



EMODnet



European Marine
Observation and
Data Network

**DATA AND DATA PRODUCT
PORTFOLIO • JANUARY 2023**



This document has been produced and designed by the EMODnet Secretariat and the Flanders Marine Institute (VLIZ), with contributions/assistance from all EMODnet thematic assembly groups.

All the maps displayed in this portfolio were obtained through the web services provided by the EMODnet thematic portals. Where data and data products are produced by, or in collaboration with, other organisations and initiatives the logos are shown.

The EMODnet portfolio aims to provide a clear and concise overview of the data and data products offered by the seven EMODnet thematic portals. It is a living document that will be updated regularly.

This version was last updated in January 2023.

Acknowledgement: The European Marine Observation and Data Network (EMODnet) (2023). EMODnet Data and data product portfolio. Available at <https://emodnet.ec.europa.eu/en/communication#data-and-product>.

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Key | Data and data products categories

Data

Data products

Data Ingestion

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PHYSICS

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DATA INGESTION

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EMODnet



YOUR GATEWAY TO IN SITU MARINE DATA, DATA PRODUCTS AND SERVICES IN EUROPE AND BEYOND

EMODNET PROVIDES AN OPERATIONAL IN SITU MARINE DATA SERVICE, DEVELOPED IN THE FRAMEWORK OF THE EC MARINE KNOWLEDGE 2020 STRATEGY, AND WORKS IN CLOSE COLLABORATION WITH THE MARINE SERVICE OF THE COPERNICUS SPACE PROGRAMME AND THE DATA COLLECTION FRAMEWORK (FISHERIES AND ENVIRONMENTAL DATA THROUGH ICES)



VISUALISE



DISCOVER



DOWNLOAD



WEB SERVICES

EMODnet
European Marine Observation and Data Network
OPEN SOURCE MARINE KNOWLEDGE BROKER

EMODNET SERVES AN INTERNATIONAL, PROFESSIONAL USER COMMUNITY SPANNING RESEARCH, POLICY, BLUE ECONOMY AND CIVIL SOCIETY



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



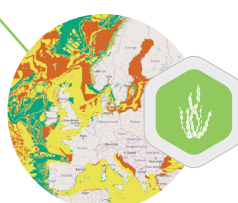
BIOLOGY

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



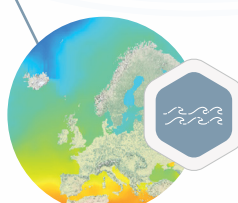
SEABED HABITATS

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

Technical update: the EMODnet Thematic Portals have been centralised

From 2023, all Thematic Portals (gateways) have been centralised. The EMODnet Central Portal is the one-point-of-entry to marine data, data products and services. The Thematic Portals will be discontinued.

Key | Data and data product processing levels



Parameters and data formats

L3

Parameter category

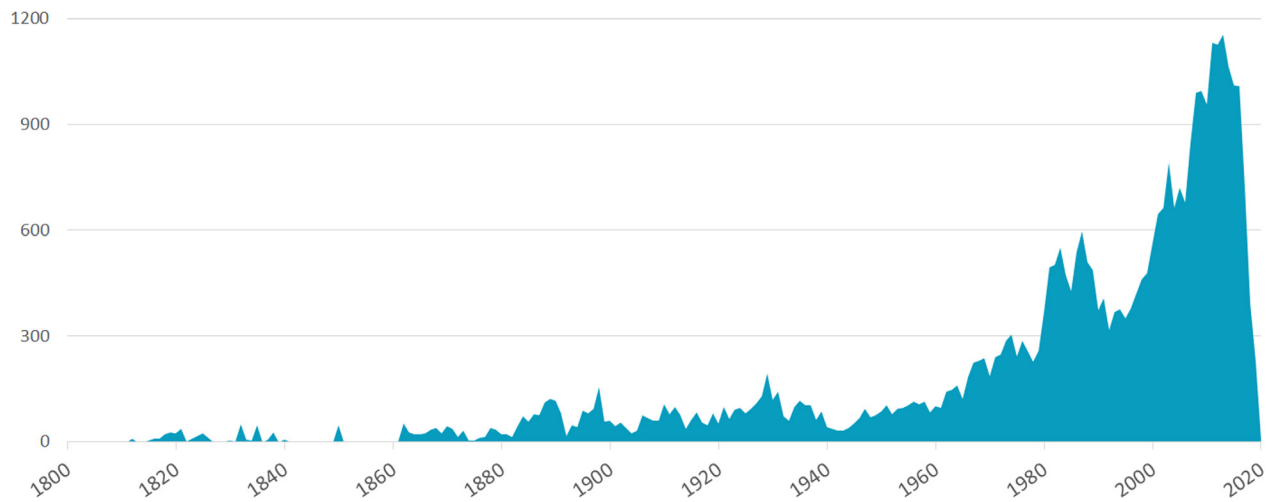
Bathymetry and elevation

Data formats

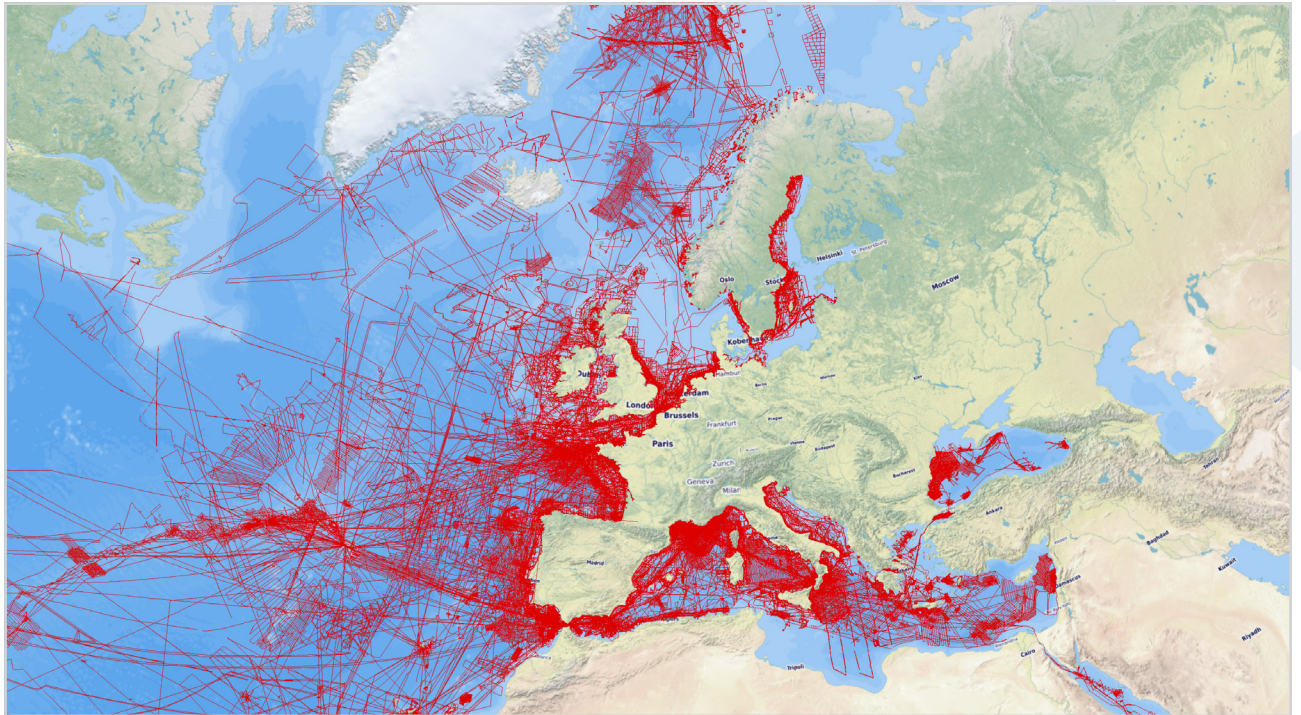
BAG, XYZ, SeaDataNet ODV, GeoTiff, NetCDF

Coverage and resolution

Temporal coverage: number of datasets per year (1800-2020).



Spatial coverage

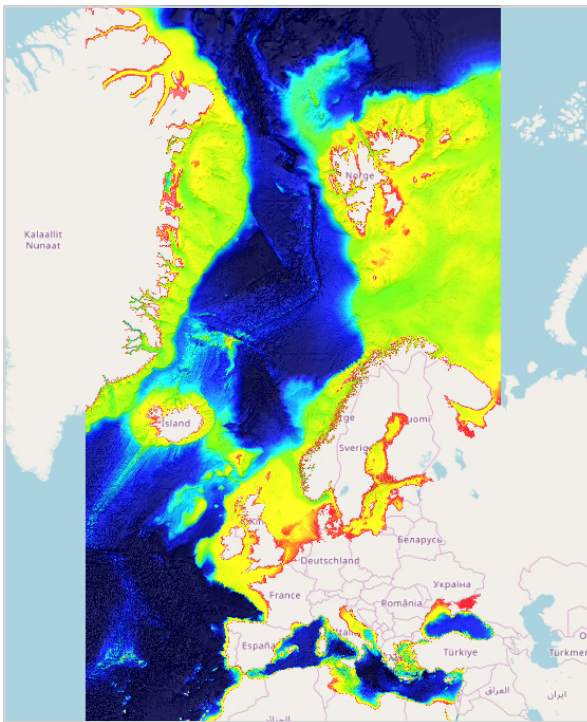


Map indicating the tracks of bathymetric surveys from which datasets have been selected and processed as input for building the overall EMODnet Digital Terrain Model (DTM). The metadata and survey data are gathered from European originators: national hydrographic services, research institutes, and companies. Their coverage goes beyond European waters as scientists collect bathymetry on a global scale.



Digital Terrain Model (DTM)

L5

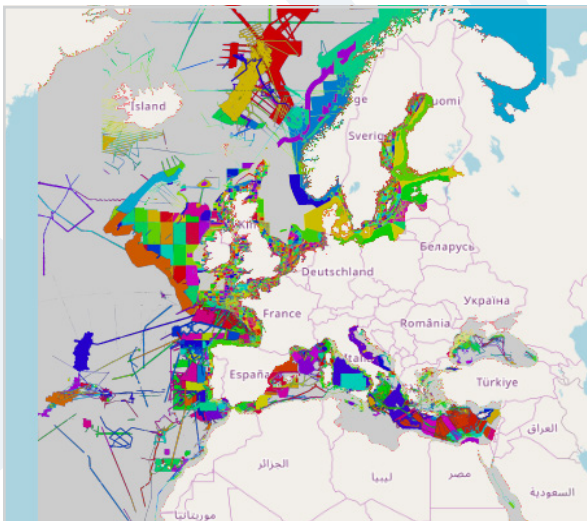


EMODnet Bathymetry Digital Terrain Model (DTM) - version 2020.

- » Temporal coverage: 1816 – 2020
- » Spatial resolution: DTM grid 1/16 x 1/16 arc minute (circa 115 x 115 m)
- » Available to download as: ESRI ASCII, EMODnet CSV, RGB GeoTIFF, NetCDF (CF), SD and XYZ
- » Vertical reference: LAT and MSL
- » Web services: WMS, WMTS, WFS, and WCS
- » Based upon circa 15.141 bathymetric surveys, 120 composite DTMs, and Satellite Derived Bathymetry datasets

Source references

L4



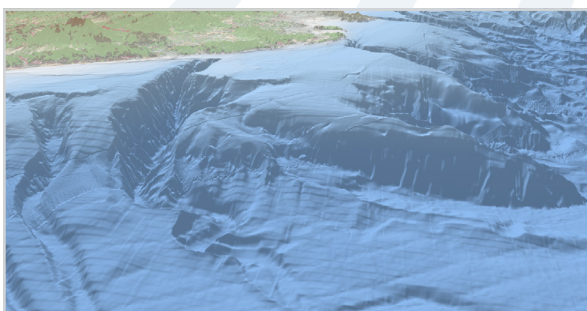
Layer containing the data sources used in the construction of the DTM.

Contains direct links to the CDI Data Discovery and Access service for survey datasets and the Sextant Catalogue service for composite DTMs and Satellite Derived Bathymetry data products. These services give metadata, and the CDI Service also facilitates requesting access to survey datasets.

- » Web services: WMS, WFS

3D-viewing of the EMODnet DTM

L5



Extra functionality has been added to the Bathymetry Viewing service for 3D visualisation of the latest EMODnet DTM.

Quality Index layer

L4



A new layer in the Bathymetry Viewing service, linked to the Source References layer. It gives maps of the used survey datasets by:

- » QI_Age: provides an indication of how old the survey of DTM is (4 options)
- » QI_Purpose: provides an indication of the purpose of the survey (4 options)
- » QI_Vertical: an indication of the vertical accuracy (5 options)
- » QI_Horizontal: an indication of the horizontal accuracy (4 options)
- » Combined quality indicator
- » Web services: WMS, WFS

Depth contours

L5

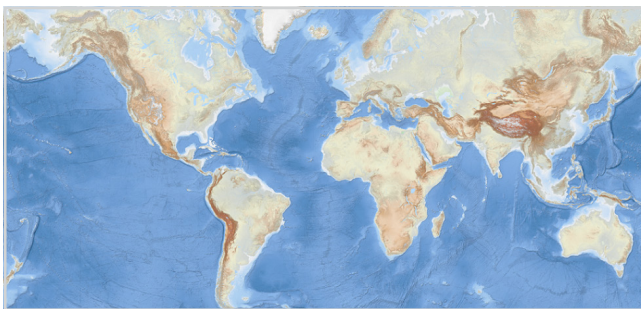


Contours based on the average depth. The contours are shown for the following depths: 50, 100, 200, 500, 1000, 2000, and 5000 meter.

- » Web services: WMS, WFS

EMODnet Bathymetry World Base Layer (EBWBL)

L5



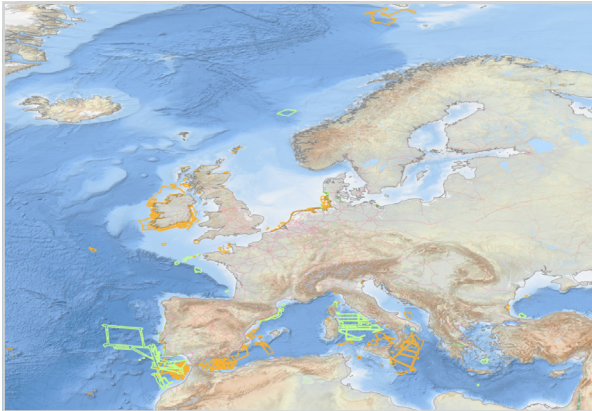
The EBWBL is composed of the 2018 EMODnet bathymetric grid of Europe (approx. 115 m resolution) and uses the GEBCO 2019 grid (approx. 500 m resolution) elsewhere. The land coverage is based on a combination of 30 arc second ASTER GDEM, SRTM3, EU-DEM, and Global 1 second worldwide water body map for the topographic part. This compilation of publicly available data sources has been merged and pre-tiled for rendering, at 10 levels of zoom starting from 75 m resolution. The EBWBL service is available as OGC WMTS service in various projection systems (EPSG 4326, EPSG 3857, EPSG 3035) including projections adapted to both poles (ESPG 3031 and 3996).

- » Web services: WMTS



High-resolution DTMs

L5



Layer in the Bathymetry Viewing service containing circa 240 High Resolution DTMs that have been generated by data providers. The resolution of HR-DTMs varies between 1/32 and 1/512 arc minutes, depending on local data policy of data providers. The HR-DTM layer allows to zoom in deeper than the common DTM layer and HR-DTMs can be interrogated for metadata and downloaded as data files.

