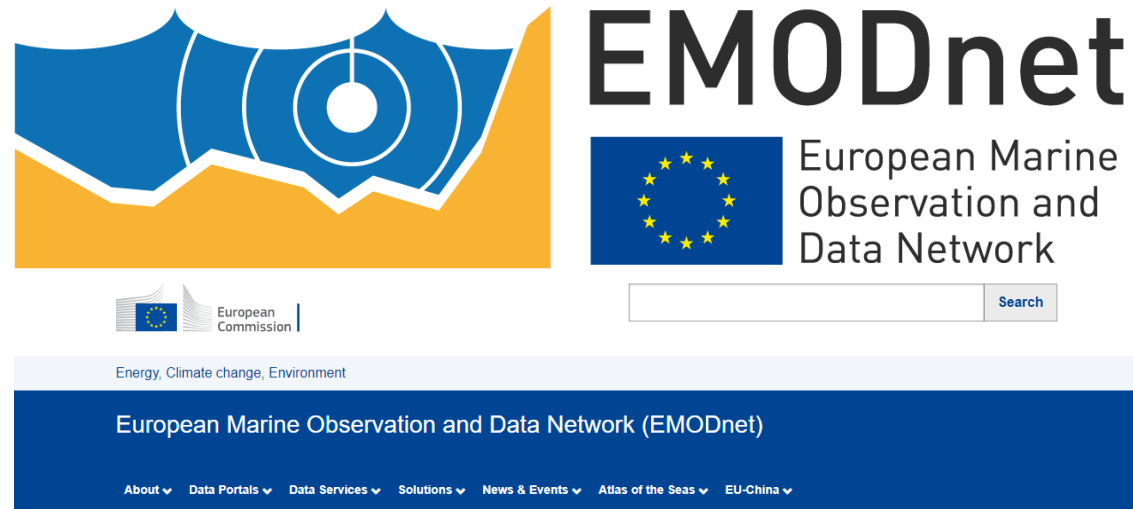# The European Marine Observation and Data Network (EMODnet): A regional best practice towards global data sharing and interoperability, and a key contributor to the Global Ocean Data Ecosystem

Kate Larkin
Deputy Head, EMODnet Secretariat

14 February 2022
*International Ocean Data Conference*

emodnet.ec.europa.eu

The European Marine Observation and Data Network (EMODnet) is:
- a **long-term** *public* **marine data service and marine knowledge initiative** funded by the **European Commission (DG MARE);**
- a **European authority and regional best practice in the marine data domain;**
- **a key marine knowledge initiative which together with Copernicus Marine Service provides the back-bone for the European marine data space, a key contributor to the Global Ocean Data Ecosystem and digital commons.**

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EMODnet: A trusted *in situ* marine data service, open and free for all
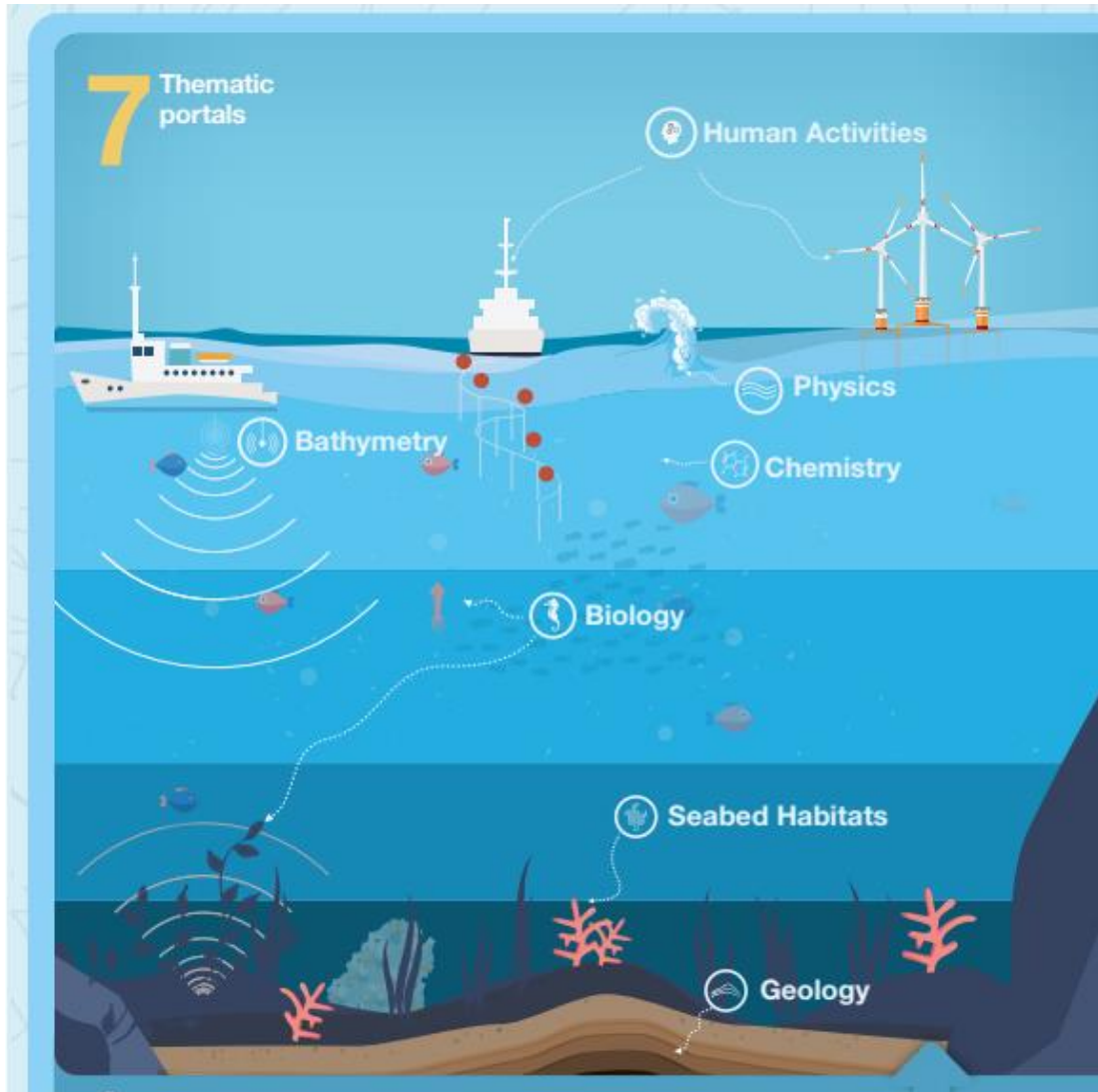
The **EMODnet Central Portal** offers a single, open and free entry point to all **7 EMODnet thematics**, which offer:

a) Harmonised, standardised and integrated datasets – each collated from hundreds of data providers - spanning a **large diversity of marine environmental parameters** from the ocean surface to the seabed, and data on **human activities at sea**;

b) Data products (e.g., Bathymetry Digital Terrain model);

c) Extensive and harmonised coverage across European seas and beyond.

