



Data quality control and products validation

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<https://www.ingv.it/it/organizzazione/chi-siamo/personale/#987>

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
(D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-
Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”



Outline

 Observational products

 Gridded products

 Modeling products

 **Data Quality Assessment → is the data fit for use?**

 SeaDataNet

 EMODnet

- bathymetry
- chemistry
- physics

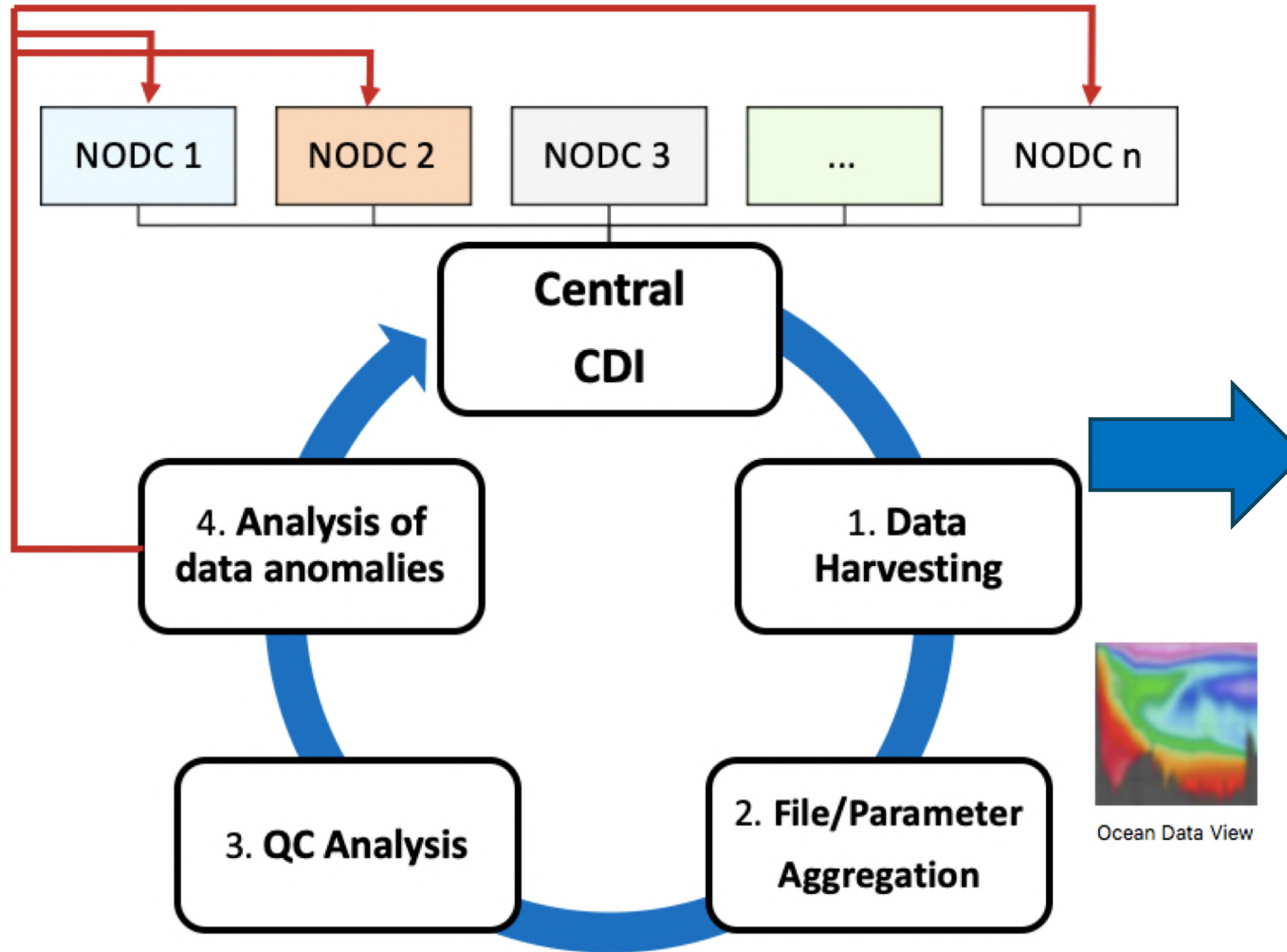
Observational products

- 🌐 aggregated datasets that derive from the data integration and metadata harmonization (adopting standards) at the Blue Data Infrastructure level
- 🌐 data originate from different observing networks: Argo, CTDs, XBTs, gliders, moorings, bottles, MBTs, ...
- 🌐 data are distributed through catalogues, web portals, dashboards and data access services (ERDDAP)
- 🌐 data are distributed using community data formats: NetCDF, csv, odv formats
- 🌐 Blue Data Infrastructures: SeaDataNet, EMODnet, Copernicus Marine Searvice, World Ocean Database (NOAA)

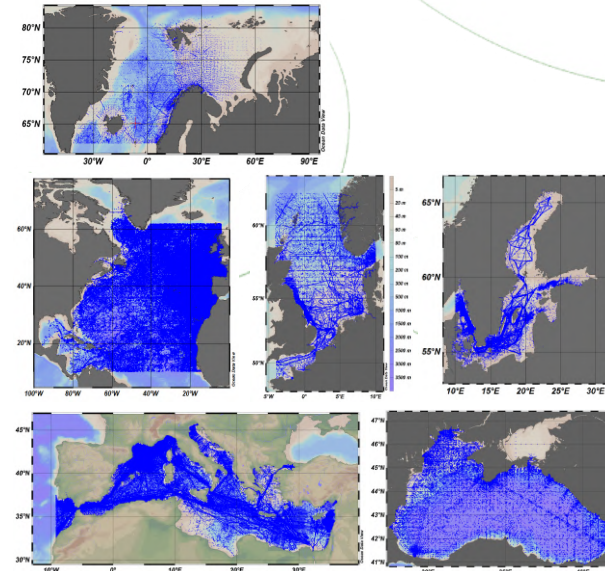
Observational products



Network of SeaDataNet data centers



T&S aggregated dataset



Products catalogue

cdi.seadatanet.org/search

SeaDataNet PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

FEEDBACK SURVEY

Hello Simona SIMONCELLI My CDI

DATASET BASKET 0

NEW SEARCH SEARCH RESET

Free search ?