Inventory of official coastlines and baselines

L5

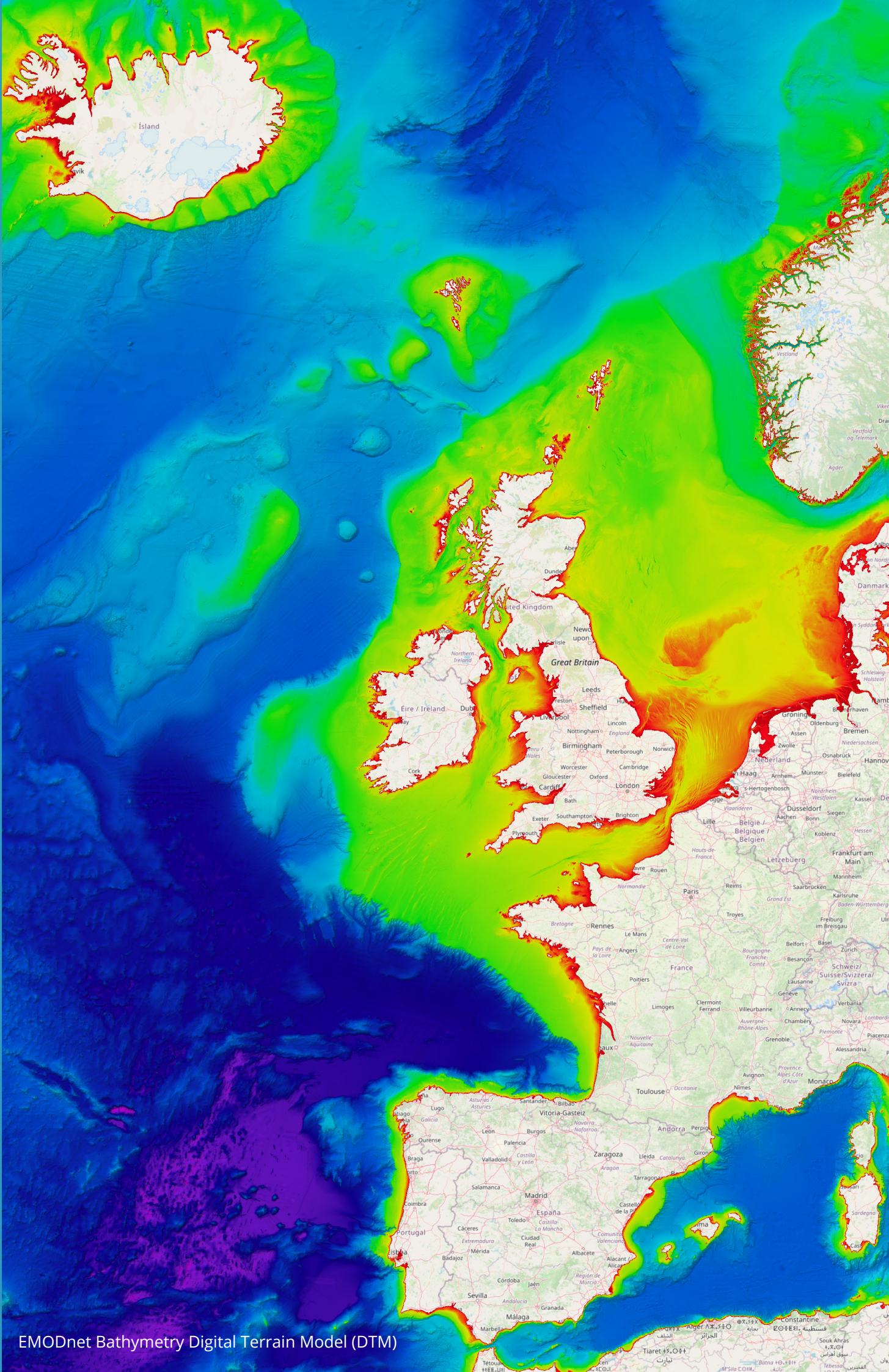
An updated inventory and report of baseline and coastline data as collected from 26 national authorities in Europe. It describes the information available per country, the resolution, the source of the data and the institute providing/hosting the data. This can be downloaded from the EMODnet Bathymetry portal together with shapefiles of the baselines and coastlines.

Best-estimate European digital coastlines

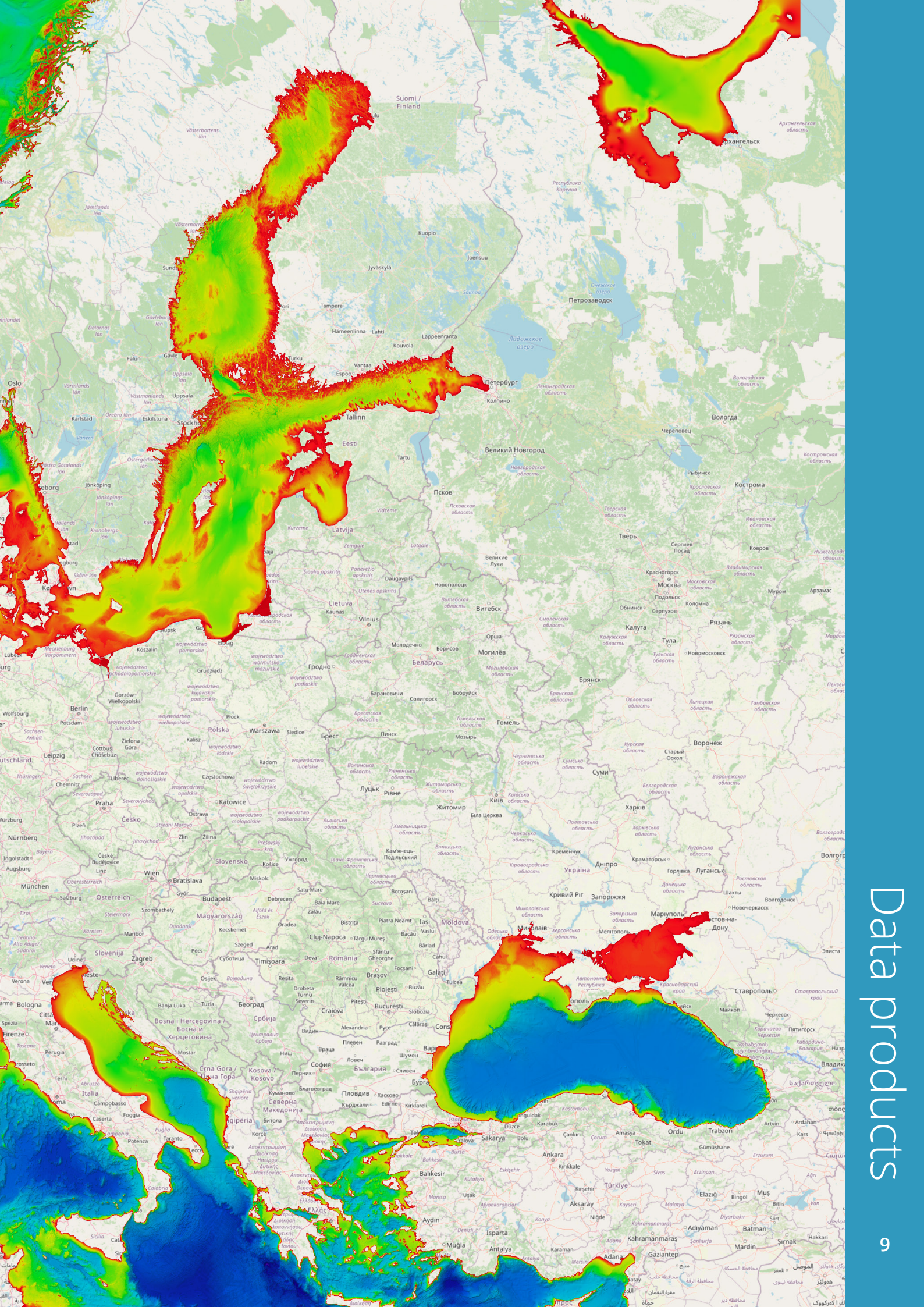
L5



Layer in the Bathymetry Viewing service containing best-estimate coastlines for the European seas at LAT (Lowest Astronomical Tide), MSL (Mean-Sea-Level), and MHW (Mean-High-Water). The updated version now covers all European coastlines. These were determined from satellite data (typically Sentinel-2 and Landsat-8) in combination with the Global Tide Surge Model (GTSM). The level of detail is bound to the resolution of the satellite sensor (e.g. 10m for Sentinel-2). These satellite derived coastlines can also be downloaded with documentation from the EMODnet Bathymetry portal.



EMODnet Bathymetry Digital Terrain Model (DTM)



Parameters and data formats

L3

Parameter groups

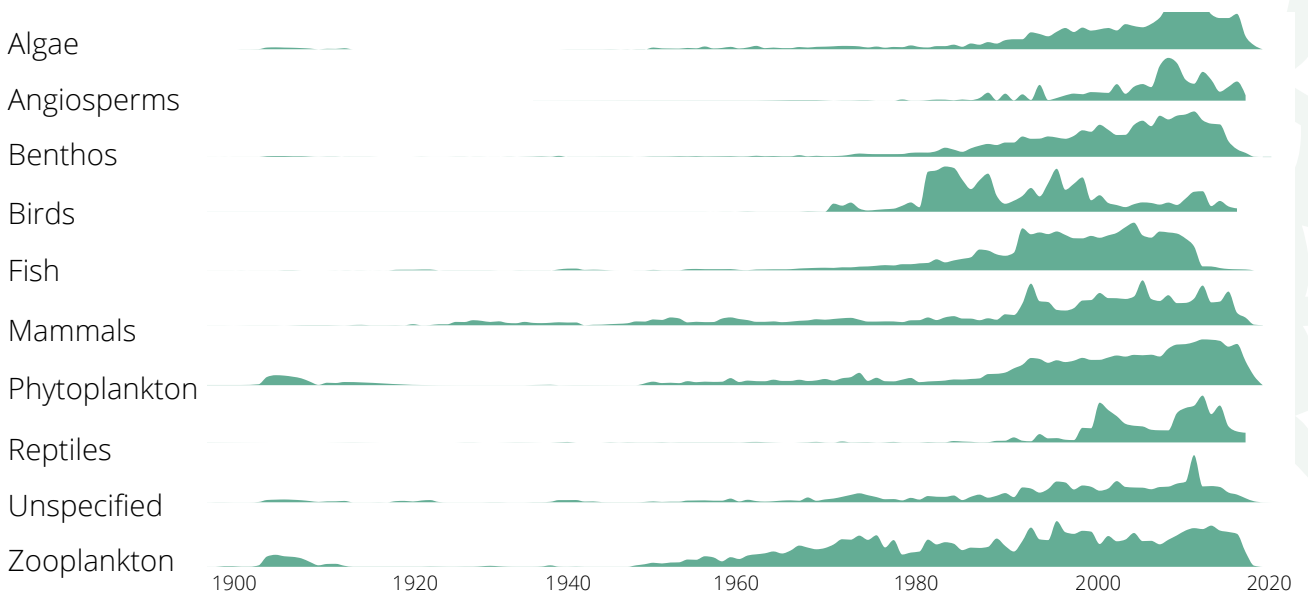
- » Species occurrences: location, date, depth
- » Biological measurements: e.g. abundance, biomass
- » Sampling information and methodology
- » Specimen characteristics: e.g. length, lifestage, sex
- » Abiotic parameters: e.g. sediment type, temperature, salinity

Data formats

Darwin Core Archive (DwC): occurrence data and measurements can be downloaded as csv, and accessed via WFS web services.

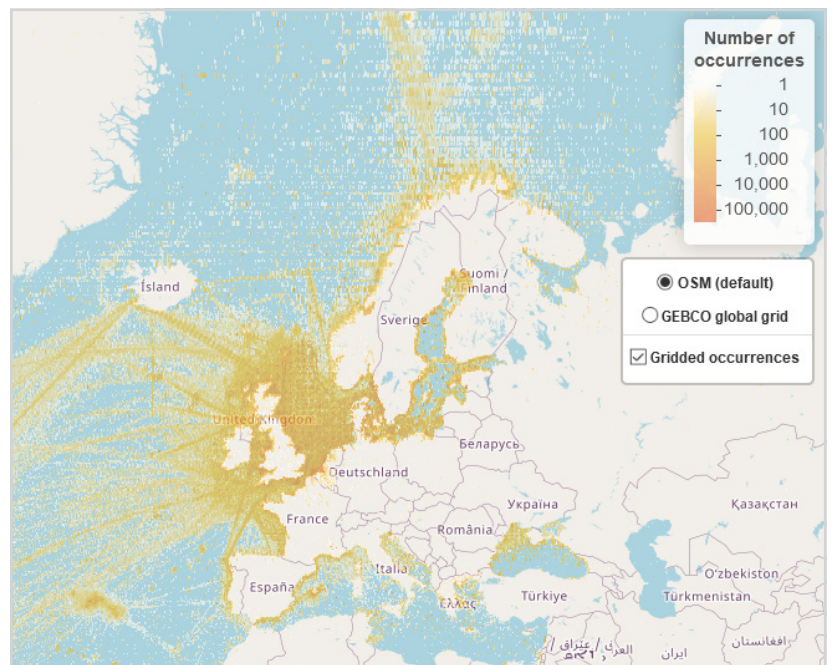
Coverage and resolution

Temporal coverage per functional group: time series of the relative number of records per functional group from 1900 to present. While the graph focuses on distribution from 1900 onwards as that's when most observations were collected, EMODnet Biology/EurOBIS offers species occurrence data that date back to 1526.



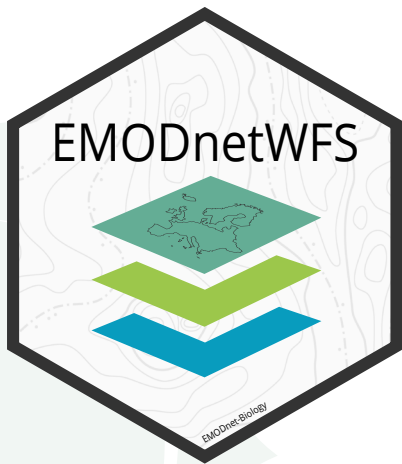
Spatial coverage

Map showing the location of the distribution records available in EMODnet Biology/EurOBIS to date: currently 1.056 datasets representing 25.066.516 occurrence records, from 95.349 species names (of which 75.080 are accepted species names).





EMODnet WFS R Package

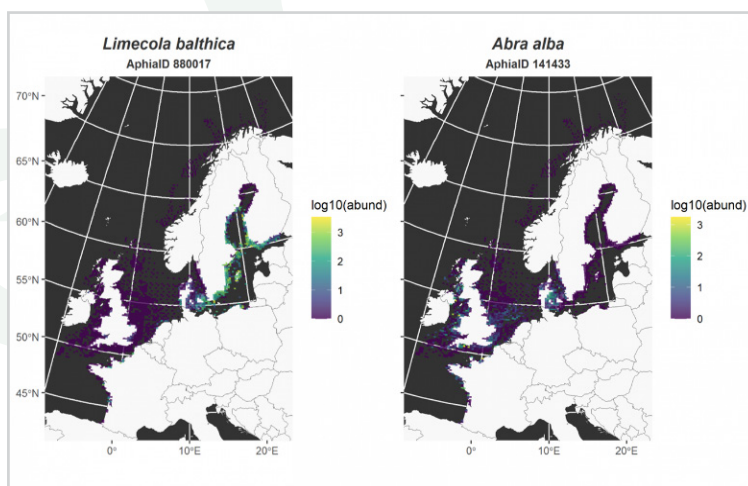


The package was designed to make EMODnet vector data layers easily accessible in R. It allows users to query information on and download data from all available EMODnet Web Feature Service (WFS) endpoints directly into their R working environment.

EMODnet WCS R Package

The package was designed to make EMODnet raster data layers easily accessible in R. The package allows users to query information on and download data from all available EMODnet Web Coverage Service (WCS) endpoints directly into their R working environment. The package also allows user to specify the coordinate reference system of imported data. EMODnetWCS depends on the R package ows4R, a general client of OGC services developed by Emmanuel Blondel.

Numerical abundance of benthic macroinvertebrates in North Sea and Baltic Sea

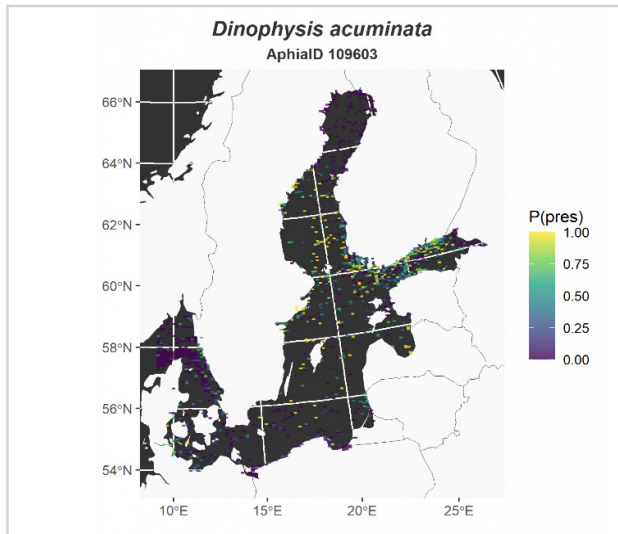


Extensive compilation of data on benthic abundance and biomass as well as similar sampling methods, sampled surfaces and sieves. This product is an update of the Distribution of benthic macroinvertebrate living modes in European seas.

- » Temporal coverage: 1911 – 2016
- » Taxonomic coverage: Benthos
- » Spatial resolution: 0.33 x 0.14 degrees

Numerical abundance of benthic macroinvertebrates in North Sea and Baltic Sea

L4 L5

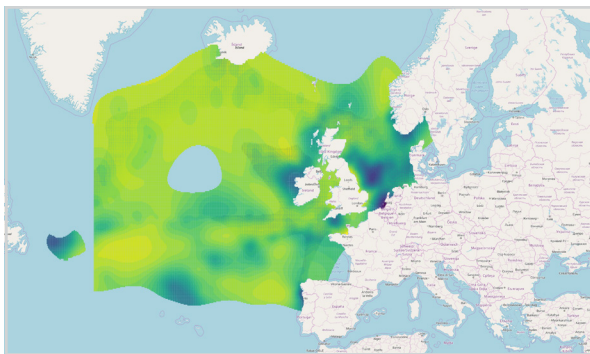


Gridded maps of presence/abundance for the most 20 common (phyto)plankton species.

- » Temporal coverage: 1955 – 2020
- » Taxonomic coverage: Phytoplankton
- » Spatial resolution: 0.19 x 0.06 degrees

Phytoplankton biomass and diversity

L5



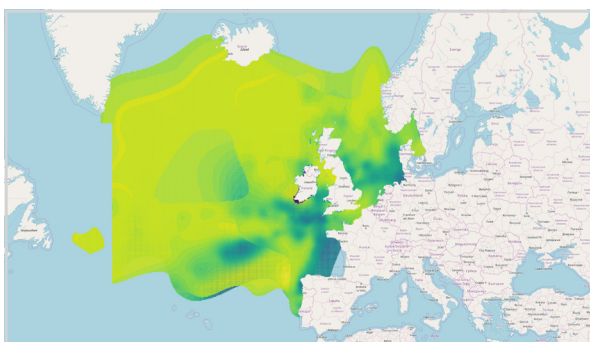
Gridded maps of average abundance of different species or species groups.