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EMODnet: Made possible by a large community of *in situ* marine data experts connecting ocean observations with data infrastructures and users for a user-driven, operational service
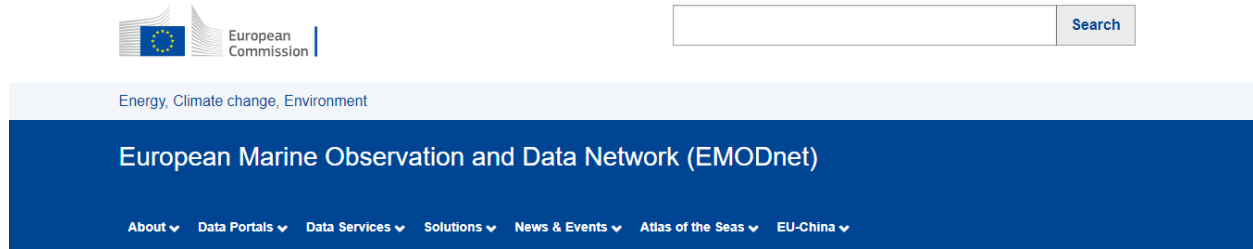
**More than a decade of partnership, collaboration and excellence**

- **Large network of >120 organizations** and hundreds more across the wider marine data landscape of data producers, providers, users;
- **Expert community of thematic and data ingestion experts** specializing in data management, visualization, services for *in situ* marine domain data;
- **Close collaboration across the Marine Knowledge Value Chain** e.g., EuroGOOS, Marine data infrastructures e.g., SeaDataNet, Research Infrastructures, Copernicus Marine, ICES, User community (research, policy, industry, civil society, citizens), etc;
- A **Secretariat** of marine domain and data experts for coordination and cohesion (technical to science-policy, ocean observation to data services and users), monitoring progress and impact, partnerships (EU and global), communication, dissemination, ocean literacy.

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EMODnet evolution: A decade of achievements
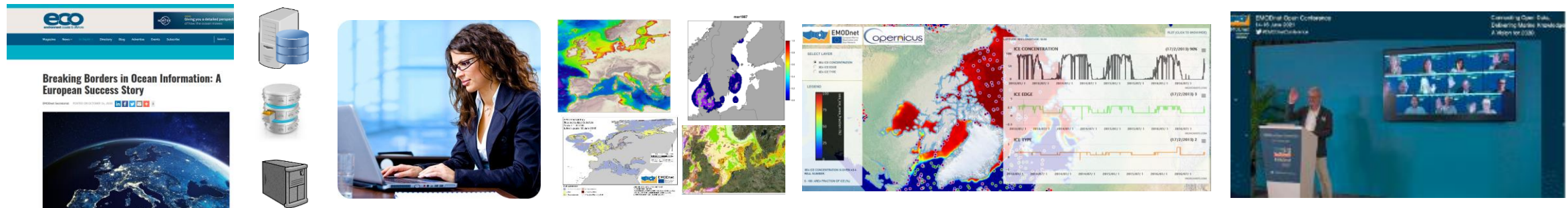

- *From regional to pan-European coverage and onwards to global remit*
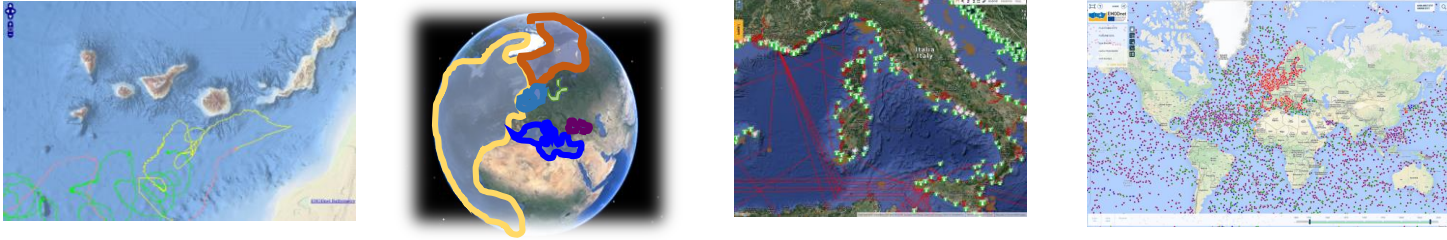
- *From a small network to a movement - bringing people & ideas together*

- *From prototypes to a fully operational, mature and user-driven distributed infrastructure*

EMODnet: Strategic partnerships for an interoperable European and Global Data Space

Copernicus Marine and EMODnet: a fruitful collaboration for the benefit of users

Home > News > Copernicus Marine and EMODnet: a fruitful collaboration for the benefit of users

- Copernicus Marine Service is a domain leader in satellite-derived data, modelling capability, forecasting and prediction and utilises *in situ* marine data as validation for remote-sensing and as input to models;
- Copernicus Marine Service and EMODnet have strong collaboration at coordination and operational levels as two key, long-term marine data initiatives of the European Union with operational data flows, cross-validation of data. joint events, use cases, etc.

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EMODnet: Added value

- Most **comprehensive** (parameter diversity, resolution and coverage) *in situ* marine environmental and human activities data and data products service in Europe;
- **Marine data products produced by domain experts** that are not offered by other marine data services in Europe or beyond.