Geographic search ?

Sea regions ?

Date search ?

Parameters ?

ADVANCED SEARCH

North West East South

Search within bounding box

Search

Arctic Ocean +

Asian mainland +

Atlantic Ocean +

Baltic Sea +

European mainland +

Indian Ocean +

Mediterranean Region +

From yyyymmdd To yyyymmdd

Search Discipline (P08)

Administration and dimensions

Atmosphere

DATA PRODUCTS

DESCRIPTIONS & DOCUMENTATION

USER MANUAL

SeaDataNet provides aggregated datasets (ODV collections of all unrestricted SeaDataNet measurements of temperature and salinity by sea basins) and climatologies (regional gridded field products) based on the aggregated datasets and data from external data sources such as the CORIOLIS Ocean Dataset for Reanalysis (CORA) and the World Ocean Database (WOD) for all the European sea basins and the Global Ocean. Each SeaDataCloud product is described in a Product Information Document (PIDoc) that can be accessed from the product's landing page. Click on the User Manual tab on the top-right corner of the page for instructions.

The screenshot shows the SeaDataNet catalog interface. A search bar at the top left contains the text 'data collection'. Below it is a map of Europe with several orange boxes highlighting different sea basins. To the right of the map are navigation buttons and a 'Reset filters' button. The main content area displays a grid of product cards. Each card has a title, a small map, a description, and a 'Source: SeaDataNet' label. At the bottom of each card are icons for sharing and downloading. The cards shown include: 'Baltic Sea - Temperature and Salinity historical data collection', 'North Sea - Temperature and salinity Historical Data Collection', 'Mediterranean Sea - Temperature and salinity Historical Data Collection', 'Arctic Ocean - Temperature and salinity Historical Data Collection', 'SeaDataCloud North Atlantic Ocean - Temperature and Salinity Historical Data...', and 'SeaDataCloud Temperature and Salinity Historical Data Collection for the Bla...'. The interface also shows 'Results 1 to 6 on 6 : 30 by page' and 'Sort by: Relevancy'.

This block shows a detailed view of the 'Mediterranean Sea - Temperature and salinity Historical Data Collection' product card. The title is 'Mediterranean Sea - Temperature and salinity Historical Data Collection SeaDataCloud...'. Below the title is a small map of the Mediterranean Sea. The main text describes the product: 'SDC_MED_DATA_TS_V2 SeaDataCloud Temperature and Salinity data collection for the Mediterranean Sea contains all open access temperature and salinity in situ data retrieved from SeaDataNet infrastructure at the...'. Below the text is the source 'Source: SeaDataNet'. At the bottom right of the card are two buttons: a share icon and a download icon. A large red arrow points from the top of the card down to the share button.

DOI of the product

[ERDDAP link to aggregated dataset V2](#)

[Simoncelli Simona, Oliveri Paolo, Mattia Gelsomina, Myroshnychenko Volodymyr \(2020\). SeaDataCloud Temperature and Salinity Historical Data Collection for the Mediterranean Sea \(Version 2\). Product Information Document \(PIDoc\). <https://doi.org/10.13155/77059>](#)

- DOI
- ERDDAP
- PIDoc

DOI Landing page

ERDDAP

PIDoc

Product Information Document

- methodology
- tech specifications
- validation
- usability

Identification

Data access

External shortname
SDC_MED_DATA_TS_V2

Resource identifier
2a2aa0c5-4054-4a62-a18b-3835b304fe64

Metadata language
English

Date (Publication)
2020-10-26

Citation proposal

IFREMER / IDM/SISMER, Simona Simoncelli, Dick Schaap, Reiner Schlitzer (2020).Mediterranean Sea - Temperature and salinity Historical Data Collection SeaDataCloud V2.
<https://doi.org/10.12770/2a2aa0c5-4054-4a62-a18b-3835b304fe64>

When using this dataset in a publication, also cite the related work(s) with:
Simoncelli Simona, Oliveri Paolo, Mattia Gelsomina, Myroshnychenko Volodymyr (2020). SeaDataCloud Temperature and Salinity Historical Data Collection for the Mediterranean Sea (Version 2). Product Information Document (PIDoc).
<https://doi.org/10.13155/77059>

ERDDAP
Easier access to scientific data

ERDDAP > tabledap > Make A Graph

Dataset Title: SDC Mediterranean Sea Aggregation V2

Institution: SeaDataNet (Dataset ID: SDC_MED_AGG_V2)

Range: longitude = -9.2919 to 36.1953°E, latitude = 30.505 to 45.76133°N, depth = -3.17745 to 7959.866m, time = 1911-08-17T09:24:00Z to 2019-09-22T11:44:00Z

Information: [Summary](#) | [License](#) | [FGDC](#) | [ISO 19115](#) | [Metadata](#) | [Background](#) | [Subset](#) | [Data Access Form](#)

Graph Type: markers

X Axis: longitude

Y Axis: latitude

Color: temp

Constraints

Field	Operator	Value
time	>=	2019-05-01T00:00:00Z
time	<=	2019-06-01T00:00:00Z
depth	>=	5
temp_qc	=	1
depth_qc	=	1
obs_date_qc	=	1

Server-side Functions

distinct

Graph Settings

Marker Type: Square

Color: [Color palette]

Color Bar: [Color bar]

Draw land mask: [Dropdown]

Y Axis Minimum: [Input]

Continuity: [Dropdown]

Scale: [Dropdown]

N Sections: [Input]

Ascending: [Dropdown]

Redraw the Graph (Please be patient. It may take a while to get the data.)