- » Temporal coverage: 1958 – 2016
- » Temporal resolution: seasonal, annual or multi-annual
- » Spatial resolution: 0.1 degree
- » Taxonomic coverage: phytoplankton species and functional groups
- » Web services: WMS, WFS

Example map: *diatoms abundance*.

Zooplankton biomass and diversity

L5



Gridded abundance maps of the six most abundant copepod species collected with the Continuous Plankton Recorder (CPR).

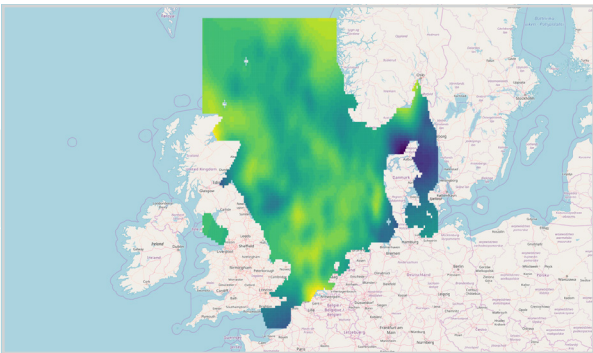
- » Temporal coverage: 1958 – 2016
- » Temporal resolution: 10-year and 1-year averages
- » Taxonomic coverage: *Calanus h.*, *Calanus f.*, *Acartia spp.*, *Oithona s.*, *Temora l.*, *Metridia l.*
- » Temporal resolution: seasonal
- » Spatial resolution: 0.1 degree
- » Web services: WMS, WFS

Example map: *Calanus helgolandicus*.



Fish abundance and distribution

L5



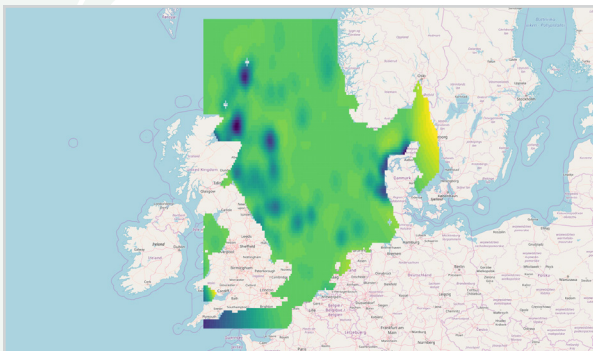
Gridded maps of average abundance of different species or species groups.

- » Temporal coverage: 1980 – 2013
- » Temporal resolution: annual or multi-annual
- » Spatial resolution: 0.1 degree
- » Taxonomic coverage: *Gadus morhua*, *Clupea harengus*, *Engraulis encrasicolus*, *Scomber scombrus*, *Sprattus sprattus*
- » Web services: WMS, WFS

Example map: *Gadus morhua*.

Marine turtles, birds, mammals abundance and distribution

L5



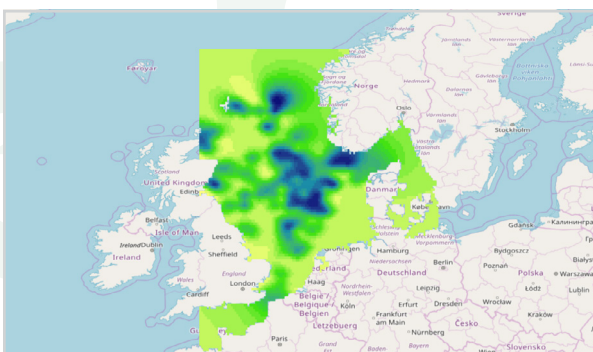
Gridded maps of average abundance of different species or species groups.

- » Temporal coverage: 1998 – 1999, 1995 – 1997, and 1980 – 1989
- » Temporal resolution: annual or multi-annual
- » Spatial resolution: 0.1 degree
- » Taxonomic coverage: seabirds, reptiles, marine mammals
- » Web services: WMS, WFS

Example map: *Phocoena phocoena*.

Benthic invertebrate abundance and distribution

L5



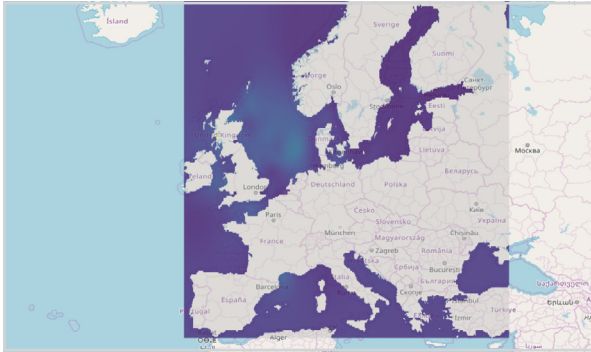
Gridded maps of average abundance of different species or species groups.

- » Temporal coverage: 1986 – 2013
- » Temporal resolution: annual or multi-annual
- » Spatial resolution: 0.1 degree
- » Taxonomic coverage: *Abra prismatica*, *Amphiura filiformis*, *Bathyporeia elegans*, *Chaetozoa setosa*, etc.
- » Web services: WMS, WFS

Example map: *Abra prismatica*.

Macrobenthos functional trait based analysis

L6

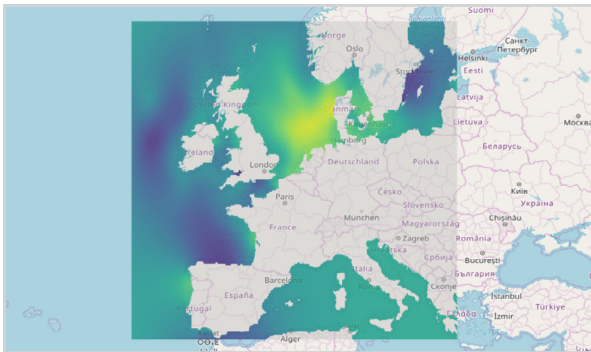


This series of products displays the main functional types of seafloor macroinvertebrates derived from a multivariate analysis of 13 life history traits defined on 617 taxa (illustrative map: vulnerability to physical damage). Other maps display scores for each of the 60 trait modalities aggregated over absolute and relative organism densities averaged per spatial location.

- » Temporal resolution: 1 year – several decades
- » Spatial resolution: 0.1 degree
- » Taxonomic coverage: macrozoobenthos

Fish functional trait based analysis

L6

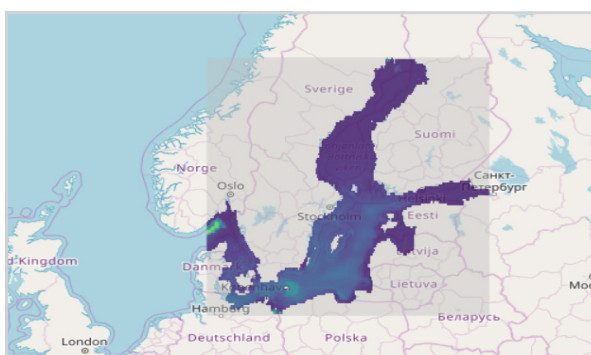


This series of products displays the main functional types and four main living modes of benthic and benthopelagic fish species derived from a multivariate analysis of eight life history traits defined on 161 taxa (illustrative map: relative abundance of small pelagic fish). Other maps display scores for each of the trait modalities aggregated over absolute and relative densities averaged per spatial location.

- » Temporal resolution: decadal (2000 -)
- » Spatial resolution: 0.1 degree
- » Taxonomic coverage: benthic and benthopelagic fish

Neural network modelling of Baltic zooplankton abundances

L6



These Baltic Sea products are gridded data products for 40 zooplankton species using a neural network modelling approach. The neural network uses dissolved oxygen, salinity, temperature, chlorophyll concentration, bathymetry and the distance from coast as input. (illustrative map: *Acartia longiremis* in 2007).

- » Temporal resolution: 2007, 2008, 2010, 2011, 2012 and 2013
- » Spatial resolution: 0.1 degree
- » Taxonomic coverage: zooplankton



Other products

- Thermal niche maps: Summaries of the environmental temperatures at which European marine species have been observed to occur, aggregated and gridded to give average thermal affinities of assemblages of major functional groups (benthos, zooplankton, macroalgae, etc.) at a 0.5 degree resolution. These are compared against current and future temperature projections under different 'IPCC scenarios'.
- Time series analysis: Workflows using phyto- and zooplankton timeseries data to show the evolution over time of depth-averaged abundance of major groups of species, as well as the most frequent species. An interactive dynamic multivariate representation of the communities shows the long-term trend as a shift in yearly and seasonal fluctuation.
- Invasive marine species: Maps showing the occurrences of marine invasive species in European marine harbours based on EurOBIS data, in order to identify same risk areas.



© Jeremy Bishop

Parameters and data formats

L3

Parameter groups

- » Acidity
- » Antifoulants
- » Chlorophyll
- » Dissolved gases
- » Fertilisers
- » Heavy metals
- » Hydrocarbons
- » Marine litter
- » Organic matter
- » Pesticides and biocides
- » Polychlorinated biphenyls
- » Radionuclides
- » Silicates

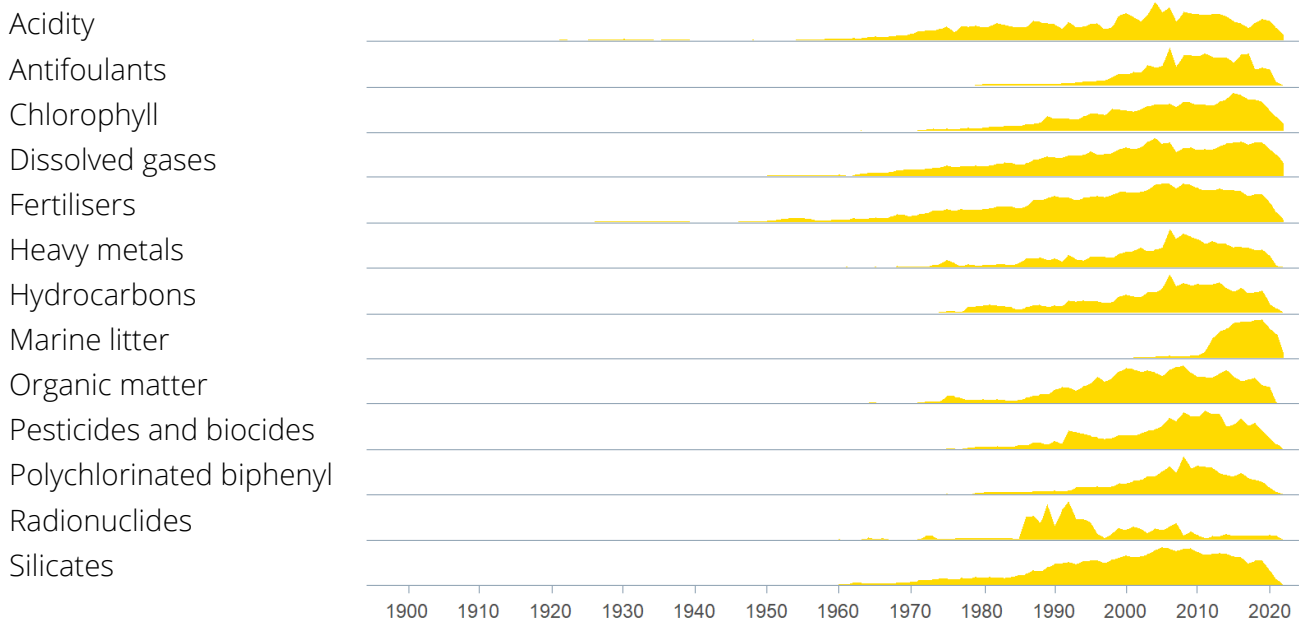
The parameters might have a depth and time component.

Data formats

ODV4 ASCII, Transposed ODV4 ASCII, NetCDF (CF)

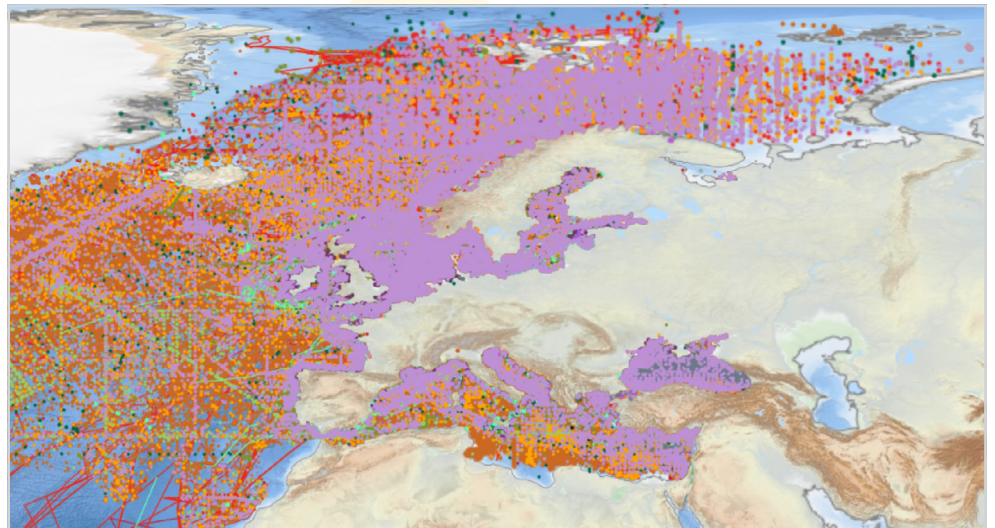
Coverage and resolution

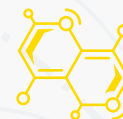
Temporal coverage: time series of the relative number of datasets per parameter group.



Spatial coverage

Distribution of the available datasets (CDIs) in EMODnet Chemistry per parameter group.

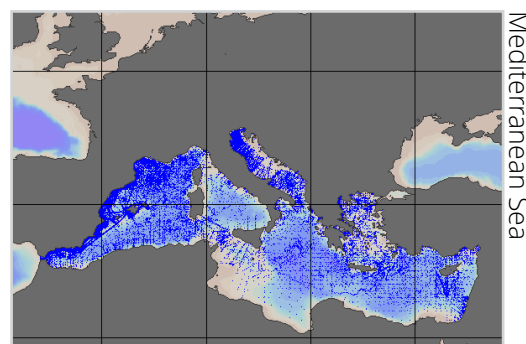
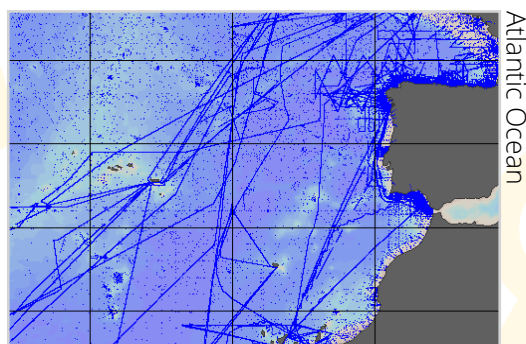




Eutrophication, Ocean acidification aggregated datasets v2021

L4

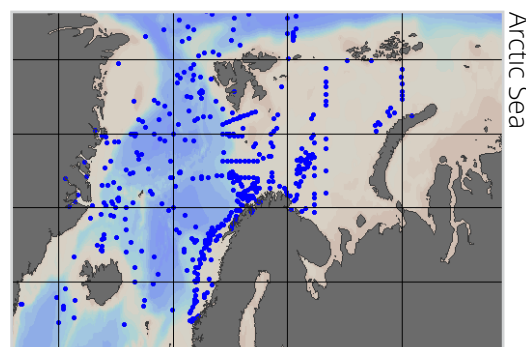
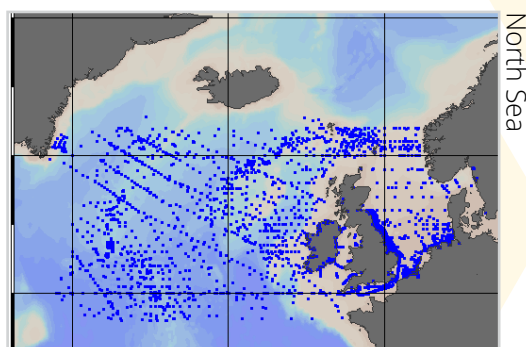
Standardised, harmonised and validated data collections concerning eutrophication (nutrients, chlorophyll and oxygen) and ocean acidification (Alkalinity and pH) available per sea region (Mediterranean Sea, Black Sea, Arctic Region, Baltic Sea, North Sea and North East Atlantic Ocean). Available to download as ODV spreadsheet format that can be easily visualised with ODV Software (more information can be found at: www.seadatanet.org/Software/ODV).