Bathymetry

Physics

Chemistry

Biology

Geology

Seabed habitats

Human Activities

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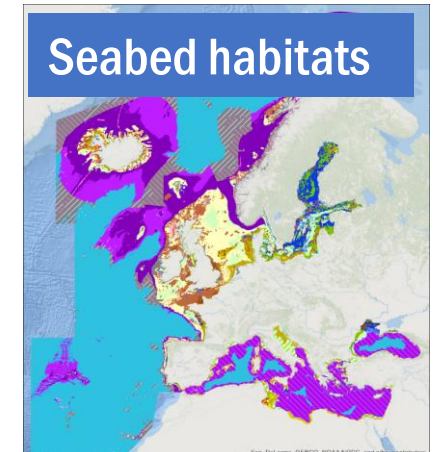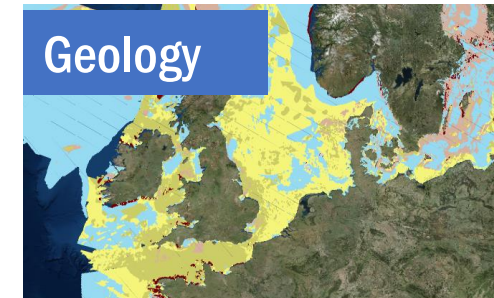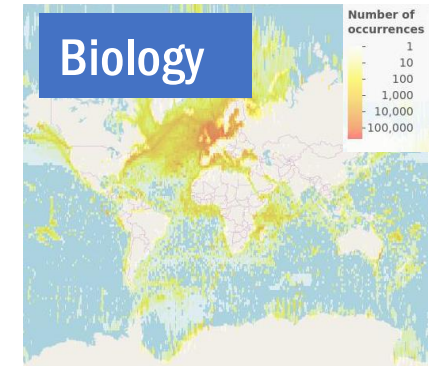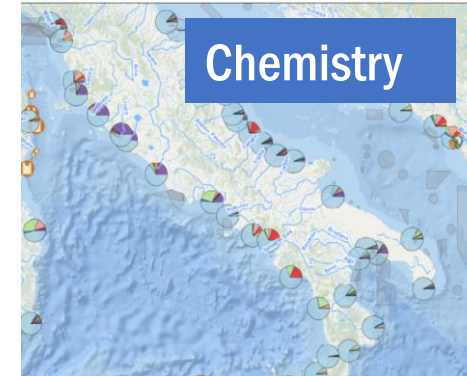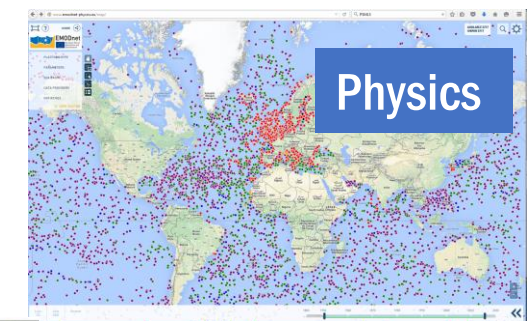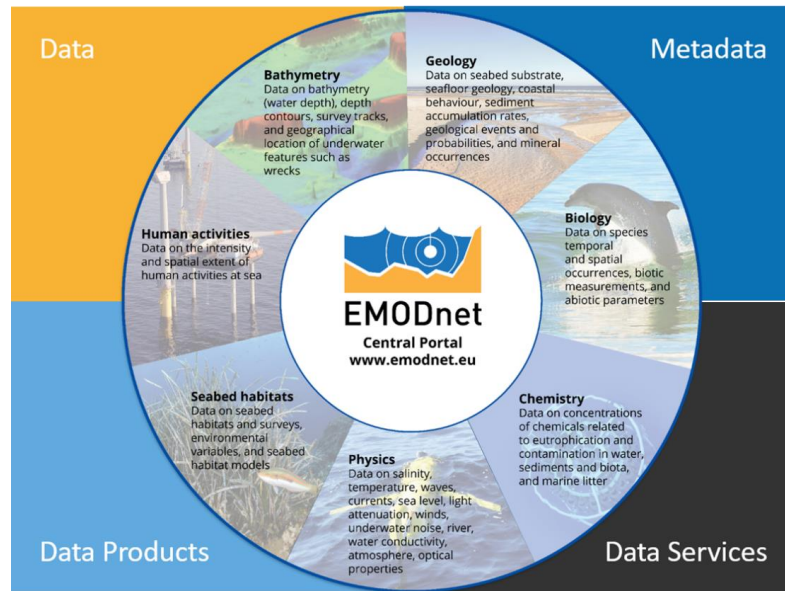
EMODnet: Added value

EMODnet data standards, services and web services

- INSPIRE and FAIR data principles;
- Aggregated, harmonized multi-parameter data sets;
- Searchable metadata;
- Data services (maps, query);
- Integrated data products;
- Web services e.g. OGC, machine-machine readability e.g. WMS, WFS, WebS.

F indable A ccessible I nteroperable R eusable

EMODnet
European Marine Observation and Data Network

OPEN SOURCE MARINE KNOWLEDGE BROKER

VISUALISE

DISCOVER

DOWNLOAD

WEB SERVICES

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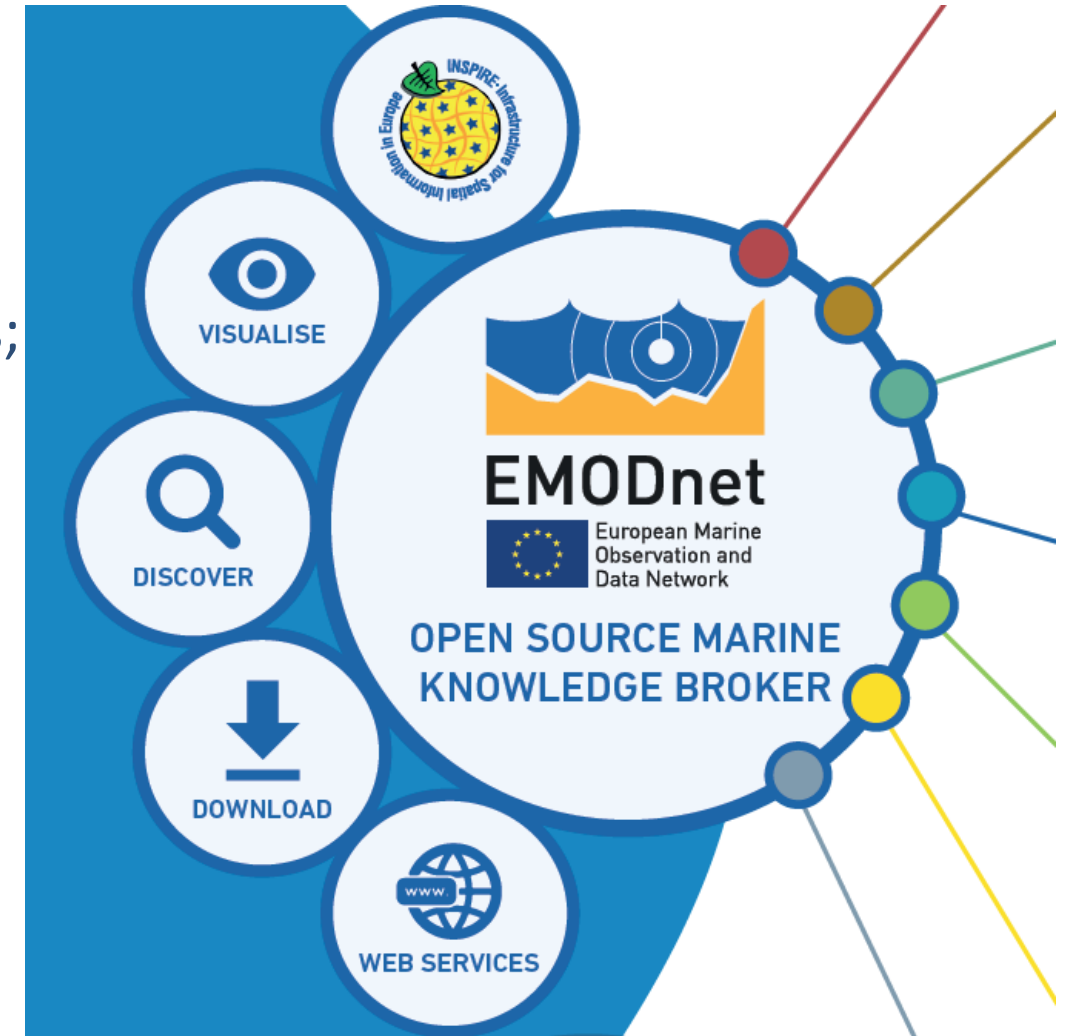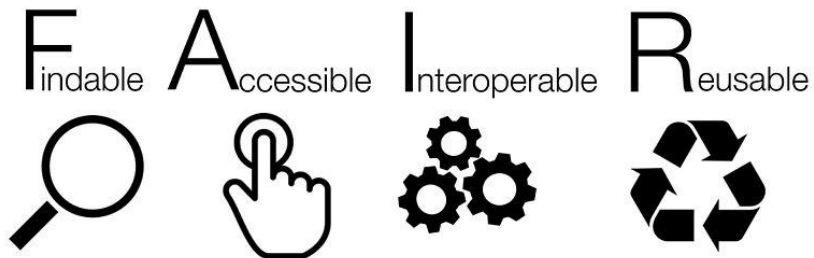
EMODnet: Added value