Optional:
Then set the File Type: (File Type information)
and Download the Data or an Image
or view the URL: https://erddap.ifremer.fr/erddap/tabledap/SDC_MED_AGG_V2.htmlTab
(Documentation / Bypass this form)

SeaDataCloud Temperature and Salinity Historical Data Collection for the Mediterranean Sea (Version 2). Product Information Document (PIDoc)

TYPE: Scientific report

DATE: 2020

AUTHOR(S): Simoncelli Simona¹, Oliveri Paolo¹, Mattia Gelsomina¹, Myroshnychenko Volodymyr²

AFFILIATION(S):
1. INGV, Bologna, Italy
2. METU, Erdemli, Turkey

REFERENCE: Product Information Document (PIDoc)

DOI: 10.13155/77059

ARCHIVER ID: 77059

LANGUAGE(S): English

PUBLISHER: SeaDataCloud

Download metadata
TXT RIS XLS RTE BIBTEX

The second release of SeaDataCloud Temperature and Salinity Historical Data Collection for the Mediterranean Sea (SDC_MED_DATA_TS_V2) includes open access in situ data of water column temperature and salinity between -9.25 and 37 degrees of longitude, thus including an Atlantic box and the Marmara Sea. The collection has been obtained harvesting all measurements contained within SeaDataNet infrastructure at the end of July 2019 belonging to 30 data providers (distributors) 124 data originators. The dataset format is Ocean Data View (ODV) binary collection. The quality control of the data has been performed using ODV 5.3.0 software. Data Quality Flags have been revised following SeaDataNet2 project QC procedures in conjunction with the visual expert check. The number of the Temperature and Salinity profiles (stations) in the collection is 1003259.

How to cite

Simoncelli Simona, Oliveri Paolo, Mattia Gelsomina, Myroshnychenko Volodymyr (2020). SeaDataCloud Temperature and Salinity Historical Data Collection for the Mediterranean Sea (Version 2). Product Information Document (PIDoc). Ref. Product Information Document (PIDoc). SeaDataCloud. <https://doi.org/10.13155/77059>

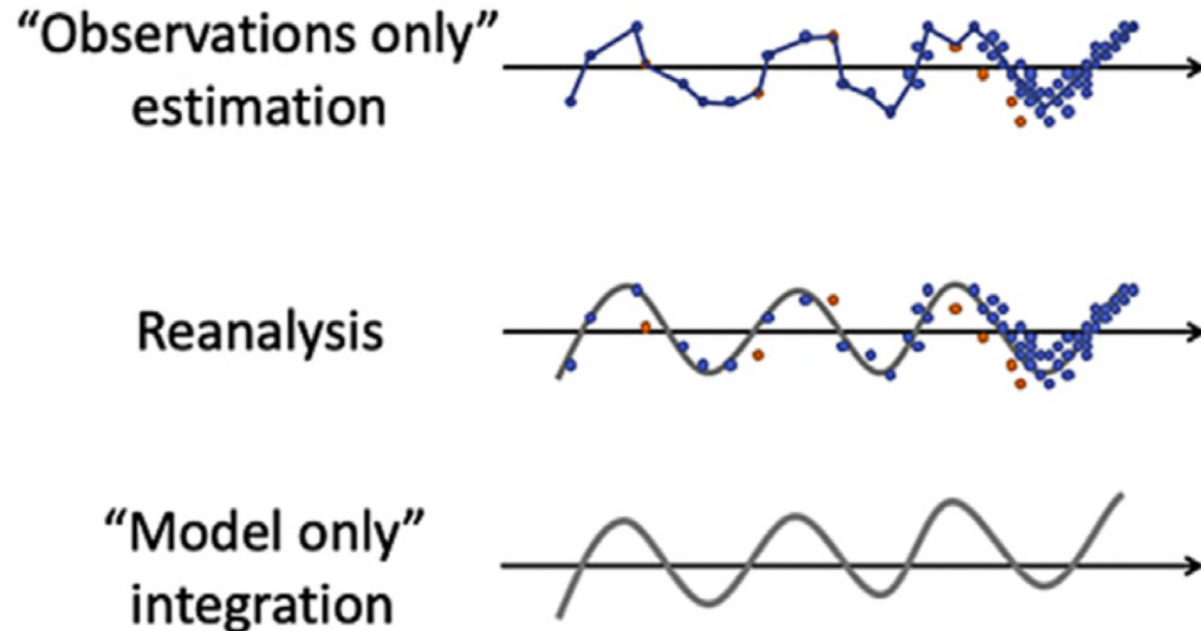
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Gridded products

- 🌐 level of complexity and information content of data products increase moving along the marine data value chain
- 🌐 Once a validated dataset or data collection has been assembled and harmonized, it can be used for multiple purposes and applications: many require mapping sparse data onto a regular 2D or 3D grid
- 🌐 **gridding** can be applied through different techniques to obtain **synoptic or climatological fields**, which can be used for ocean and climate monitoring, process-oriented studies, model initialization or validation
- 🌐 In order to derive gridded products, observations must be generally aggregated over a chosen time scale
- 🌐 grid resolution depend on the the spatial and temporal time coverage of observations

Gridded products

Schematic view of past ocean reconstruction methodologies



Monthly objective analyses for the global ocean computed from in-situ T and S profiles are example products from the