Contaminants aggregated datasets v2021

L4

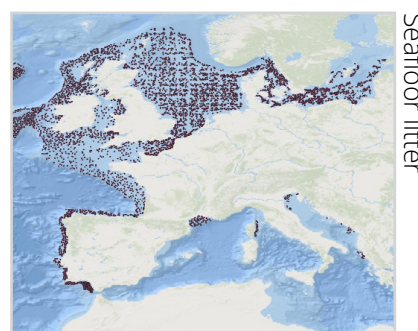
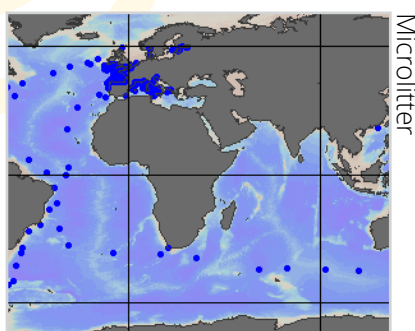
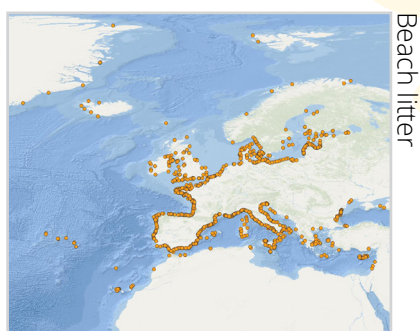
Standardised, harmonised and validated data collections concerning contaminants (in seawater, biota and sediment) available per sea region (Mediterranean Sea, Black Sea, Arctic Region, Baltic Sea, North Sea and North East Atlantic Ocean). Available to download as ODV spreadsheet format that can be easily visualised with ODV Software (more information can be found at: www.seadatanet.org/Software/ODV).



Marine litter aggregated datasets v2021

L4

Standardised and harmonised data collections concerning beach, seafloor litter and floating micro-litter. The harmonised datasets for beach litter can be downloaded as EMODnet Beach litter data format Version 1.0, which is a spreadsheet file composed of 4 sheets: beach metadata, survey metadata, animals and litter. Regarding seafloor litter, the collection can be downloaded as EMODnet Sea-floor litter data format Version 1.0, which is a csv file (tab separated values). For floating micro-litter, the harmonized dataset can be downloaded as ODV collection and spreadsheet (TXT file).



Eutrophication – Gridded climatologies

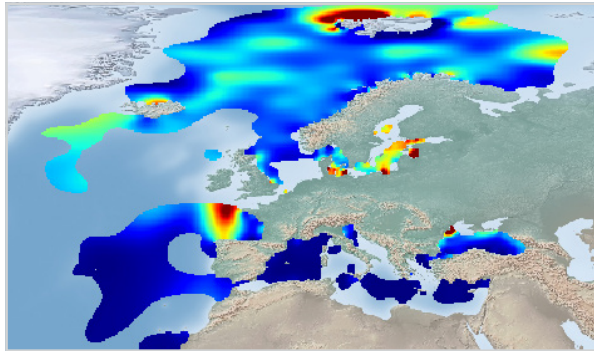
L5

Web services (for all): WMS
Downloadable as NetCDF

They are spatially interpolated maps that display the depth variability over time of 5 variables: Dissolved inorganic nitrogen (DIN), Phosphate, Silicate, Chlorophyll - a, and Dissolved oxygen concentration, implemented following MSFD board guidelines.

All European seas

L5

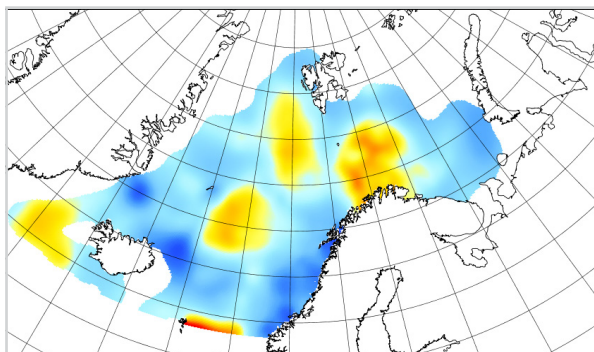


Monthly climatologies built by combining available data of:

- » Temporal coverage: 1960 - 2020;
- » Temporal resolution: monthly;
- » Spatial resolution: 0.25 degree;
- » Depth coverage: 0-5500 m;
- » Depth levels: 102;
- » Tool: DIVAnd;
- » Unit: mg/m³ or umol/l.

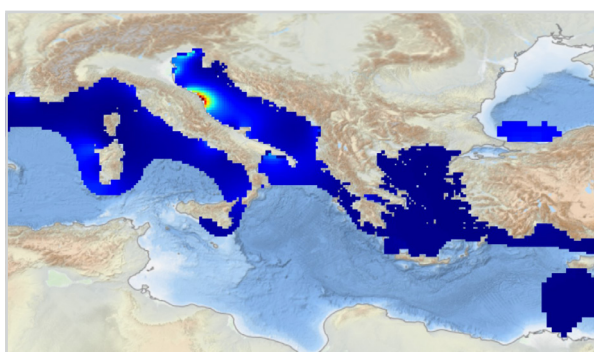
By sea region

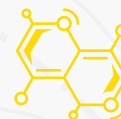
L5



Moving 6-year analysis, for the Arctic Region, North East Atlantic Ocean, Baltic Sea, North Sea, Mediterranean Sea and Black Sea

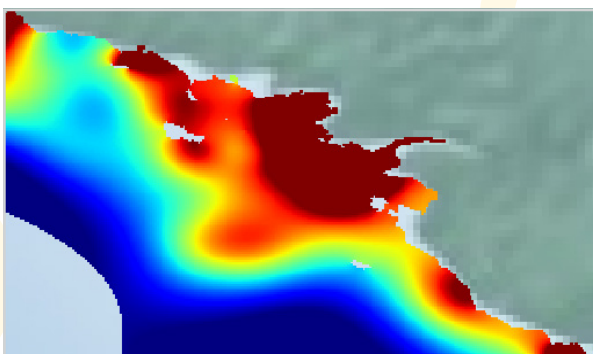
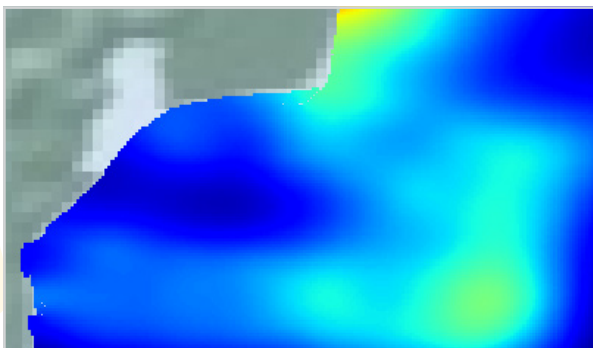
- » Temporal coverage: 1997 - 2017
- » Temporal resolution: seasonal
- » Spatial resolution: 0.1 degree (it slightly varies among regions)
- » Depth coverage: It widely varies among regions (minimum 0-200 m in the Black Sea; maximum 0-3000 m in the NE Atlantic)
- » Vertical resolution: finer near the surface
- » Tool: Diva and DIVAnd (dependent on region)
- » Unit: mg/m³ or umol/l





Coastal areas

L5

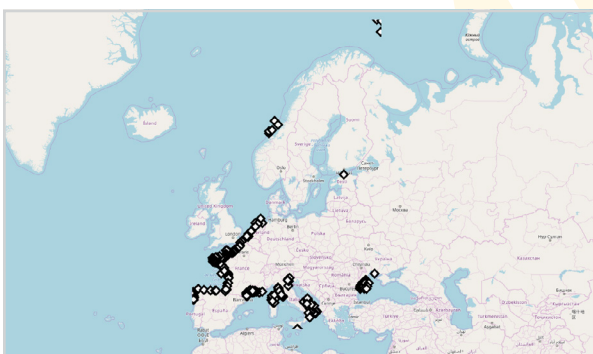


Seasonal climatologies built by combining data of specific coastal areas: Gulf of Riga (Baltic Sea), Danube Delta (Black Sea), Loire River (NE Atlantic Ocean), Po River (Mediterranean Sea). Temporal coverage: dependent on data availability and varies with regions and parameters;

- » Temporal resolution: seasonal
- » Spatial resolution: 0.01 degree
- » Depth coverage: dependent on data availability and varies with regions and parameters
- » Tool: DIVAnd
- » Unit: mg/m³ or umol/l

Maps of 10 selected contaminants

L5



Harmonised, validated and, subsequently, analysed and aggregated datasets are represented in the new maps for contaminants. These maps show data spatial distribution and contribute to the evaluation of data quality and adequacy for environmental quality assessment. Products, focused on ten different substances, display data below and above Limit of Quantification (LOQ), data with LOQ above or below 30 percent of EQSD threshold values, as well as the information on the sampled matrix.

- » Temporal coverage: 1970 – 2017
- » Temporal resolution: annual
- » Available to download as: compressed Shapefile and PNG
- » Web services: WMS, WFS

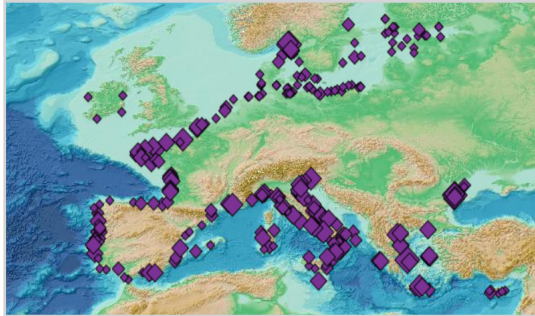
Example map: Anthracene stations above/below LOQ/LOD

*Note that actual values are sea-basin and parameter dependent.

Marine litter maps for beach and seafloor litter

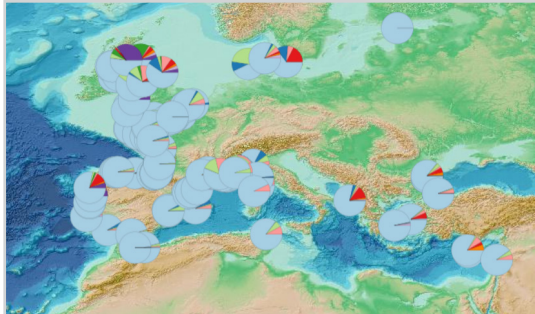
L4

- » Web services (for all): WFS
- » Downloadable as Shapefile

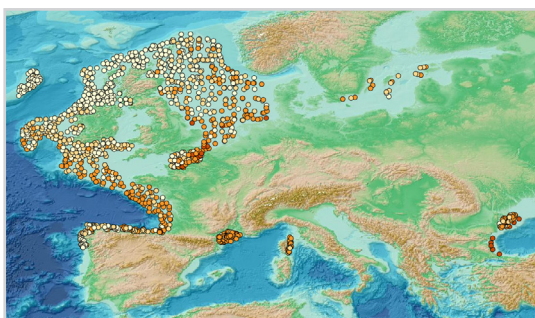


Beach litter (2001 – 2020)

- » Official monitoring
 - Beaches locations and litter list used
 - Number of surveys & temporal coverage per beach
 - Median of total number of litter items per 100m & to 1 survey (example map)
 - Median total number of litter items per 100m & to 1 survey from 2001 to 2021
 - Composition of litter according to material categories in percent per beach/year
 - Median number of cigarette related items per 100m & to 1 survey - without UNEP_MARLIN
 - Median number of cigarette related items per 100m & to 1 survey - UNEP_MARLIN only
 - Median number of fishing and aquaculture related plastic items per 100m & to 1 survey
 - Median number of plastic bags related items per 100m & to 1 survey
 - Median number of single use plastics (SUP) related items per 100m & to 1 survey

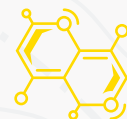


- » Other sources (2001 – 2020)
 - Beaches locations and litter list used
 - Number of surveys & temporal coverage per beach
 - Median of total number of litter items normalized per 100m & to 1 survey
 - Composition of litter according to material categories in percent normalized per beach per year (example map)
 - Median number of cigarette related items normalized per 100m & to 1 survey - without UNEP_MARLIN
 - Median number of cigarette related items normalized per 100m & to 1 survey UNEP_MARLIN only
 - Median number of fishing and aquaculture related plastic items normalized per 100m & to 1 survey
 - Median number of plastic bags related items normalized per 100m & to 1 survey
 - Median number of single use plastics (SUP) related items normalized per 100m & to 1 survey

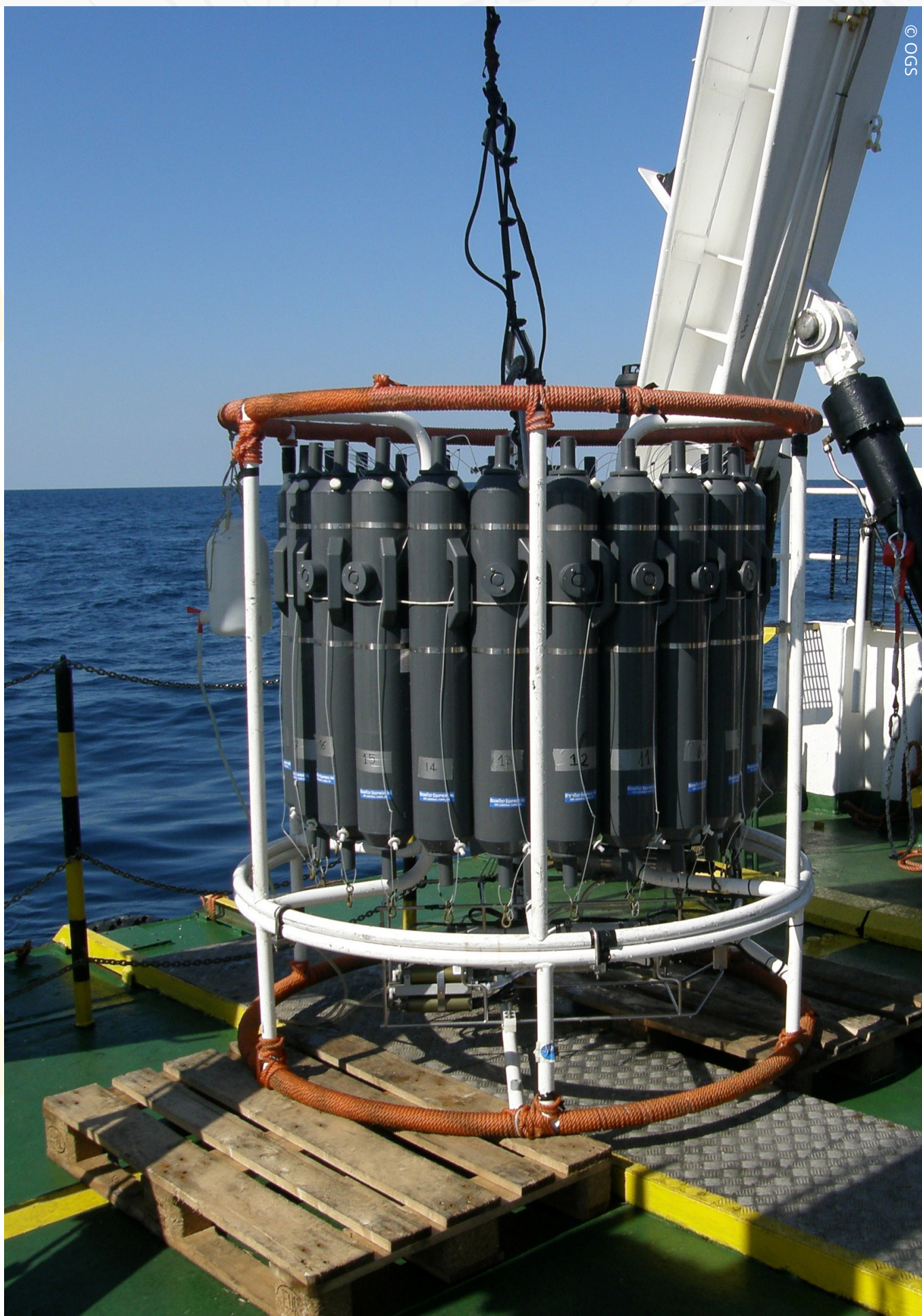


Seafloor litter (2006 – 2021)

- Trawls locations
- Density (Nb. Items/km²) (example map)
- Material categories percentage per year
- Fishing related items density (Nb. Items/km²)
- Plastic bags density (Nb. Items/km²)



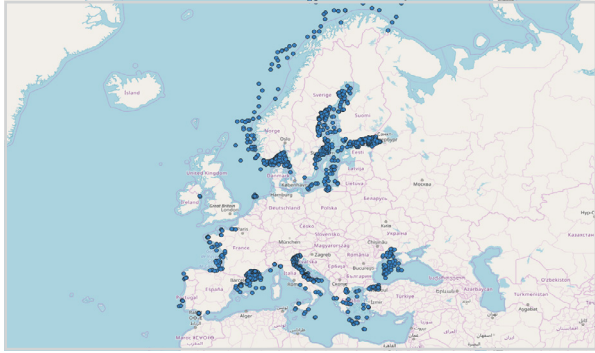
© OGS



EMODnet Geology mainly makes available data products except for Sedimentation rates map providing collated data.

Sedimentation rates

L4



Sedimentation rate map of the European Seas. The attribute table contains sediment accumulation rates expressed in cm/year, together with sampling information.