Collect data once, use many times.
Visualize and make data come alive.

- reduce uncertainty;

- increase productivity and cost-effectiveness;

- add value and impact to your data;

- stimulate innovation.

Vessel density by EMODnet Human Activities. The map is a grid with 1 square kilometre cells, each with a colour gradient for vessel density.

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EMODnet: User metrics

EMODnet Central Portal: Most users already use EMODnet CP as their principal gateway to EMODnet data and data products, across all thematics

Technical update: the EMODnet Portals are centralising

Starting from 2021, all Thematic Portals (gateways) will be centralised and brought into the EMODnet Central Portal following a stepwise approach (on a portal by portal basis). The Central Portal will become the one-point-of-entry to marine data, data products and services.

Bar chart values: 89753, 23356, 9855, 21563, 8264, 26104, 9736, 6855, 3401

Unique visitors to EMODnet services in 2021

HUMAN ACTIVITIES
Aggregate extraction – Algae production – Aquaculture – Cables – Cultural heritage – Dredging – Environment – Fisheries – Hydrocarbon extraction – Main ports – Ocean energy facilities – Other forms of area management/ designation – Pipelines – Waste disposal – Vessel density – Wind farms

GEOLOGY
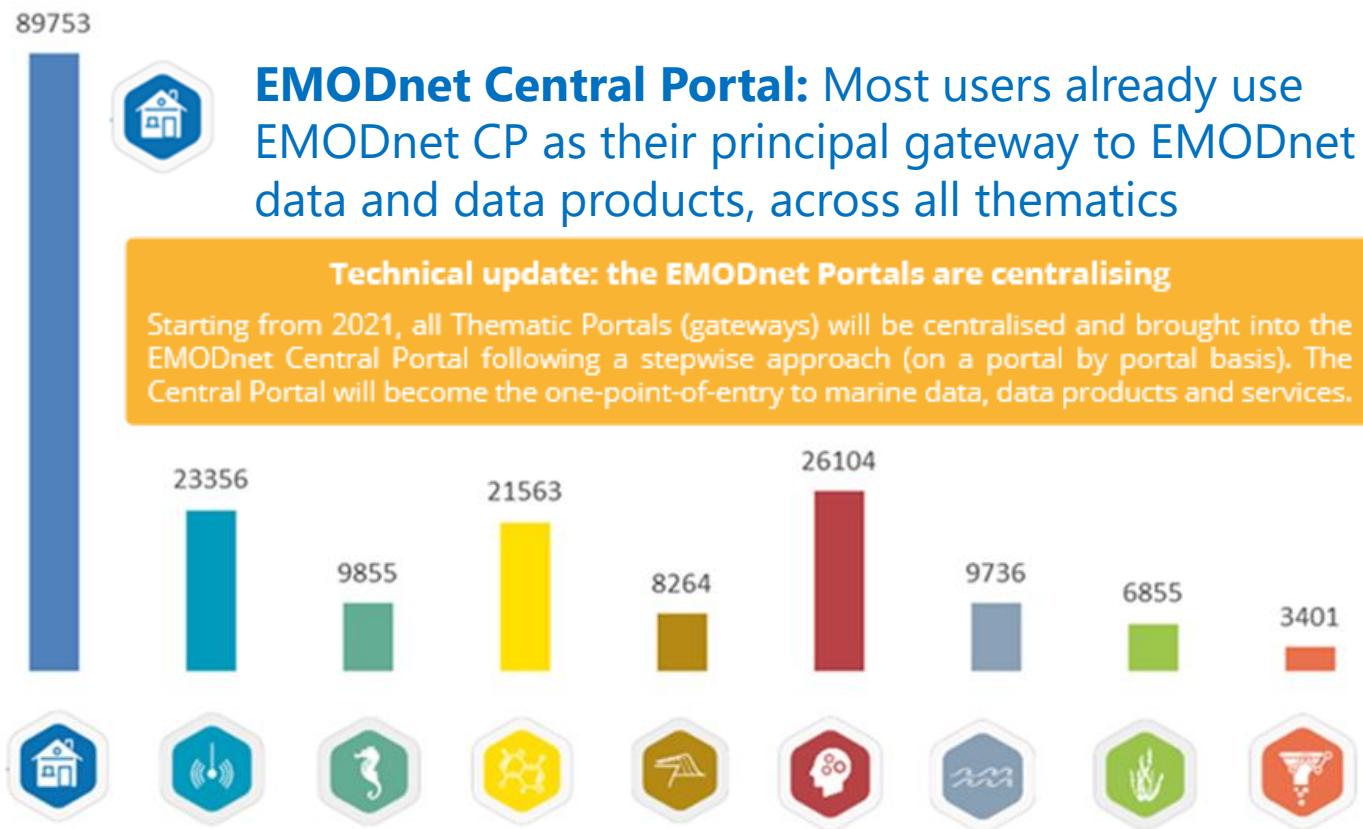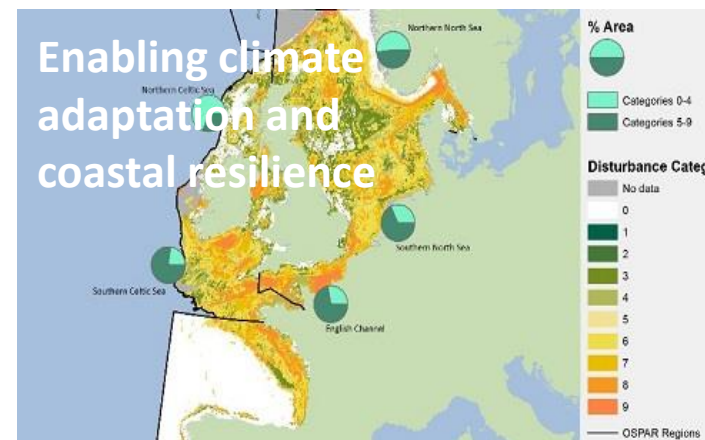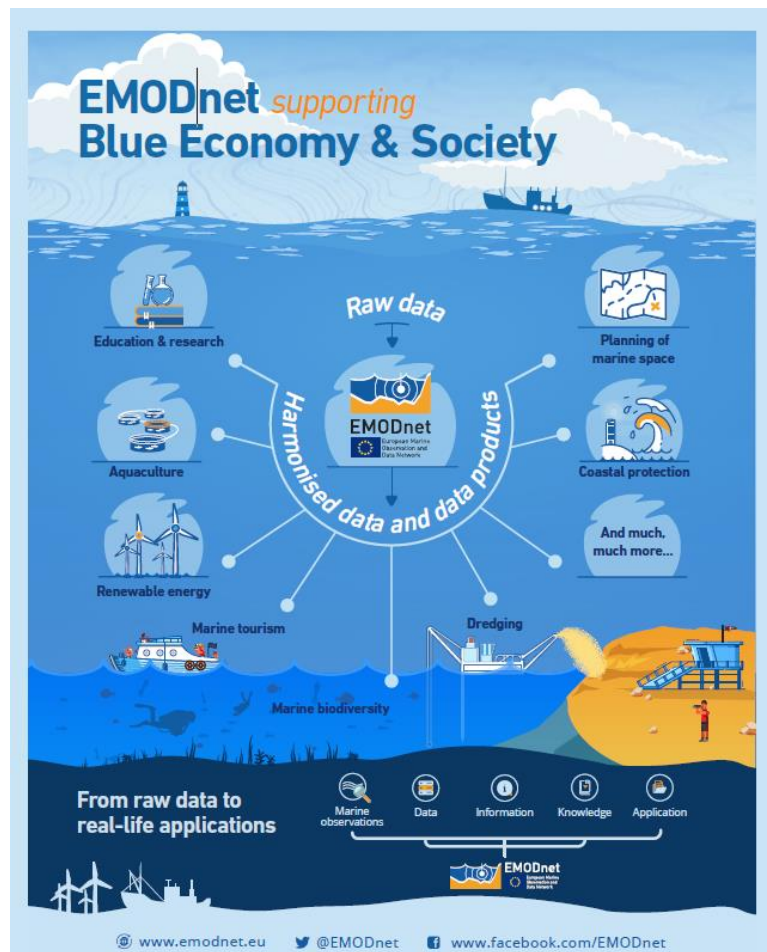Seabed substrate-Seabed accumulation rates-Seafloor lithology, stratigraphy and fault maps – Coastal behaviour – Geological events distributions – Mineral occurrences – Submerged landscapes – Quaternary geology – Geomorphology – Boreholes locations – Seismic tracks

BIOLOGY
Phytoplankton – Zooplankton – Macro algae – Seagrass – Fish – Reptile – Bird – Sea mammals – Benthos – Functional traits – Introduced species – Protected species – Indicator species