- CMS CORA-OA

<https://doi.org/10.17882/46219>

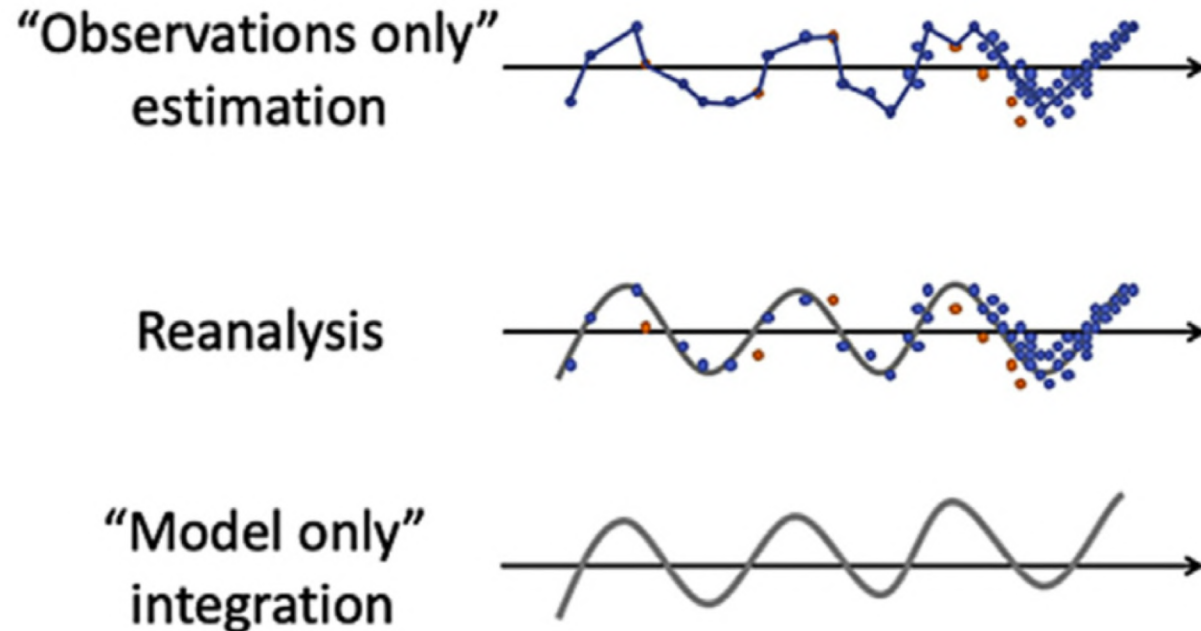
- Met Office Hadley Center EN4

<https://www.metoffice.gov.uk/hadobs/en4/>

→ can be discontinuous and noisy, highly depending on the space-time distribution of observations; however, the associated uncertainties tell the users where the products are more or less reliable

Gridded products

Schematic view of past ocean reconstruction methodologies



Validated in-situ or remotely sensed data records are then used for model assessment or can be assimilated in ocean general circulation models in NRT for forecasting activities or in DM within retrospective experiments designed for climate applications, such as **ocean reanalyses**.

Reanalysis products are characterized by dynamical balances, higher temporal resolution, up to daily scales, and temporal continuity, since the **model hydrodynamic equations** project forward in time the initial information and **data assimilation** constrains the model solution close to the available observations

EMODnet: *in situ* marine data service

FAIR data layers and added value data products with metadata standardized, harmonized and validated according to international standards, openly and freely available

EMODnet serves users in policy, research, industry, and society, the EU Digital Twin Ocean and global ocean data initiatives



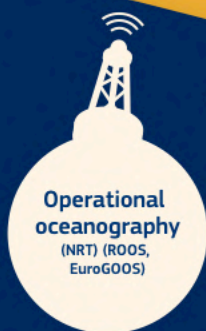
EC marine data service developing pan-European data products* and aggregated datasets



Marine *in situ* data pipeline to EMODnet: National Oceanographic Data Centres, regional and European data infrastructures and services



in situ ocean observations (collected in water/air/seafloor) are the foundation of the EMODnet marine data pipeline



*All EMODnet data products are published under an open data licence

One central map viewer

to visualise all EMODnet data

1 OCEAN 1 EMODnet

One single portal

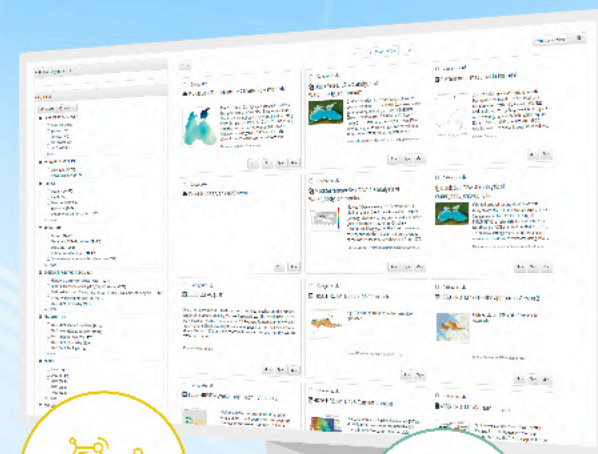
One central metadata catalogue

to enhance data search and discovery

120
partners

+100
use cases

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



BATHYMETRY



HUMAN ACTIVITIES



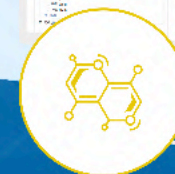
PHYSICS



GEOLOGY



SEABED HABITATS



CHEMISTRY



BIOLOGY

EMODNET.EC.EUROPA.EU
<https://emodnet.ec.europa.eu/geoviewer/#/>

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







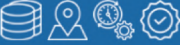
The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) 2021/1139 of the European Parliament and of the Council of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund.




EMODnet
European Marine
Observation and
Data Network

Key | Data and data product processing levels




- L0** Raw data. Unprocessed instrument data at full resolution, including synchronisation methods (e.g. elimination of CTD up-down duplicates) and excluding communication artifacts. 
- L1** Full resolution data reconstructed with calibration coefficients, geo- and time-referenced. 
- L2** Geo- and time-referenced processed (derived) data with a minimum QC. Near-real time (NRT) with full spatial and/or temporal resolution. 
- L3** Delayed mode data with further QC, usually with some completeness, consistency and space/time uniformity. Data QC checks may include comparison with historical data and/or Level 5 products such as climatologies or gridded data. 
- L4** Collated data from different measurements, samples and/or sources that have been integrated in a data system by means of standardisation and/or categorisation, and subset or otherwise selected or derived to fulfil a specific requirement. Data can represent numerical values and presence/absence of a category or entity. Integration of datasets at this level enables further QC based on parameter to parameter relationships (e.g. TS diagrams). 