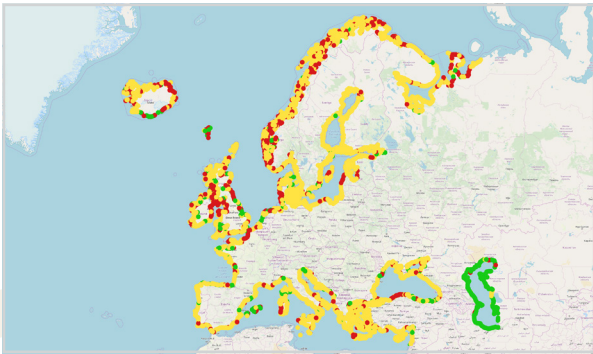
- » Available to download as: ESRI file geodatabase
- » Web services: WMS, WFS





Coastal behaviour via satellite data

L5

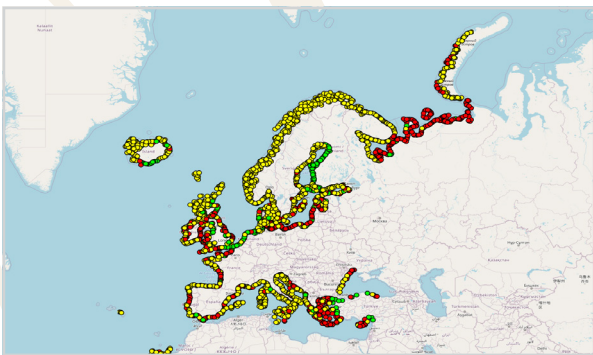


Shoreline-migration map allows users to visualise pan-European coastal behaviour for 2007-2017 at different spatial scales. Three coastal migration classes are defined – erosion, stable (<math><0.5\text{ m}</math> of mean annual change), and accretion. Works best for sandy shorelines.

- » Available to download as: GeoJSON
- » Web services: WMS, WFS

Coastal behaviour via field data and aerial photographs

L5

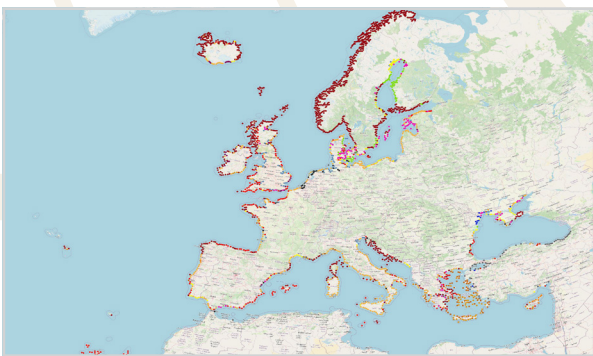


Shoreline-migration map allows users to visualise pan-European coastal behaviour at different spatial scales. Three coastal migration classes are defined – erosion, stable (<math><0.5\text{ m}</math> of mean annual change), and accretion – which are accompanied by the level of accuracy (e.g. estimated, confirmed, no information).

- » Available to download as: QGIS GeoPackage, ESRI shapefile
- » Web services: WMS, WFS

Coastal type

L5



Map showing coastal lithology, morphology and setting. The visualised coastal types can be grouped into four main classes: cliffs of rock or erosion-resistant consolidated sediment, sand and gravel beaches, muddy coasts, and coasts characterised by man-made structures.

- » Available to download as: QGIS GeoPackage, ESRI shapefile
- » Web services: WMS, WFS

Seabed substrates

L6

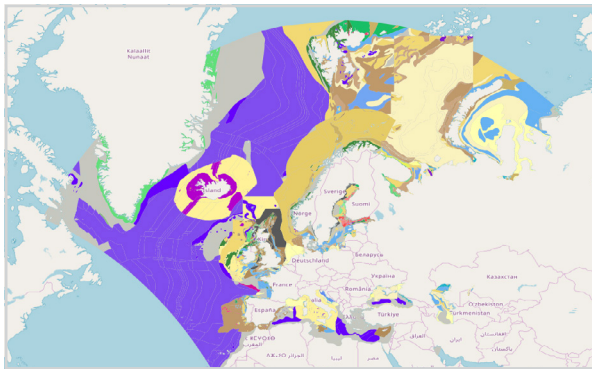


Multiscale maps of seabed substrates at scales 1:1M, 1:250k, 1:100k and multiscale (1:1M, 1:250k, 1:100k, 1:50k and 1:25k). The substrate classes are defined on basis of the modified Folk sediment triangle. At minimum level the data includes following 5 classes: mud to muddy sand, sand, coarse substrate, mixed sediment, rock and boulders.

- » Scale: 1/1.000.000, 1/250.000, 1/100.000, 1/50.000, 1/25.000
- » Available to download as: ESRI file geodatabase
- » Web services: WMS, WFS

Seafloor (bedrock)

L6

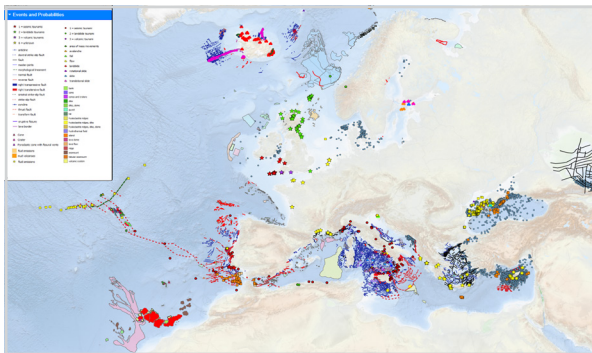


Seafloor stratigraphy, lithology and fault maps representing the marine pre-Quaternary geological units, their age, structure and physical characteristics.

- » Multiresolution scale: 1/100.000 – 1/5.000.000
- » Available to download as: ESRI file geodatabase
- » Web services: WMS, WFS

Geological event distribution

L6

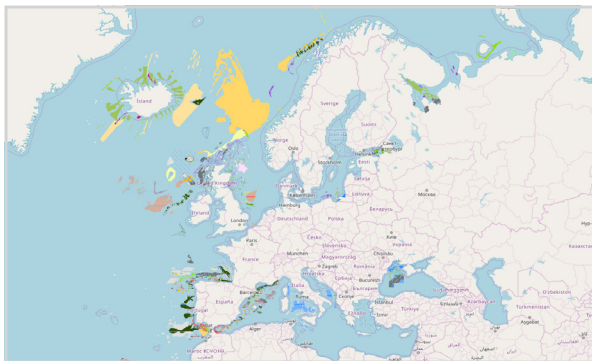


Geographical distribution of all significant geological events such as submarine landslides, fluid emissions, tectonics, earthquakes, tsunamis and volcanoes identified by their characteristics which are detailed in the attribute tables of the GIS layers.

- » Multiresolution scale: 1/250.000, 1/100.000
- » Available to download as: ESRI shapefile
- » Web services: WMS, WFS

Geomorphology

L6

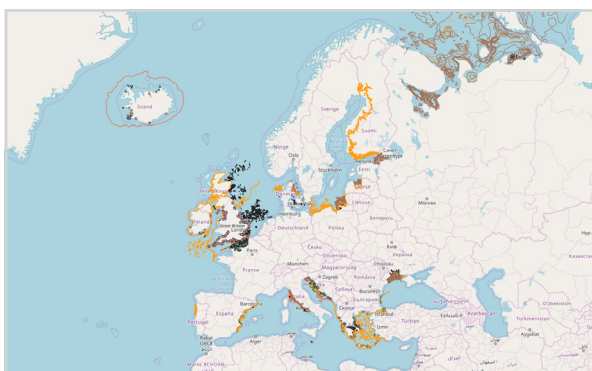


Maps showing the geomorphology of the seafloor representing the "marine landscape". This consists of two layers: (1) General physiographic features (e.g. continental shelf, continental slope, ridge) and (2) marine landforms (e.g. canyon, sea mount, delta lobe, moraine, esker) and their genesis.

- » Multiresolution scale: 1/10.000 – 1/16.000.000
- » Available to download as: ESRI file geodatabase
- » Web services: WMS, WFS

Submerged landscapes

L6



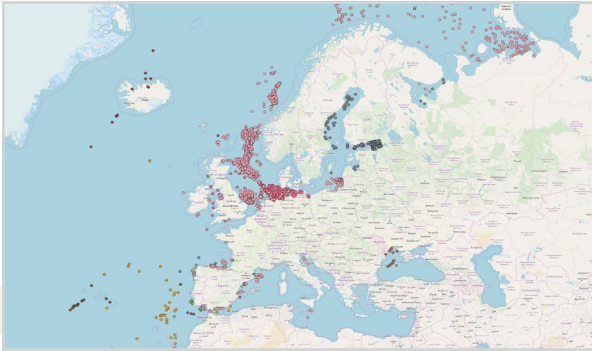
Information on submerged landscapes preserved on continental shelves around Europe and the Caspian. It includes more than 40,000 features representing 27 classes of submerged landscape and palaeoenvironmental indicator ranging from mapped and modelled palaeocoastlines, evidence for submerged forests and peats, and submerged freshwater springs.

- » Available to download as: ESRI file geodatabase
- » Web services: WMS, WFS



Mineral occurrences

L6

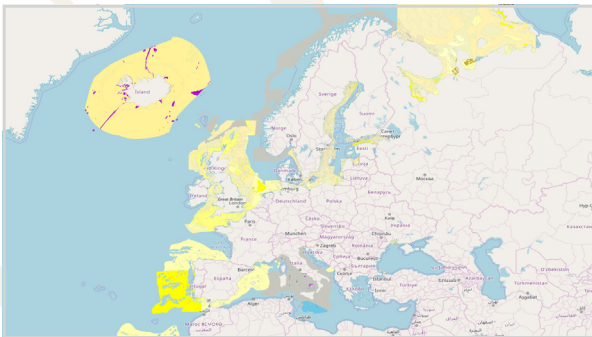


Information on known marine mineral occurrences in European seas. Comprising marine aggregates, hydrocarbons, gas hydrates, placers, phosphorites, evaporites, polymetallic sulphides, polymetallic nodules, cobalt rich ferromanganese crust, metal rich sediment, sapropel, and vein hosted mineralisation.

- » Available to download as: ESRI shapefile
- » Web services: WMS, WFS

Quaternary geological units

L6



Upper seafloor stratigraphy, lithology, and genesis maps representing the youngest marine Quaternary geological units, their age, genesis and physical characteristics. Multiscale maps at scale ranges 20k – 100k, 100k – 300k, 300k – 1,5M, <1.5M.

- » Multiresolution scale: 1/20.000 – 1/3.000.000
- » Available to download as: ESRI file geodatabase
- » Web services: WMS, WFS



© Pixabay

Parameters and data formats

L4

Themes and subthemes

- » Aggregate extraction
- » Algae production: macroalgae, microalgae, Spirulina
- » Aquaculture: finfish, shellfish and freshwater production
- » Cables: telecommunications cables, power cables
- » Desalination plants
- » Cultural heritage: ship wrecks, lighthouses, submerged prehistoric archaeology and landscape
- » Dredging sites
- » Environment: Natura 2000 areas, nationally designated areas, World Database on Protected Areas, state of bathing water
- » Fisheries: ICES statistical areas, FAO fishery statistical area, fish catches by FAO fishery statistical areas, fish sales, fishing effort, fishing intensity
- » Maritime Spatial Planning (MSP): MSP Spatial Plan Area, MSP Zoning Areas
- » Military areas
- » Nuclear power plants
- » Ocean energy facilities: project locations and test sites
- » Oil and Gas: active licences, boreholes, offshore installations
- » Other forms of area management / designation: advisory councils, international conventions, EEA coastline, maritime boundaries, MSFD reporting units, Exclusive Economic Zones
- » Pipelines
- » Traffic in main ports
- » Waste disposal: dredge spoil dumping, dumped munitions, port reception facilities, urban wastewater discharge points and treatment plants
- » Wind farms

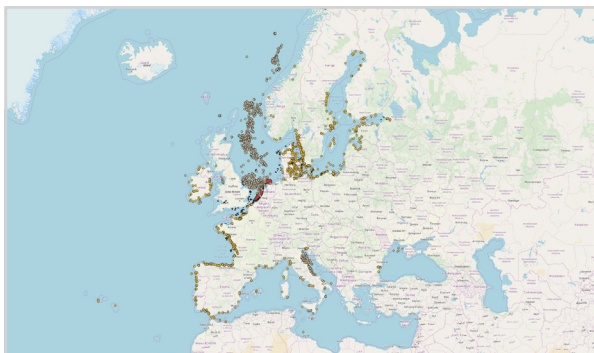
Data formats

ESRI shapefile, ESRI File Geodatabase, WMS and WFS web services

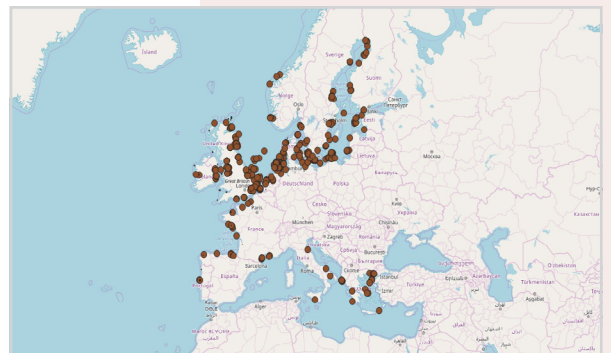
Coverage and resolution

Spatial coverage: the following example maps illustrate the distribution of the respective human activities.

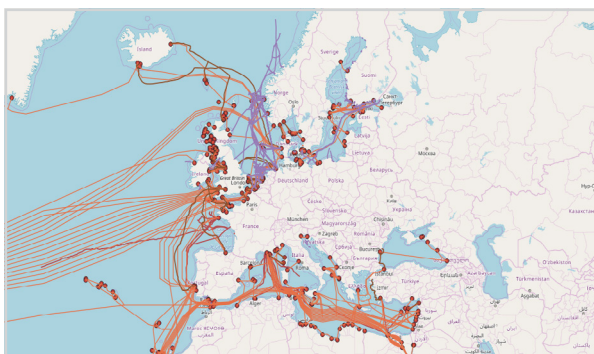
Dredging, aggregate extraction and offshore platform locations



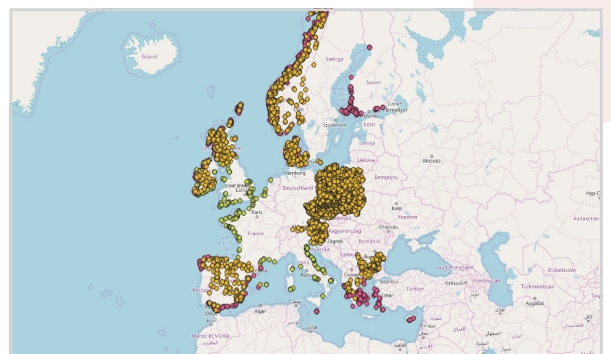
Energy facilities and wind farms



Submarine cables and pipelines



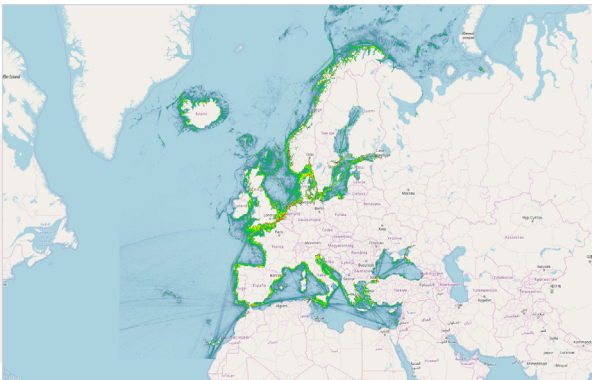
Finfish, freshwater and shellfish production sites





Shipping Density

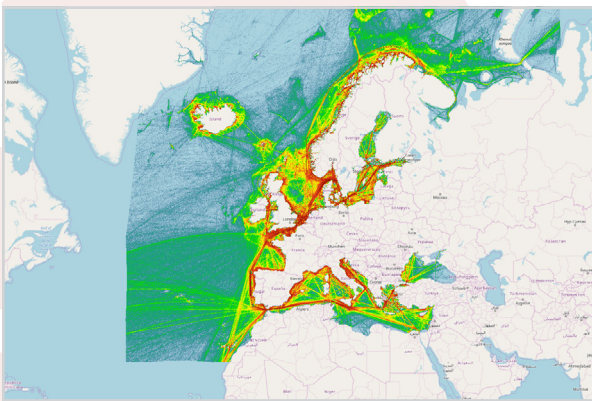
L5



Vessel Density Maps

Number of hours spent in a grid cell by ship type.

- » Temporal coverage: 2017 – 2020
- » Temporal resolution: monthly and annual
- » Spatial resolution: 1 km²
- » Available to download as: GeoTIFF
- » Web services: WMS, WCS



Route Density Maps (EMSA)

Number of ship routes in a grid cell by ship type.

- » Temporal coverage: 2019 – 2020
- » Temporal resolution: monthly, seasonal and annual
- » Spatial resolution: 1 km²
- » Available to download as: GeoTIFF
- » Web services: WMS, WCS



© Andy Dingley

Parameters and data formats

L2 L3

Parameter groups and variables

- » Water temperature (°C)
- » Water salinity (psu)
- » Water conductivity (biogeochemical): dissolved oxygen (kg/m³), fluorescence (S/m), turbidity (ml/l), total chlorophyll-a (mg/m³), etc.
- » Currents and winds (m/s): direction
- » River flow (m³/s)
- » Optical properties: light irradiance surface PAR (micromole photon/m².s), turbidity (milliF.T.U Formza Turb Unit)
- » Sea level (m)
- » Atmospheric: air temperature (°C), relative humidity (%), atmospheric pressure (decibar, pascal)
- » Underwater noise (dB)

Platform types: mooring buoys, ARGO profilers, drifting buoys, HF radars, tide stations, river gauging stations, ferrybox and CTD profiles from ships, gliders, marine mammal.