BATHYMETRY
Digital Terrain Model – Survey tracks and bathymetric survey data – Source references – Depth contours

SEABED HABITATS
Survey point data – Broad scale seabed habitat map – Environmental variables influencing habitat type – Individual seabed habitat maps from surveys – Modelled maps of specific habitats – Composite data products

CHEMISTRY
Acidity – Antifoulants – Chlorophyll – Dissolved gases – Fertilizers – Heavy metals – Hydrocarbons – Marine litter (micro, beach, seafloor) – Organic matter – Pesticides and biocides – Polychlorinated biphenyls – Radionuclides – Silicates

PHYSICS
Wave height and duration – Sea temperature – Wind speed and direction – Salinity – Horizontal speed of the water column – Water clarity – Changes in sea level – Inflow from rivers – Water conductivity / biochemical parameters – Atmospheric parameters – Underwater noise

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EMODnet: An operational service delivering marine data, information and knowledge for research, policy, blue economy and society

EMODnet *supporting* **Blue Economy & Society**

Raw data

Education & research

Aquaculture

Renewable energy

Marine tourism

Marine biodiversity

Dredging

Planning of marine space

Coastal protection

And much, much more...

From raw data to real-life applications

Marine observations · Data · Information · Knowledge · Application

@ www.emodnet.eu @EMODnet www.facebook.com/EMODnet

Improving evidence-based management of space at sea

decarbonising maritime transport and offshore energy

Enabling climate adaptation and coastal resilience

Providing sustainable food production

Preserving biodiversity and investing in nature

emodnet.ec.europa.eu

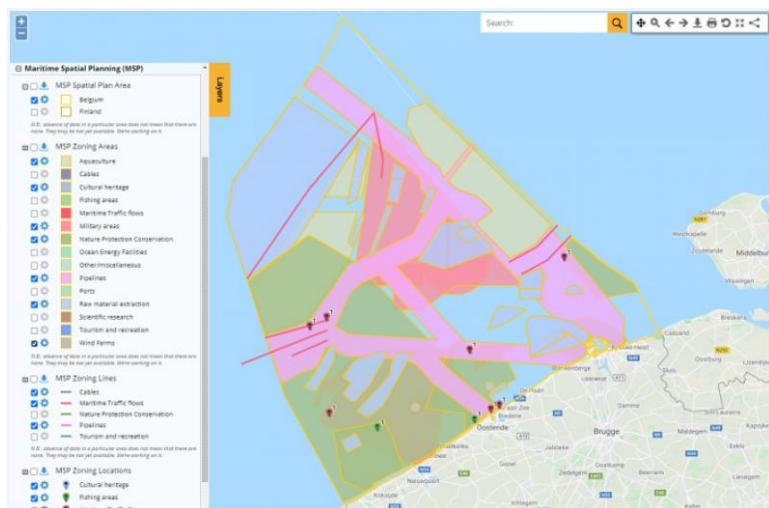# EMODnet: A EU focal point for Marine Spatial Planning data & national plans