Data

- L5** Model or analysis output that uses data of Level 2 and/or 3 as input. Data products of this level represent the spatial distribution of a single parameter derived from multiple measurements. Data are aggregated and undergo some level of geo-processing and spatial or temporal interpolation to cover data gaps and/or solve data discrepancies. 
 - L5A. One-dimensional distribution of a specific parameter, without variations on the temporal or depth dimensions.
 - L5B. Two-dimensional distribution of a specific parameter, with variations on the temporal and/or depth dimensions.
 - L5C. Three-dimensional distribution of a specific parameter.

Data products

- L6** Derived information from multi-variable model or analysis that has Level 5 data products and/or Level 2-3 data as input. These input data and data products might have been gathered or developed by the thematic lot itself, by other thematic lots or third parties. 

<https://emodnet.ec.europa.eu/Portfolio>



HUMAN ACTIVITIES

Aggregate extraction - Algae production - Aquaculture - Cables - Cultural heritage - Dredging - Environment - Fisheries - Maritime Spatial Planning - Military Areas - Nuclear Power Plants - Ocean energy facilities - Oil and Gas - Other forms of area management/designation - Pipelines - Ports - Waste disposal - Shipping density - Wind farms



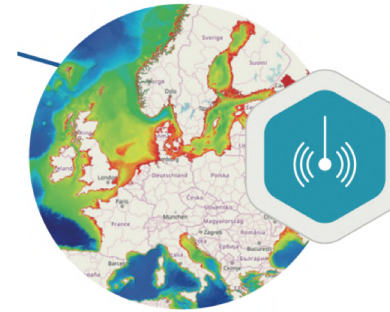
GEOLOGY

Seabed substrate-Seabed accumulation rates-Sea-floor 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

Parameters and data formats

L3

Parameter category

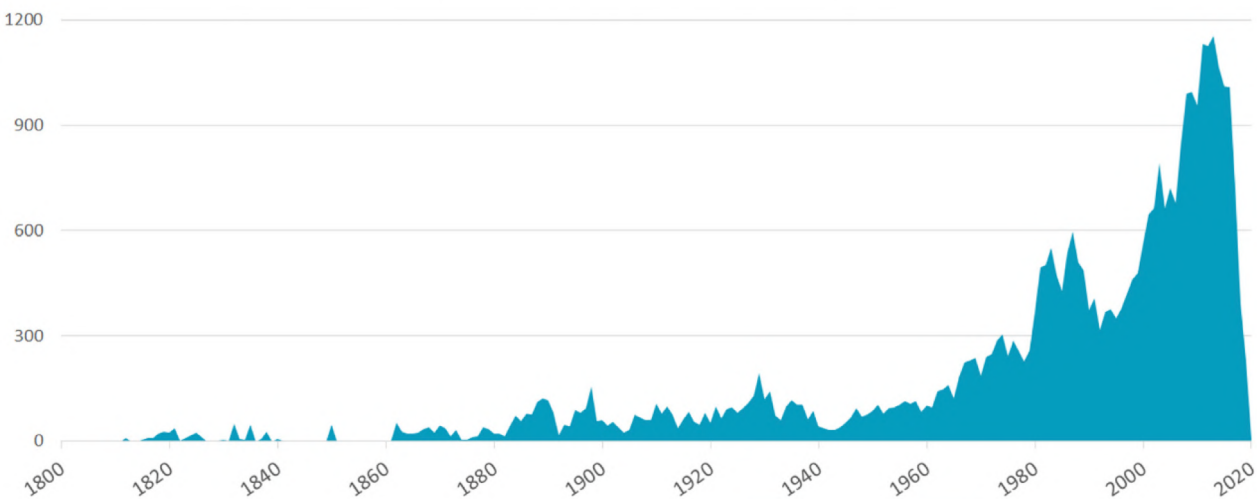
Bathymetry and elevation

Data formats

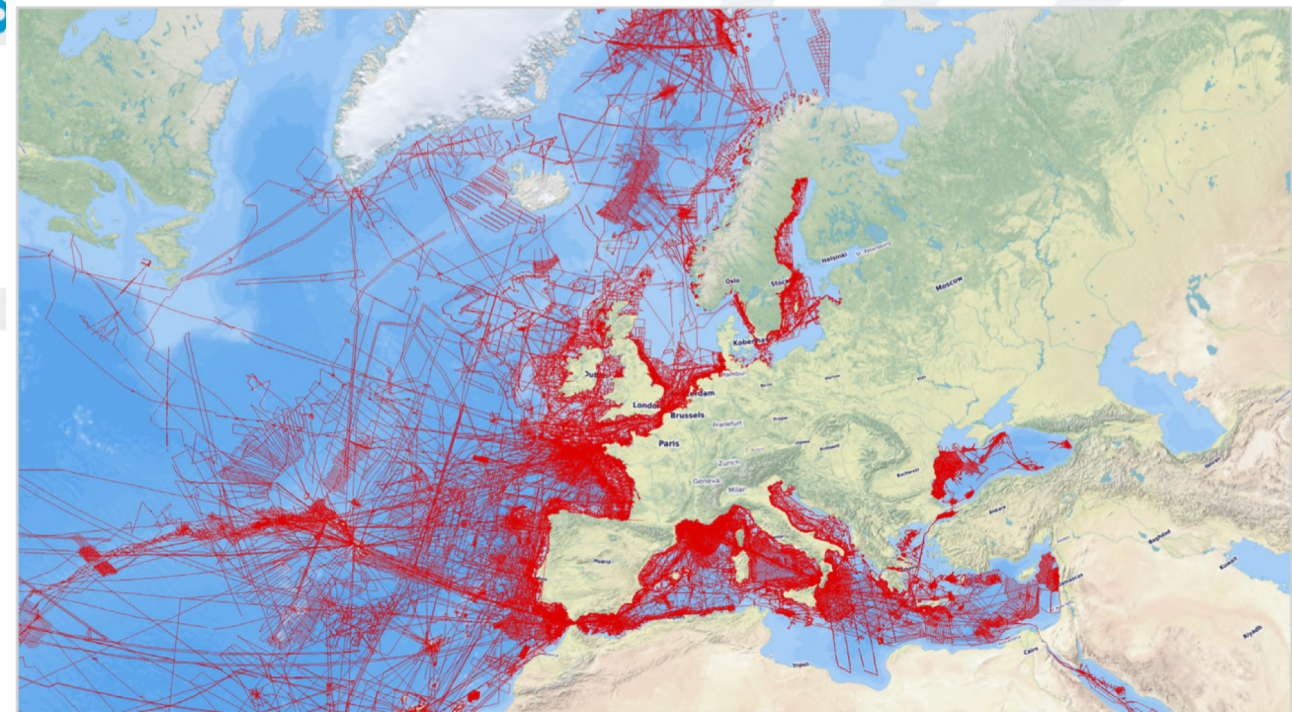
BAG, XYZ, SeaDataNet ODV, GeoTiff, NetCDF