Data formats

html table, ESRI asc & csv, Google Earth kml, OPeNDAP binary, mat, NetCDF, ODV txt, csv, tsv, json, and xhtml

Coverage and resolution

Temporal resolution: minutes to seasons

Temporal coverage: time series of the relative number of datasets per year from 1900 to present. EMODnet Physics also offers historical datasets that date back to 1807.

Atmospheric

Biological parameters

Currents

Optical properties

River run-off

Sea level

Underwater noise

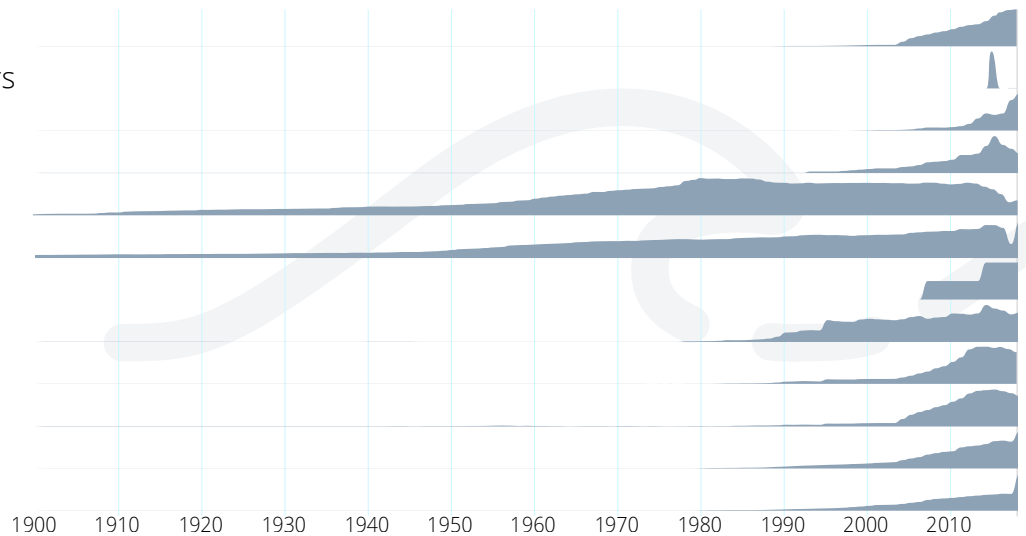
Water conductivity

Water salinity

Water temperature

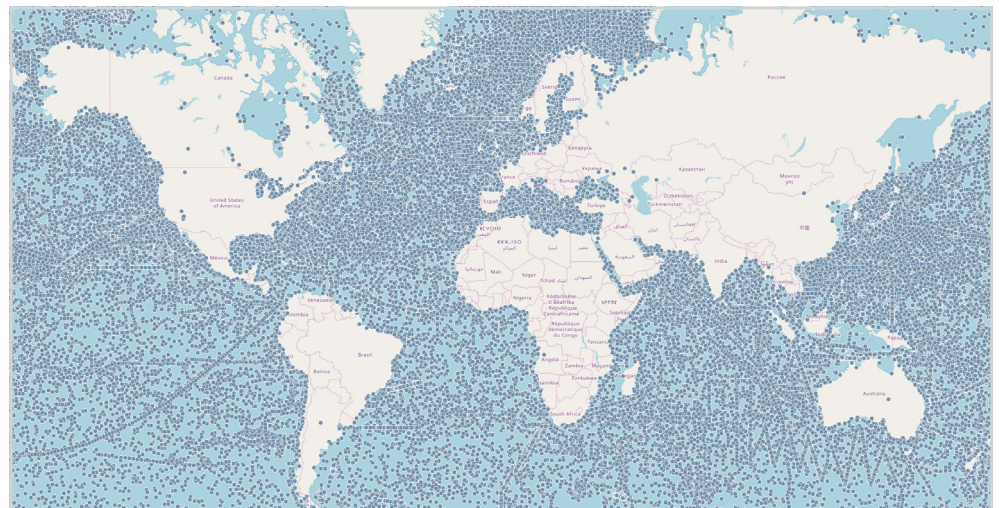
Waves

Winds



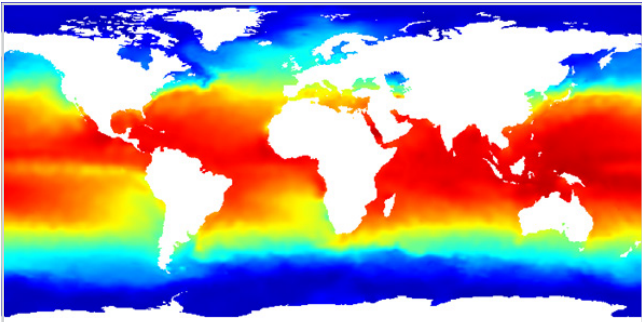
Spatial coverage

Overview of all the platforms (linked in Physics) that measure or have measured one or more physical variables.





Temperature



Temperature in the Water Column

L5

EMODnet Physics Product name: Temperature in the Water Column (1990 - 2020) - CORA

- » Temporal coverage: 1990 – 2020
- » Temporal resolution: monthly
- » Spatial resolution: 8 – 22 km
- » Depth coverage = -2000 – 0 m
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) – [ERDDAP](#)
- » DOI: <https://doi.org/10.48670/moi-00038>

Temperature Climatology

L5

Temperature climatological fields for Global, North Adriatic Sea, North Atlantic Ocean, Mediterranean Sea, Black Sea and North Sea. The computation was done with the DIVAnd (Data-Interpolating Variational Analysis in n dimensions).

EMODnet Physics Product names: NorthAtlanticOceanTemperature Climatology monthly, MediterraneanSeaTemperature Climatology monthly, BlackSeaTemperature Climatology monthly, NorthSeaTemperature Climatology monthly, NADR - North Adriatic HR Temperature Climatology, Seawater Temperature from GLODAPv2_2016b

- » Temporal coverage: 1955 – 2019
- » Temporal resolution: monthly
- » Spatial resolution: 8 – 22 km
- » Depth coverage = -2000 – 0 m
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [ERDDAP](#)

Temperature Anomaly 30 years

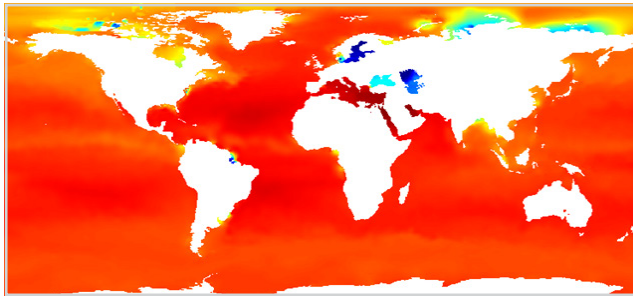
L5

The sea surface temperature monthly anomaly is calculated over baseline averages of 30 years. This product compares the yearly average temperature with the average of the baseline period. The product is based on the Coriolis Ocean database for ReAnalysis (CORA) v.5.2. (only surface data), developed by IFREMER for Copernicus Marine Service. The product was developed by ETT for EMODnet Physics.

EMODnet Physics Product name: Sea Surface Temperature Annual Anomaly [30 years average baseline]

- » Temporal coverage: 1990 – 2019
- » Temporal resolution: yearly
- » Spatial resolution: 8 – 22 km
- » Depth coverage = Surface
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [ERDDAP](#)

Salinity



Salinity in the Water Column

L5

Global Ocean-Gridded fields of Salinity in the water column. The product reprocessed *in-situ* global product CORA (INSITU_GLO_TS_REP_OBSERVATIONS_013_001_b) using the ISAS software. Developed by IFREMER for Copernicus Marine Service. Downstreamed by ETT for EMODnet Physics.

EMODnet Physics Product name: Salinity in the Water Column (1990 - 2020) - CORA

- » Temporal coverage: 1990 – 2020
- » Temporal resolution: monthly
- » Spatial resolution: 8 – 22 km
- » Depth coverage = -2000 – 0 m
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) – [ERDDAP](#)
- » DOI: <https://doi.org/10.48670/moi-00038>

Salinity Climatology

L5

Salinity climatological fields for Global, North Adriatic Sea, North Atlantic Ocean, Mediterranean Sea, Black Sea and North Sea. The computation was done with the DIVAnd (Data-Interpolating Variational Analysis in n dimensions).

EMODnet Physics Product names: NorthAtlanticOceanSalinity Climatology monthly, MediterraneanSeaSalinity Climatology monthly, BlackSeaSalinity Climatology monthly, NorthSeaSalinity Climatology monthly, NADR - North Adriatic HR Salinity Climatology, Seawater Salinity from GLODAPv2_2016b

- » Temporal coverage: 1955 – 2019
- » Temporal resolution: monthly
- » Spatial resolution: 8 – 22 km
- » Depth coverage = -2000 – 0 m
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [ERDDAP](#)



Salinity Anomaly 30 years

L5

The sea surface salinity monthly anomaly is calculated over baseline averages of 30 years. This product compares the yearly average salinity with the average of the baseline period. The product is based on the Coriolis Ocean database for ReAnalysis (CORA) v.5.2. (only surface data), developed by IFREMER for Copernicus Marine Service. The product was developed by ETT for EMODnet Physics.

EMODnet Physics Product name: Sea Surface Salinity Annual Anomaly [30 years average baseline]

- » Temporal coverage: 1990 – 2019
- » Temporal resolution: yearly
- » Spatial resolution: 8 – 22 km
- » Depth coverage = Surface
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [ERDDAP](#)

Salinity SMOS

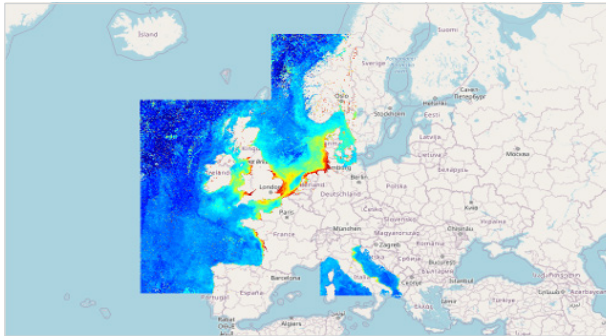
L5

Integration of Sea Surface Salinity measurements provided by the Soil Moisture and Ocean Salinity (SMOS) European satellite mission. This product provides daily integrated satellite Sea Surface Salinity (SSS) measurements at global scale. The SMOS SSS maps are merged with daily Sea Surface Temperature maps in order to increase the spatial resolution of the original Level 3 SSS maps. The product has a spatial resolution of 0.05°x0.05° and the temporal coverage is from 2011 till May 2021.

- » **EMODnet Physics Product name:** SMOS BEC global SSS product v2 L4
- » Temporal coverage: 2011 – 2021
- » Temporal resolution: monthly
- » Spatial resolution: 8 – 22 km
- » Depth coverage = Surface
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [ERDDAP](#)

Optical Properties

L5



Total Suspended Matter

L5

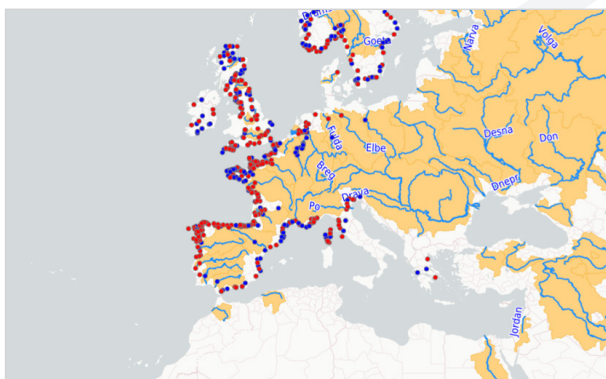
Concentration of total suspended matter (conc_tsm, mg/l) is a product of the Coastcolour L2W Concentrations Data, obtained from the OC4 algorithm for clear and moderate turbid waters, and from the CoastColour v1 neural network. The L2W product was then remapped on a regular grid, maintaining the 300 m full resolution, in order to obtain L3 products over the Mediterranean Sea, North Sea and Baltic Sea and monthly averaged. Developed by EMODnet Physics.

EMODnet Physics Product name: Total Suspended Matter Mediterranean Sea, Total Suspended Matter Baltic Sea, Total Suspended Matter North Sea

- » Temporal coverage: 2003 – 2012
- » Temporal resolution: monthly
- » Spatial resolution: 0.3 km
- » Depth coverage = Surface
- » Unit: % (suspended particles, that are not dissolved)
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [ERDDAP](#)

River Run-off

L5



River Outflow

L5

Operational *in situ* river outflow data. The product includes near real time data from European river stations. Each one of the dots represents a river measuring station.

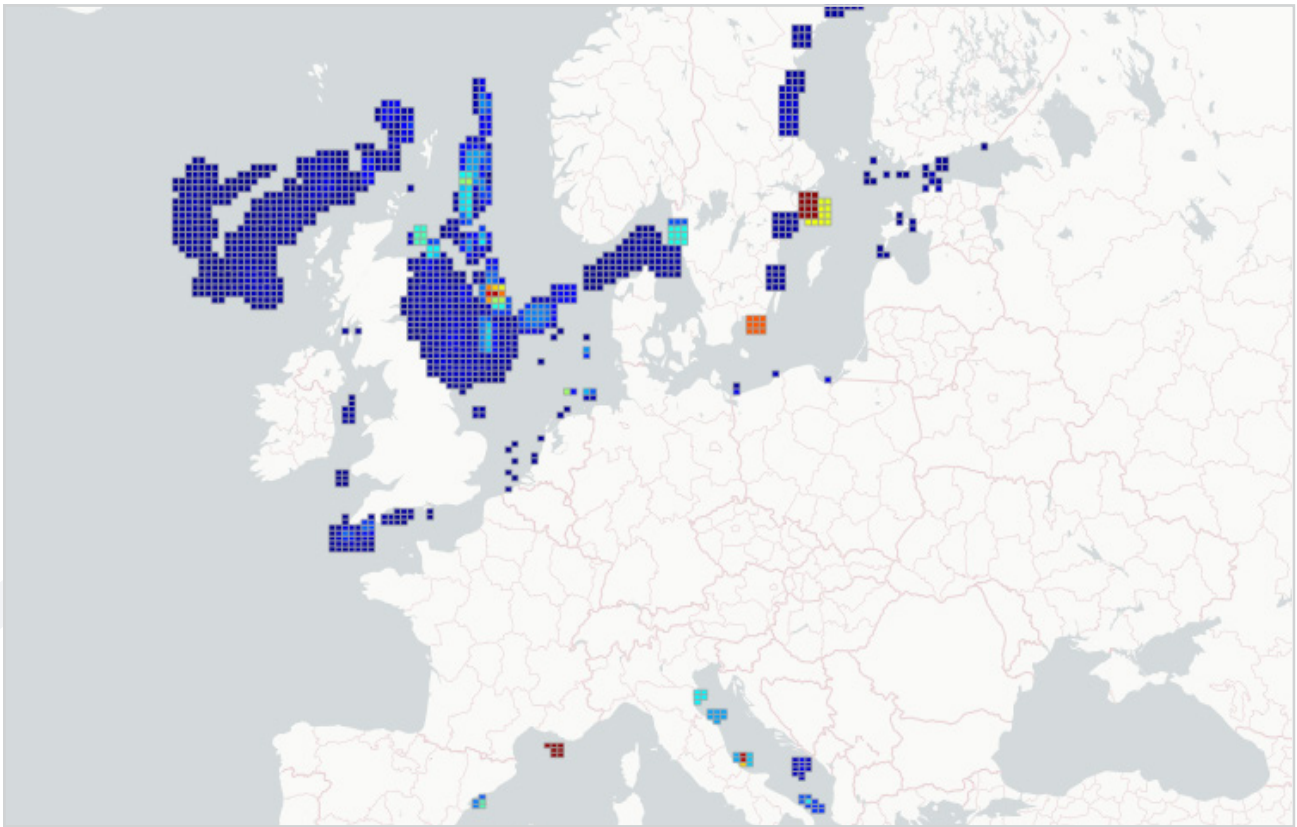
EMODnet Physics Product name: EMODnet Physics DB of the river gauging stations

- » Temporal coverage: 1900 – now
- » Temporal resolution: hourly to monthly, monthly to annual averages
- » Spatial resolution: *in situ* / sea basin
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [Geoserver](#)



Under Water Noise

L5



Impulsive Noise Events

L5

Impulsive noise events in Pulse Block Day unit(PBDU). A PBDU is the number of days in a calendar year in which impulsive sound activity occurred within the cell-grid. The product applies a common grid (10' latitude x 20' longitude) to harmonize the Regional Conventions events DBs. These data are collected at national level and contribute to the Sea Regional Convention events registry. ICES (<https://accobams.org/conservations-action/anthropogenic-noise/>) is hosting OSPAR and HELCOM registries. Mediterranean data are integrated from CTN under the ACCOBAMS demonstrator (<https://www.ices.dk/data/data-portals/Pages/underwater-noise.aspx>).