«*EMODnet Human Activities is a focal point for EU Member State Marine Spatial plans and in the fuiture this can be epxanded to include MSP data products, for examples at the European level*».
Joni Kaitaranta, HELCOM

Data for MSP

MSP Spatial Plan Area for Belgium, EMODnet Human Activities

EMODnet Human Activities
Map viewer and data visualization
(centralising by end 2022)

EMODnet provides a EU focal point for:

o **Access to transboundary *in situ* marine environmental and human activities data,** essential for MSP, as a tool to manage the use of our seas and oceans coherently and to ensure that human activities take place in an efficient, safe and sustainable way;

o **European Member State/National Marine Spatial Plans** through EMODnet Human Activities (Belgium, Denmark, Finland and Latvia already available, more to follow)

o **EMODnet Human Activities works in close co-operation with Regional Sea Conventions, the EC JRC, Technical Group (TG) on Data for MSP** towards a technical solution for harmonising EU MSP within EMODnet.

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EMODnet: User testimonials

## EMODnet for the Blue Economy: Offshore Renewable Energy

«*We realise the importance of EMODnet data and data products e.g. Bathymetry, Physics in reducing uncertainty and improving offshore energy operators costs in mico siting of cables*». **Gerben de Boer, Van Oord, EC MKEG member**

Human Activities

EMODnet wind farm and hydrocarbon extraction datasets to support the development of wind farm projects

The EMODnet Human Activities portal has become a vital tool for C2Wind, a Danish company working in th ewind industry. Wind farm and hydrocarbon extraction datasets are the most commonly explored datasets, identifying locations of already existing structures. Additional datasets on occasion are surveyed to provide the full extent of human activities. This crucial information is used in the preliminary phases of projects, determining areas of interest for the development of wind farm projects.
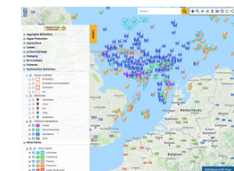
EMODnet for marine policy

«*The collaboration between EMODnet Chemistry and EC JRC has led to a a common database with harmonised beach litter data from 300 beaches across Europe. This is a key contribution to enable Member States to carry out marine litter assessments for the Marine Strategy Framework Descriptor 10, and as a direct input to develop the EU Single Use Plastics Directive* ». **Georg Hanke, EC JRC**

Chemistry

11 May 2021

EMODnet Chemistry: a point of reference for management of marine litter data in the context of the EU Marine Strategy Framework Directive

EMODnet Chemistry provided valuable contributions to the completion of **a Joint List of Litter Categories for Marine Macrolitter Monitoring** that includes the litter types occurring in the coastal and marine environment. The list can be used to enable comparable monitoring across the European Seas and beyond, as well as across different compartments of the marine environment.

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EMODnet: Use cases

EMODnet Bathymetry & Physics data supporting Sea Situational Awareness for tourist navigation

SINDBAD+, is a project co-funded by the European Commission (POR FESR 2014-2020), that aims at providing a service that can predict weather conditions and analyse its consequences on the navigation depending on the characteristics of the boat such as length, width and depth. The service targets luxury and leisure boaters. The SINDBAD partners use EMODnet Physics and EMODnet Bathymetry to initiate and validate data forecast models.

04 Mar 2021

EMODnet-Physics a win-win cooperation with OceanOPS to improve performance monitoring for Ocean Observing Platforms, data and information systems

In close collaboration with OceanOPS, EMODnet Physics is connecting multiple data sources with the OceanOPS metadata repository thanks to the unique identification system managed by OceanOPS. This is automatically reducing the duplication issues related to multi data sources and increasing the quality of the information system developed by EMODnet Physics. At the same time, EMODnet Physics is connecting OceanOPS to networks that are not yet under its radar to continuously improve the monitoring of the Ocean Observing systems operating in the global ocean.

10 Nov 2020

EMODnet Seabed Habitats contributes to the debate on the decommissioning of offshore infrastructure

This study was published by a group of authors, including representatives from a range of universities and research organisations. The lead author is the **University Technology Sydney's fish ecology lab**, which aims to provide novel research to inform on the sustainability of the oceans and their fish populations. They actively engage in public debate on a wide range of issues affecting the marine environment, and also act as a hub for student research training. Their studie

Improving storm surge modelling in the North Sea

Changes in coastal sea level caused by the combined effect of surface winds and air pressure have the potential to cause widespread coastal flooding, damage to infrastructure and loss of life.

The low-lying lands bordering the North Sea are particularly vulnerable as was seen most notably in the catastrophic events of 1953. It is expected that climate change will increase the frequency and severity of such events.

31 Jan 2022

Development of a new sea level product covering European Seas and the Global Ocean

The Euro-Mediterranean Center on Climate Change (CMCC) has developed a first version of a web application with the "Total Sea Level" variable from EMODnet Physics. This solution presents a demonstrator of end-user application and decisional support dashboard systems to support public authorities in their daily management activities.

15 Jun 2021

EMODnet partners with Copernicus Marine for a joint data catalogue supporting evaluation of Good Environmental Status for the Marine Strategy Framework Directive.

A joint Copernicus Marine and EMODnet data catalogue for the Marine Strategy Framework Directive (MSFD) has been developed. It gathers all relevant marine data products from **Copernicus Marine Service** and **EMODnet** for all the MSFD descriptors (except Descriptor 4) in the Baltic Sea.

Continue reading

31 Jan 2022

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

Collaboration between EMODnet Biology, EMODnet Seabed Habitats and OBIS (Ocean Biodiversity Information System) has facilitated richer dataset publication and ensured the greatest volume of high-quality species and habitat data are available for reporting, assessments and informed decision making.

Continue reading

19 Sep 2020

OSPAR intermediate assessments: evaluation the ecological status of the marine environment in the NE atlantic
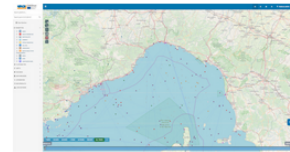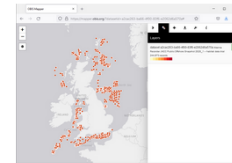
Users identified the main areas where disturbance from bottom-contact fishing was predicted to cause the most significant impact to benthic marine habitats. This work fed directly into the OSPAR Intermediate Assessment (2017) with future implications towards the Marine Strategy Framework Directive assessments.