Coverage and resolution

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



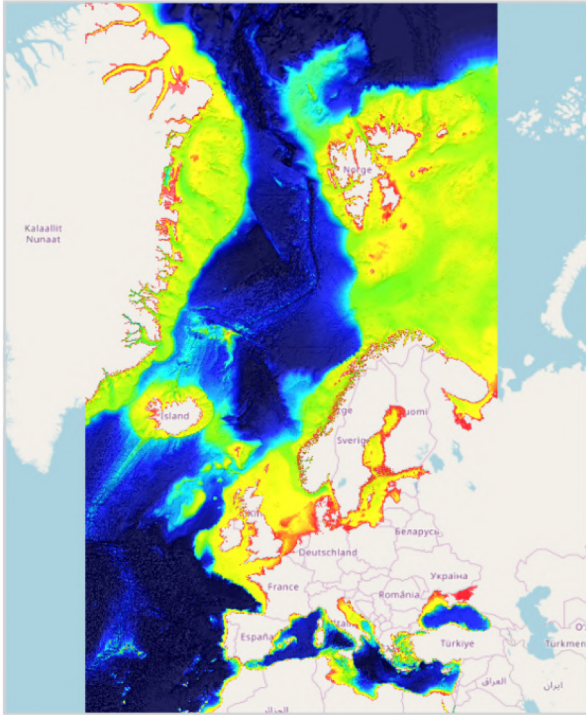
Spatial coverage



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

- 🌐 basic information to support planning of most maritime activities, to assist navigation safety, to monitor coastal erosion, sea level changes
- 🌐 crucial to define high resolution models' topography and increase their reliability, especially in the coastal area.
- 🌐 However, there are still many marine areas that are poorly mapped representing a serious risk for navigation accidents and consequent pollution dispersion, but also a limitation for the predictability of hydrodynamics and multihazards in coastal areas

Parameters and data formats

L3

Parameter groups

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

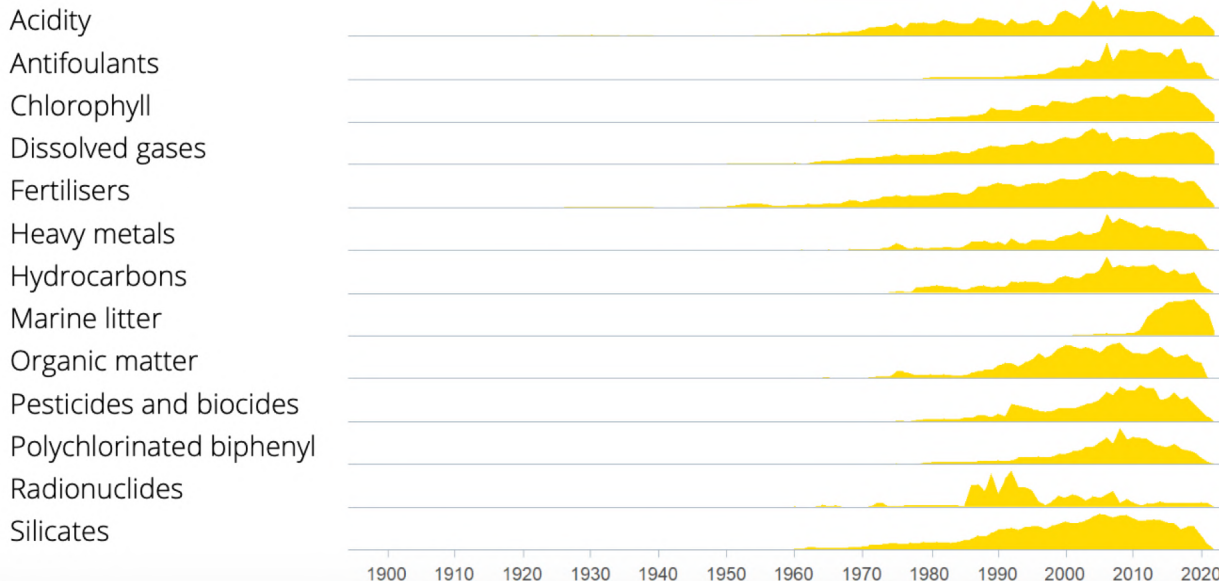
The parameters might have a depth and time component.

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.



EMODnet Chemistry focuses on four main themes:

- Eutrophication;
- Ocean acidification;
- Contaminants;
- Marine litter

six major European sea regions are covered: the Arctic Ocean, Baltic Sea, Northeast Atlantic Ocean North Sea, Black Sea, and Mediterranean Sea

Key services

A range of services and functionalities are provided to users for i) identifying and requesting access to the chemistry datasets that are gathered by EMODnet Chemistry, and ii) viewing, analysing, and downloading chemistry data products that are generated by EMODnet Chemistry:

1. **Data Discovery and Access Service** is the interface of SeaDataNet to search for, narrow down queries, and download selections of measurement data.