EMODnet Physics Product name: EMODnet Impulsive Noise Events Registry

- » Temporal coverage: 2014 – 2019
- » Spatial resolution: grid 10 x 20 arc minute
- » Unit: pulse block days
- » Web services: WMS, WFS
- » Links: [Geonetwork](#) - [Geoserver](#)

Continuous noise monitoring sites

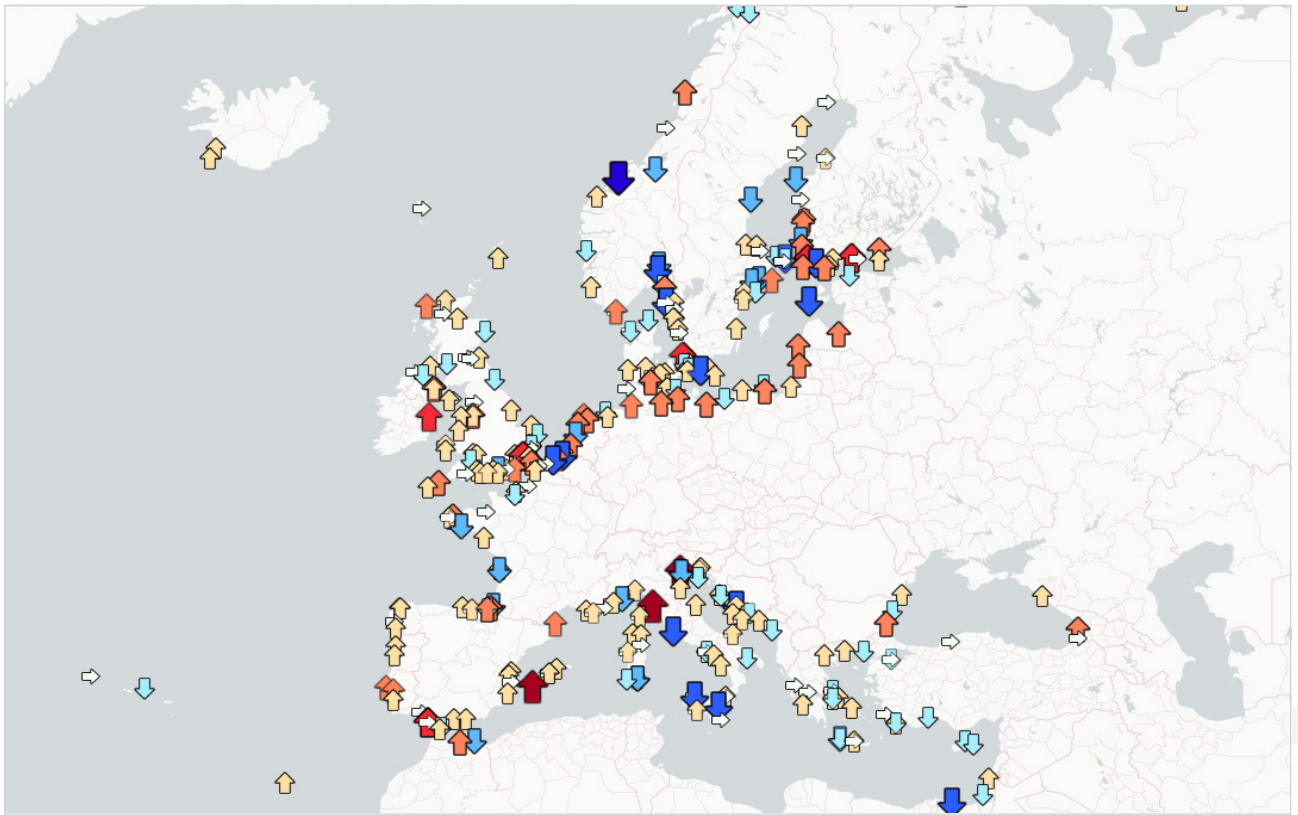
L5

Fixed stations and transects to assess continuous noise. Data are collected from ICES DB (www.ices.dk/data/data-portals/Pages/Continuous-Noise.aspx), the JOMOPANS (<https://jomopansgestool.au.dk/en/about>) project and QUIETSEA (<https://quietseas.eu/>).

EMODnet Physics Product name: EMODnet Physics - Continuous noise monitoring sites

- » Spatial resolution: *in situ* / sea basin
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [Geoserver](#)

Sea level



Sea Level Trends

L5

In Situ Relative Sea Level Trends. These products (developed for EMODnet Physics) use: PSMSL, SONEL, DUCAS and CMCC data on sea level data from the global network of tide gauges since 1900.

EMODnet Physics Product name: EMODnet Physics Global relative Sea Level Trends, EMODnet Physics Absolute Sea Level Trends - SONEL, EMODnet Physics - Absolute Sea Level Trend – GLORYS12V, EMODnet Physics - Absolute Sea Level Trend – DUCAS

- » Temporal coverage: 1900 – now
- » Temporal resolution: hourly to monthly, monthly to annual averages
- » Spatial resolution: *in situ* / sea basin
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#)

Sea Level Near Real Time

L5

Near real-time Sea-level data from *in situ* stations (tide gauges). This product includes the European tide gauges organized under EuroGOOS TG TT and CMS INSTAC, IOC sea level core network, GLOSS stations, UHSLC Fast Delivery network, JRC TAD network. The EMODnet Physics product offers the latest 60 days of operational data (60m time res). Each one of the dots on the map represent a fixed measuring station that provided data in the last 60 days.

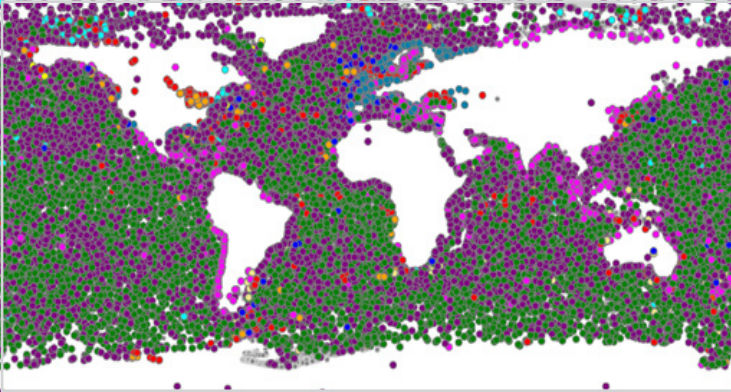
EMODnet Physics Product name: EMODnet Physics near real time sea level data

- » Spatial resolution: *in situ* / sea basin
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [Geoserver](#)



In Situ Platforms

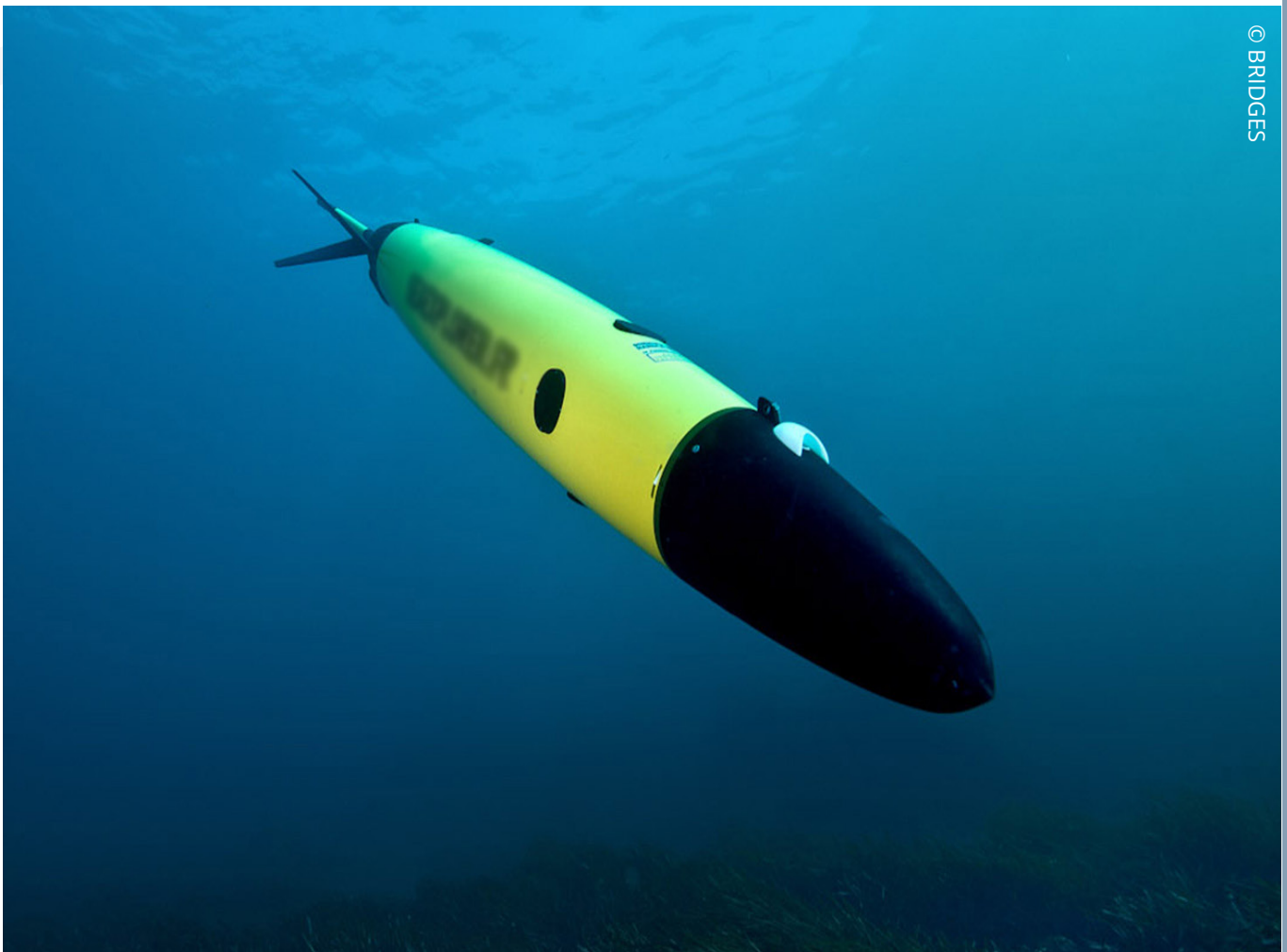
L5



Collection of *in situ* data (time-series, profiles and datasets) as recorded by platforms (tide gauge, river stations, CTDs, etc.). The product offers near real time and delayed mode data. It integrates data from major marine and oceanographic initiatives and data repositories (EuroGOOS ROOS, CMS INSTAC, SeaDataNet NODCs, ICES, PANGAEA, etc.)

EMODnet Physics Product name: EMODnet Physics - *In Situ* data from operational platforms and research projects

- » Spatial resolution: *in situ* / sea basin
- » Web services: WMS, WCF, WFS, WAF, REST, OpenDAP
- » Links: [Geonetwork](#) - [Geoserver](#)



Parameters and data formats

L4

Parameter category

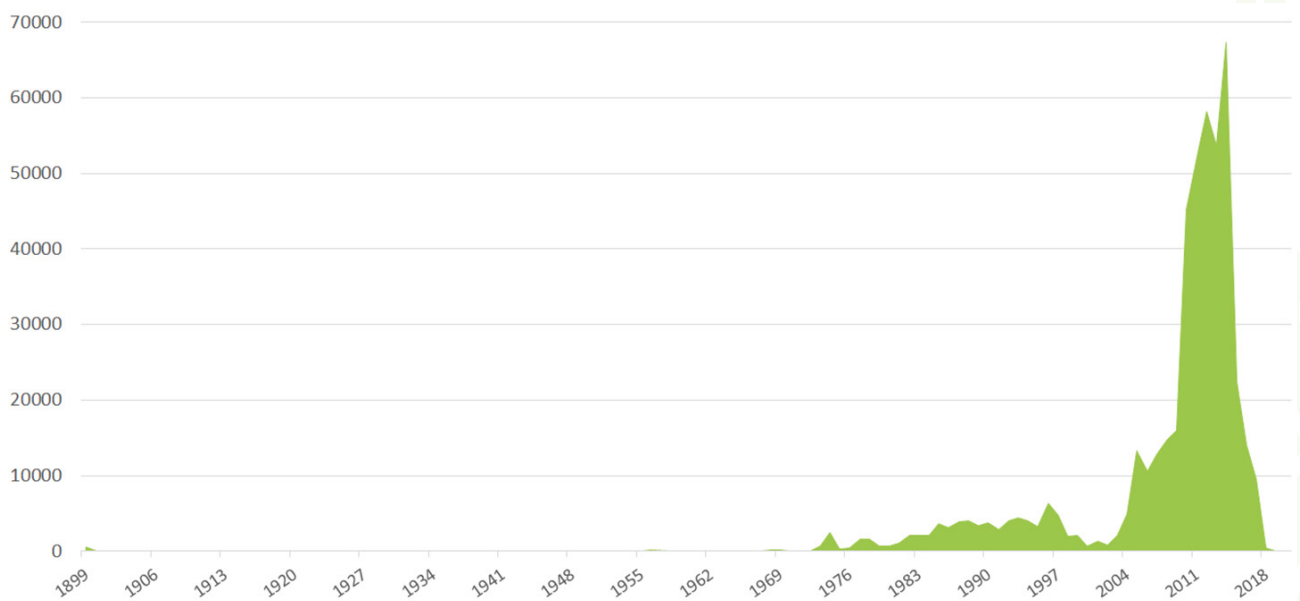
Habitats and biotopes, classified according to the European Nature Information System (EUNIS) habitat classification, where possible, and other regional, national and local classification systems.

Data formats

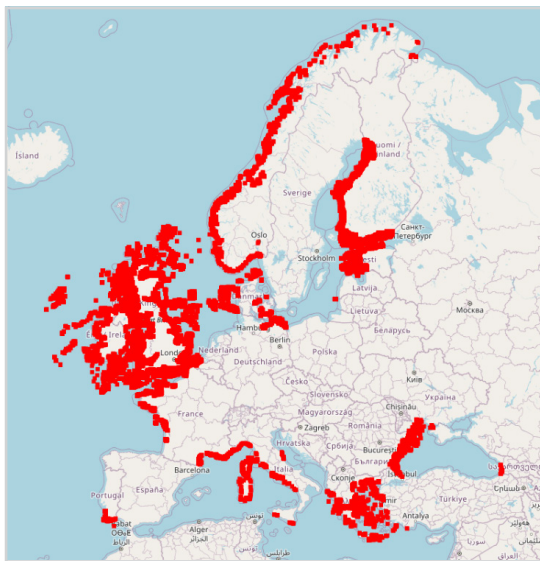
Data can be downloaded as an ESRI Shapefile, and accessed via WMS and WFS web services.

Coverage and resolution

Temporal coverage: number of records per year.

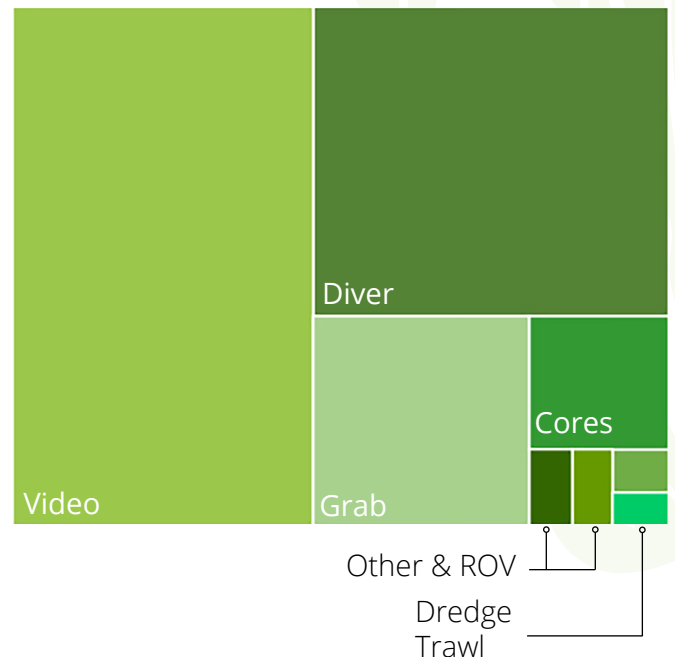


Spatial coverage



Note: spatial coverage is currently expanding to a pan-European scale.