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EMODnet: Evolution of services towards a simplified user experience
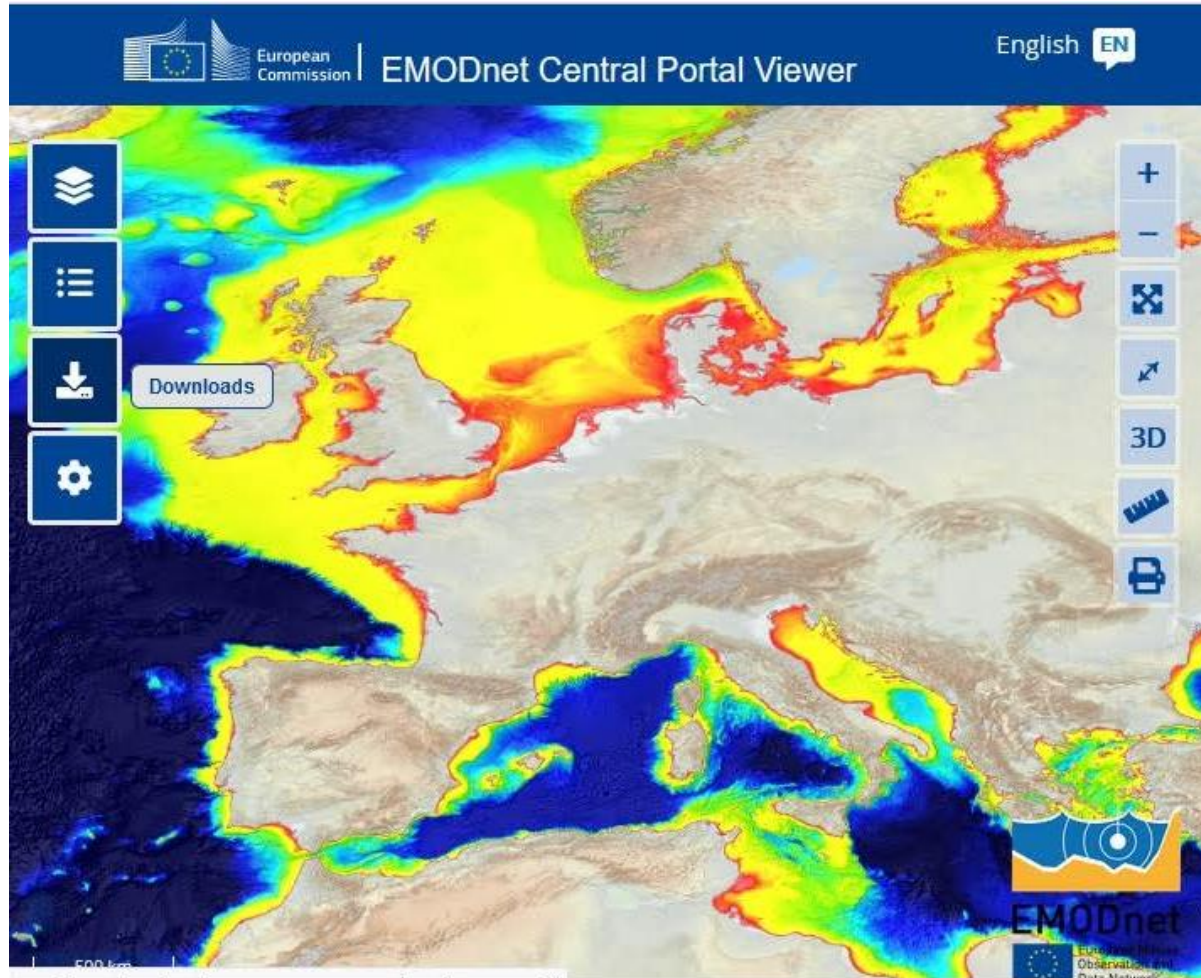
In 2021-2022 EMODnet is centralising all its services

What will EMODnet Centralisation look like for users?
- Common Map viewer
- Central Portal Catalogue (GeoNetwork)
- New EMODnet Central Portal ERDDAP server

How will the user experience be simplified?
- Easier access to all EMODnet data and data products through a Common Map viewer
- Direct downloads possible from the ERDDAP server (no logins required)

Centralisation of all EMODnet services is a major technical upgrade which is ongoing until end 2022….watch this space for updates and announcements!

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EMODnet: A key contributor to the Ocean Decade

EMODnet is relevant to all 6 Ocean Decade objectives:

o A safe **ocean**

o A sustainable and productive **ocean**.

o A transparent and accessible **ocean**.

o A clean **ocean**.

o A healthy and resilient **ocean**.

o A predicted **ocean**.

«EMODnet – a true hallmark in Marine Observations, Data and networking – is hugely important, not only for Europe, but as an example for other regions, and a valuable partner for IOC of UNESCO». **Vladimir Ryabinin, Executive Secretary of the Intergovernmental Oceanographic Commission (IOC-UNESCO)**

EMODnet has a key role to play – together with other marine knowledge actors across the world - to realise a truly transparent and accessible ocean whereby all nations, stakeholders and citizens have:

o **simplified access to ocean data, information and knowledge**, through user-driven interfaces and online data discovery and access services based on machine-machine communication;

o **trust in the provenance of the data** (through standardized, rich metadata) to increase the uptake and use and;

o **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.

EMODnet: Strengthening Partnerships for International Interoperability and Impact

- **A key partner for open data, open science, data diplomacy and digital data stewardship** in Europe, and beyond;
- **Interoperable data discovery and access,** in collaboration with other key data services
- **Further diversifying data parameters and sources** (e.g. industry, citizen science)
- **Extending FAIR** to FAIR, CARE and TRUST

Transparency,
Responsibility,
User focus,
Sustainability and
Technology

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EMODnet: A regional marine data, information and knowledge service directly contributing in diverse ways to the UN Ocean Decade

UNESCO — United Nations Educational, Scientific and Cultural Organization · Intergovernmental Oceanographic Commission · 2021 2030 United Nations Decade of Ocean Science for Sustainable Development

IODE International Oceanographic Data and Information Exchange

OIH Ocean InfoHub

14-16 June 2021 #EMODnetConference   A Vision for 2030.