+ **Chemistry CDI Discovery and Access service**

2. **Products Catalogue service** provides functionality to search and browse metadata of chemistry data products and includes links to viewing and download.

3. **webODV Data Explorer and Extractor** allows users to create subsets, perform scientific analyses, generate various graphs, and download datasets in various formats from the validated aggregated data collections of EMODnet Chemistry.

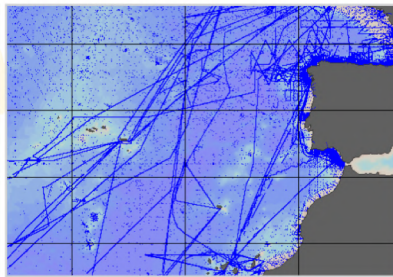
+ **webODV data explorer and extractor**

<https://emodnet.ec.europa.eu/Portfolio>

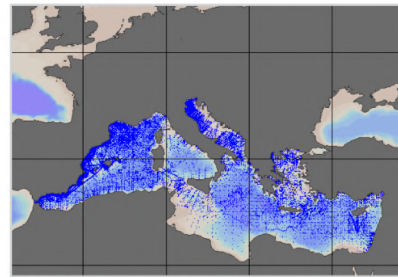
Eutrophication, Ocean acidification aggregated datasets v2021

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).



Atlantic Ocean

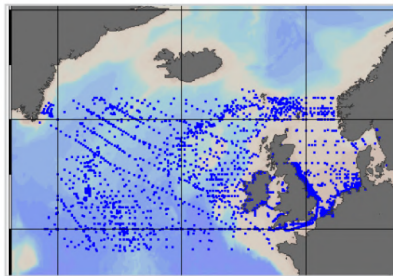


Mediterranean Sea

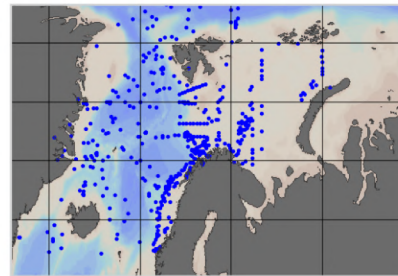
Contaminants aggregated datasets v2021

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).



North Sea



Arctic Sea

Eutrophication – Gridded climatologies

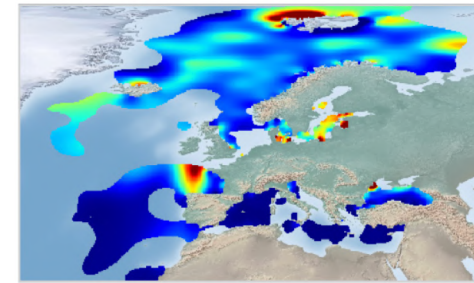
L5

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.

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

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.

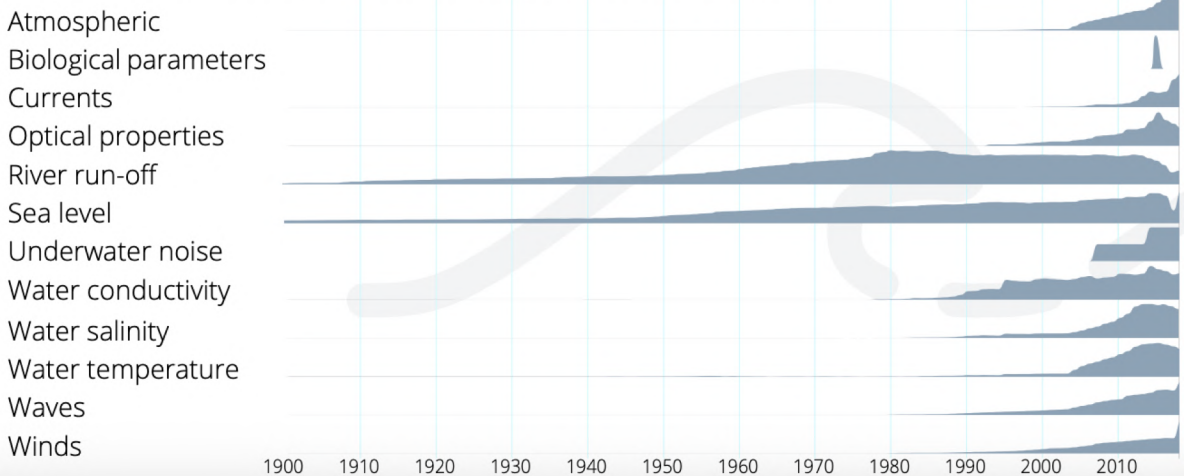
Data formats

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

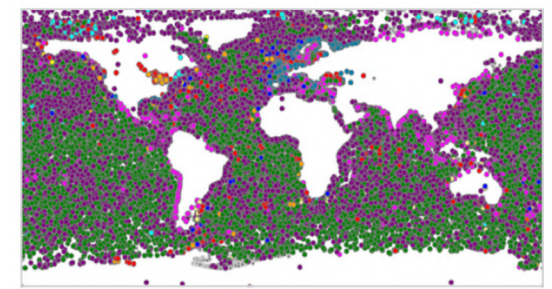
Temporal coverage: time series of the relative number of datasets per year from 1900 to present. EMODnet Physics also offers historical datasets that date back to 1807.