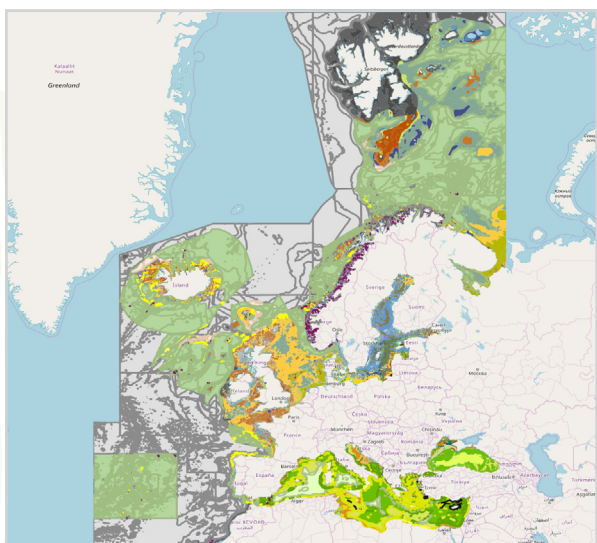
Proportional availability of data per survey type





EMODnet broad-scale seabed habitat map for Europe (EUSeaMap): EUNIS / full-detailed habitat classification

L6

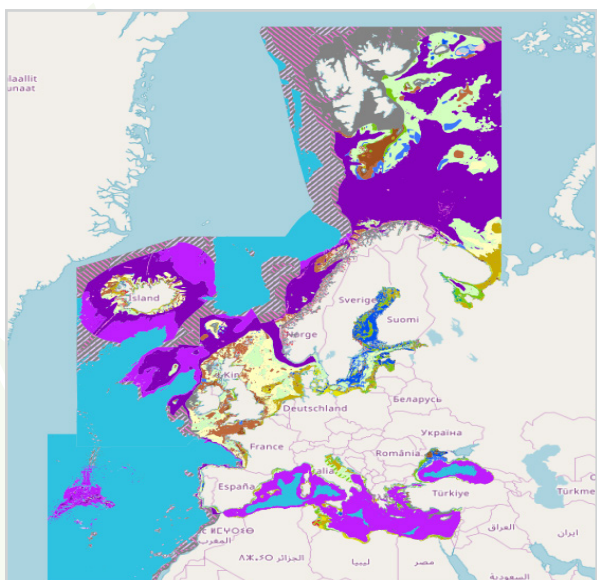


Updated in 2021 with improved resolution and addition of biogenic habitats

- » With associated confidence layer
- » Spatial resolution: ~100 m, 1/16 * 1/16 arc minute
- » Available to download as: ESRI shapefile
- » Web services: WMS

EMODnet broad-scale seabed habitat map for Europe (EUSeaMap): MSFD Benthic broad habitat types

L6

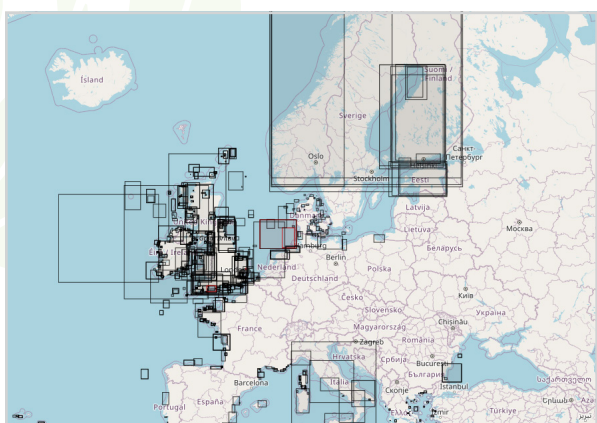


Updated in 2021 with improved resolution and addition of biogenic habitats.

- » With associated confidence layer
- » Spatial resolution: ~100 m, 1/16 * 1/16 arc minute
- » Available to download as: ESRI shapefile
- » Web services: WMS

Collection of individual habitat maps from surveys

L6

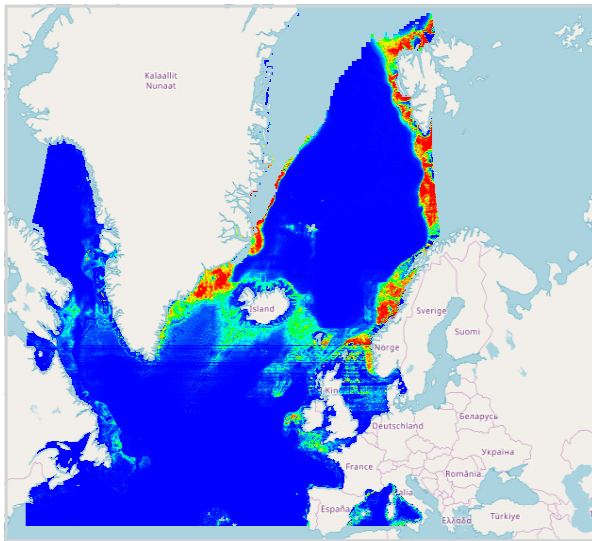


Over 800 seabed habitat maps collated from various sources, grouped according to habitat classification: EUNIS 2007, EUNIS 2019, Habitats Directive Annex I, Barcelona Convention and Other. Now with the addition of Essential Fish Habitats.

- » Web services: WMS, WFS
- » Available to download as: ESRI shapefile

Collection of modelled maps of specific habitats

L6



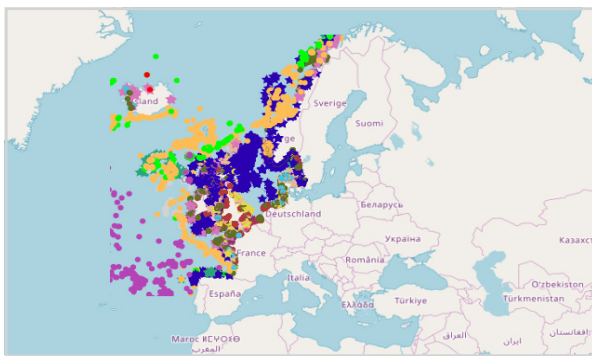
Over 70 predictive habitat models of various habitats, collated from various sources, grouped according to sea region.

» Web services: WMS, WCS

Example map: Predictive habitat model of ostur distribution in the North Atlantic.

Composite data products

L6



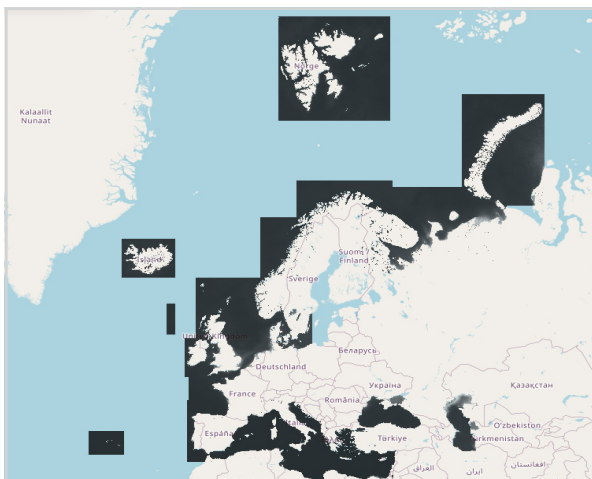
Compilations of data from multiple sources into new products that show the presence and extent of priority habitats, including OSPAR threatened and/or declining habitats, Essential Ocean Variables (live coral, seagrass and macroalgae), Biogenic substrate and Coralligenous and other calcareous bioconcretions. The official reported gridded distribution of habitat types listed in the Habitats Directive Annex 1 from the European Environment Agency are also available.

» Available to download as: ESRI shapefile
» Web services: WMS, WFS

Example map: OSPAR threatened and/or declining habitats in the NE Atlantic.

Environmental variables that influence habitat type: optical properties

L5



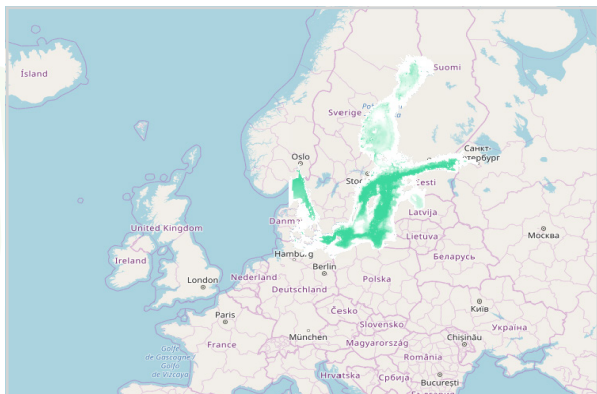
Created for EMODnet Seabed Habitats. Includes Light attenuation coefficient (KDPAR), Light (PAR) at the sea surface, Light (PAR) at the seabed, and associated confidence assessments.

» Temporal coverage: 2005 – 2019
» Spatial resolution: 250 m
» Web services: WMS



Environmental variables that influence habitat type: probability of the seabed being below the halocline

L5

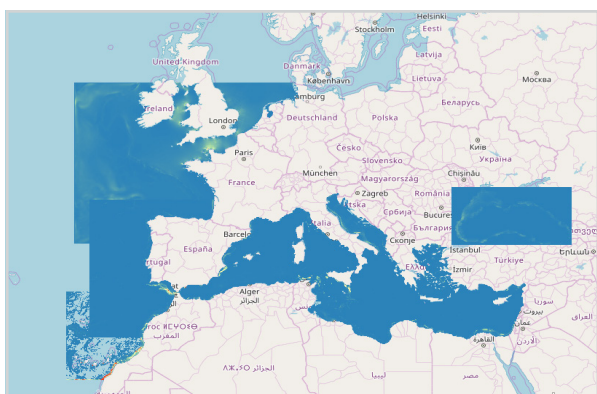


Created for EMODnet Seabed Habitats for the Baltic Sea only, includes confidence assessment.

- » Spatial resolution: 5.5 km
- » Web services: WMS

Environmental variables that influence habitat type: kinetic energy at the seabed due to currents

L5

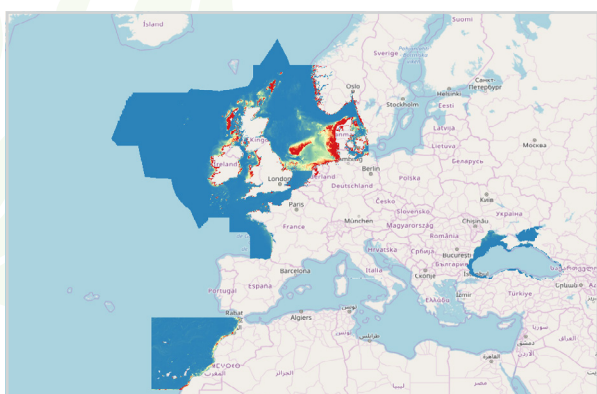


Created for EMODnet Seabed Habitats. Includes separate models for Mediterranean, Macaronesia, Celtic Sea, North Sea, Channel, Biscay, Black Sea and Adriatic. Includes confidence assessments.

- » Temporal coverage: variable
- » Temporal resolution: variable
- » Spatial resolution: variable
- » Web services: WMS

Environmental variables that influence habitat type: kinetic energy at the seabed due to waves

L5



Created for EMODnet Seabed Habitats. Includes separate models for Macaronesia, Celtic Seas, North Sea and Biscay. Includes confidence assessments.

- » Temporal coverage: variable
- » Temporal resolution: variable
- » Spatial resolution: variable
- » Web services: WMS

Environmental variables that influence habitat type: exposure index at the sea surface

L5

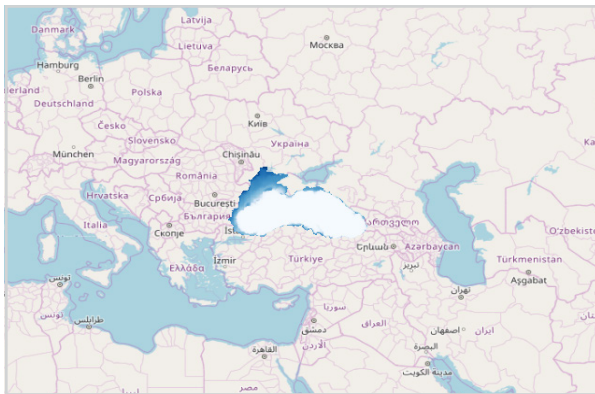


Created for EMODnet Seabed Habitats for the Baltic Sea only.

- » Temporal coverage: 2002 – 2007
- » Spatial resolution: 25 m
- » Web services: WMS

Environmental variables that influence habitat type: density of dissolved oxygen at the seabed

L5



Created for EMODnet Seabed Habitats for the Black Sea only.

- » Temporal coverage: 1992 – 2018
- » Temporal resolution: monthly
- » Spatial resolution: 1/36 x 1/27 degree (~3 km)
- » Web services: WMS

Environmental variables that influence habitat type: from external providers

L5



Other environmental variables from external providers, including kinetic energy due to waves and currents for various regions.

- » Temporal coverage: variable
- » Temporal resolution: variable
- » Spatial resolution: variable
- » Web services: WMS

Example map: kinetic energy at the seabed surface due to currents – Norway (source: Institute of Marine Research).



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WAKE UP YOUR DATA – MAKE USE OF EMODnet INGESTION

The EMODnet Data Ingestion portal is a public service providing marine data collectors and producers with an easy data submission process. This is particularly useful for marine data holders – whether from public or private sectors - that are not yet connected to the existing marine data management infrastructures. By using EMODnet Ingestion, data holders are supported and guided through the data curation process. Working across a large European network of data centres spanning all European sea-basins, Data Ingestion enables marine data to be harmonised, standardised, and made ready with appropriate metadata describing the data, so data are ready for distribution through EMODnet, through the existing pathways towards the EMODnet thematics.

Since the start of 2021, more than 700 marine data sets from 130 data providers from research, government, industry, and more have been ingested and processed for wider publication. This has resulted in many new data sets becoming available through EMODnet. Original data providers are acknowledged in the metadata of EMODnet integrated data sets and data products.

Share your data with EMODnet and retain ownership, whilst increasing the impact – go to www.EMODnet-ingestion.eu

WAKE UP YOUR DATA

*Set them free for
Blue Society*



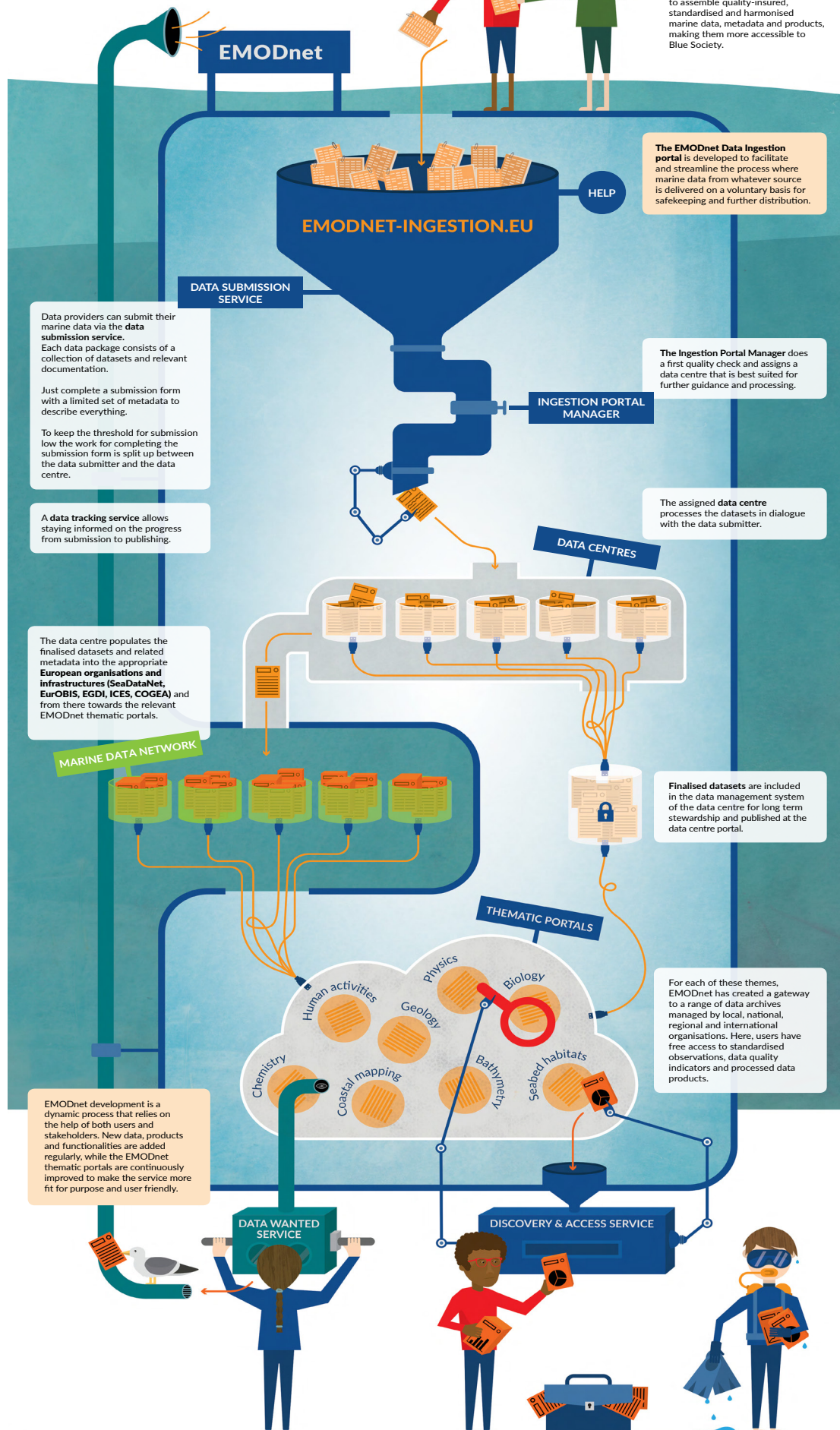
EMODNET-INGESTION.EU



WAKE UP YOUR DATA

Set them free for Blue Society

The European Marine Observation and Data Network (EMODnet) is a long-term marine data initiative from the European Commission Directorate-General for Maritime Affairs and Fisheries (DG MARE). EMODnet is a consortium of organisations that work together to assemble quality-insured, standardised and harmonised marine data, metadata and products, making them more accessible to Blue Society.





EMODnet



European Marine
Observation and
Data Network



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.