"We want global data and information systems and EMODnet's guidelines are great for community of practice. The network is also a role model for other regions."
Peter Pissierssens, IOC-IODE UNESCO

- Co-Chair of the UN Ocean Decade (OD) Data Coordination Group (EMODnet Secretariat);

- Contributor and expert to the IWG-SODIS Intersessional Working Group Strategy on Ocean Data and Information Stewardship for the UN Decade (EMODnet Coordinators);

- Multiple inputs to UN OD Actions:
    - DITTO (Digital Twins of the Ocean, Steering partner)
    - COAST PREDICT (Advisor role)
    - Ocean Best Practices (EMODnet referenced)

- IODE Ocean Data and Information System (ODIS): All EMODnet thematic portals/central portal are registered on ODIS catalogue. Additional records will be added from the EU-China EMOD-PACE marine data project;

- IOC Ocean InfoHub Project (OIH): EMODnet is a European focal point & technical advisor to the development of ODIS architecture & interoperability with EMODnet.

emodnet.ec.europa.eu   EMODnet European Marine Observation and Data Network
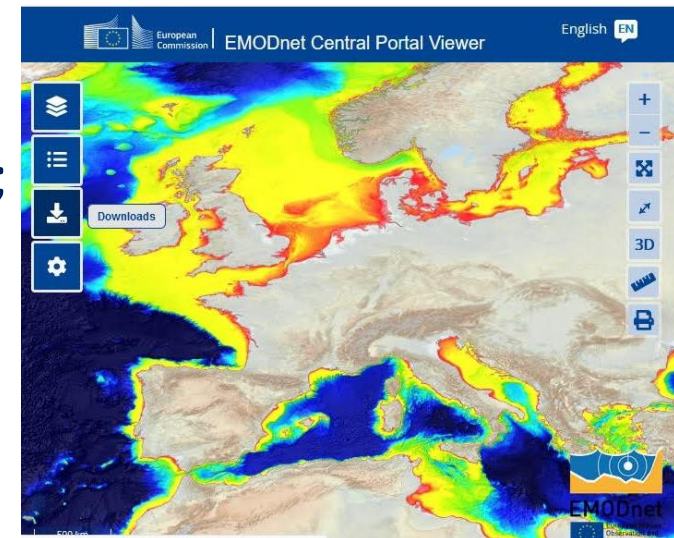
Key messages

EMODnet today is a trusted EU public service for marine data, information and knowledge, in Europe and beyond;

EMODnet new phase (by end 2022) will complete the consolidation stage to deliver a <u>fully centralized service</u> with:

- A simplified single entry point to all data/data products;
- A data cache approach more suited to today's data driven world towards next phase ocean data and information management;
- an enhanced data discovery service using a central metadata catalogue and machine-machine search engine;
- a central map viewer;
- interoperability across the digital (marine data) commons.
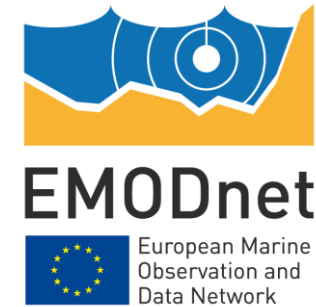
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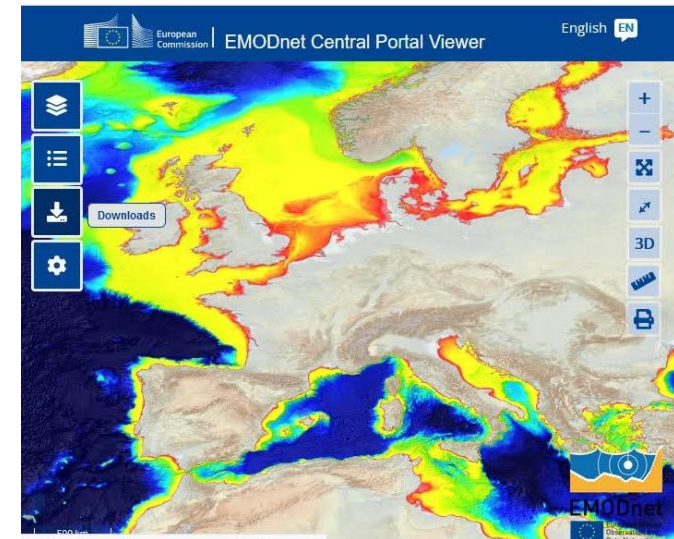

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Key messages

EMODnet new phase (by 2023) will:

- Further **expand and diversify the EMODnet "offer"** including partnerships with citizen science, industry & regions beyond Europe;

- Further **connect with actors across the marine knowledge value chain**, including the **EU and global Ocean Observation capacity**;

- Continue to **strengthen strategic EU partnerships** e.g., with Copernicus Marine Service to ensure European marine data services are "future-fit" for the EU marine data space, the EU Green Deal Space, the Digital Twin Ocean and Destination Earth.

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Key messages

In coming decade, EMODnet by 2030 will:

- Strengthen the **implementation of the Digital Commons** within Europe and beyond;

- **Forge new collaborations worldwide** (at regional and global levels) to move towards a fully interoperability data sharing framework at Ocean Basin level e.g., the All Atlantic Data Space, and across the Global Ocean Data Ecosystem;

- **Expand its contribution to the UN Ocean Decade and its partnership with IOC-UNESCO, IODE and other actors**, including:

  - A EMODnet UN Ocean Decade Coordination Group;

  - EMODnet key recommendations and principles for supporting the UN Ocean Decade Data Vision;

  - EMODnet input to UN Ocean Decade Actions, Collaborative Centres (e.g., for Ocean Prediction);

  - EMODnet leadership in Ocean Best Practices;

  - Enhance EMODnet contribution to demonstrations and training in ocean data and information stewardship;

  - Alignment and optimized tagging of EMODnet data for UN 2030 Sustainable Development Goals, Essential Ocean / Biodiversity Variables etc. And much more!

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Thank you for your attention!

With thanks to all co-authors:

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EMODnet European Marine Observation and Data Network

Thanks also to the EMODnet Secretariat team, all EMODnet partners, Associated Partners, contributors and users.

- **Discover the EMODnet Central Portal** and see what EMODnet services can do for you;
- Learn more about EMOD-network of experts, user testimonials, achievements and partnerships via the EMODnet Conference 2021 recordings and resources: **https://emodnetconference2021.eu/**
- **Connect** with the **online EMODnet community**
  - @EMODnet (Twitter);
  - EMODnet monthly Newsletter;
  - Ask questions and submit feedback via the EMODnet Central Portal and via online surveys
- **Contact us via the EMODnet Central Portal** to discuss data sharing, data/data product use, queries on data/web services, and to explore partnerships.

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