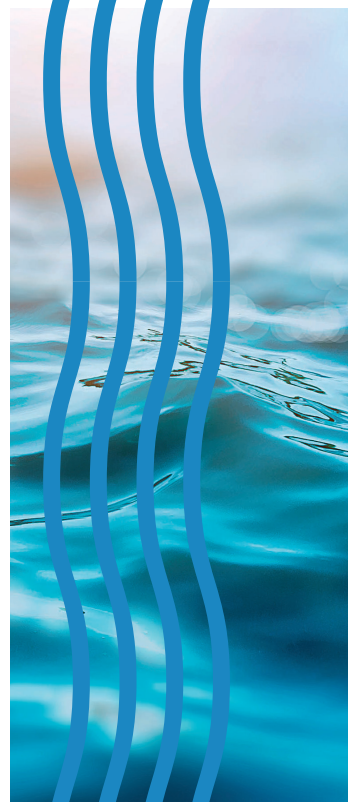
EMODnet Team

EU MARE
Policy Officer

Zoi Konstantinou

Head of EMODnet
Secretariat*

Jan-Bart Calewaert

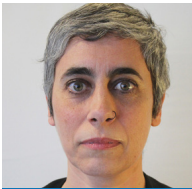*Leadership of the EMODnet Secretariat changed to
Kate Larkin in April 2023.

Head of EMODnet
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EMODnet Technical
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Ingestion

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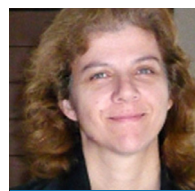
Sissy Iona

Coordinators of the EMODnet Partnership in 2023.

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 **https://emodnet.ec.europa.eu/en/publications-list-2023**.

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.

EMODnet
European Marine
Observation and
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