Data on temperature, salinity and currents in the water column, sea level trends, wave height and period, wind speed and direction, water turbidity (light attenuation), underwater noise, river flow, and sea-ice coverage

In Situ Platforms

L5

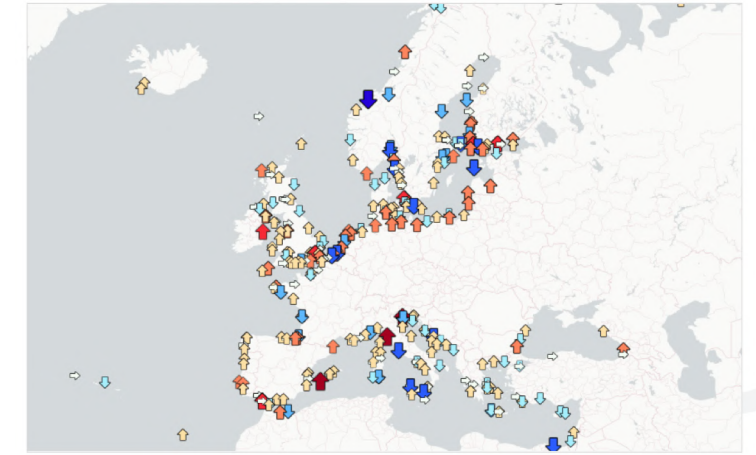


Collection of *in situ* data (time-series, profiles and datasets) as recorded by platforms (tide gauge, river stations, CTDs, etc.). The product offers near real time and delayed mode data. It integrates data from major marine and oceanographic initiatives and data repositories (EuroGOOS ROOS, CMS INSTAC,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

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](#)

Societal Challenges Products

- 🌐 Multidisciplinary information is required to address the multiple societal needs of guaranteeing sustainability, safety, and security of human activities, as well as good environmental conservations
- 🌐 The development of midstream and downstream services and applications, from either public bodies and private enterprises in support of decision-making processes, frequently needs the contribution of non-ocean data and/or information products
- 🌐 The integration of ocean products with multidisciplinary information strengthens the necessity of data and metadata harmonization for their rapid uptake and exploitation

Parameters and data formats

L4

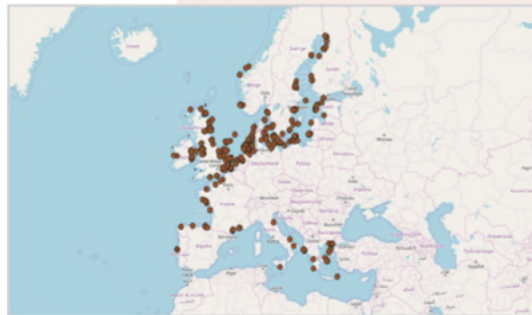
Themes and subthemes

- » 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

Dredging, aggregate extraction and offshore platform locations

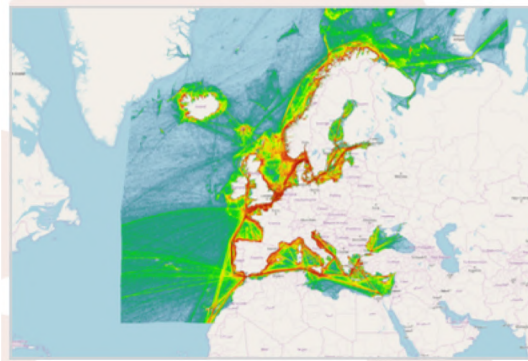


Energy facilities and wind farms



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

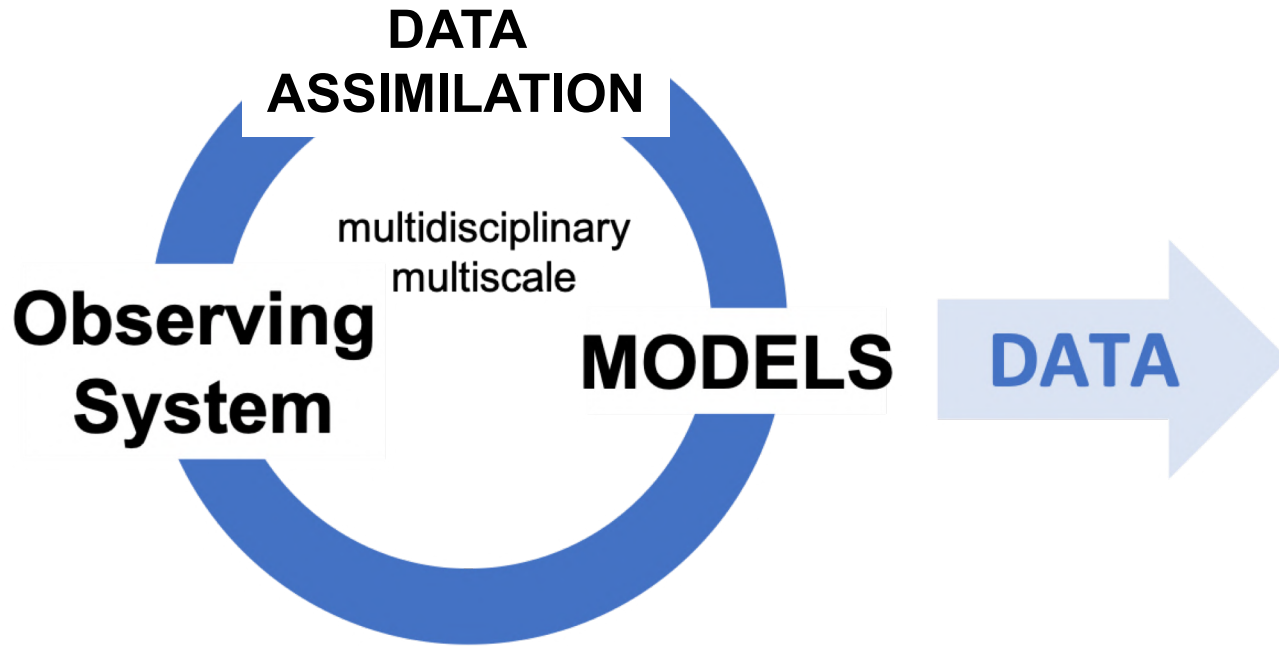
Submarine cables and pipelines



Finfish, freshwater and shellfish production sites



Modeling products



**PRODUCTS
APPLICATIONS
SERVICES
for society**



Blue
Growth



Multi-
Hazard



Ocean
Health



Ocean
Literacy



REANALYSES

FORECAST

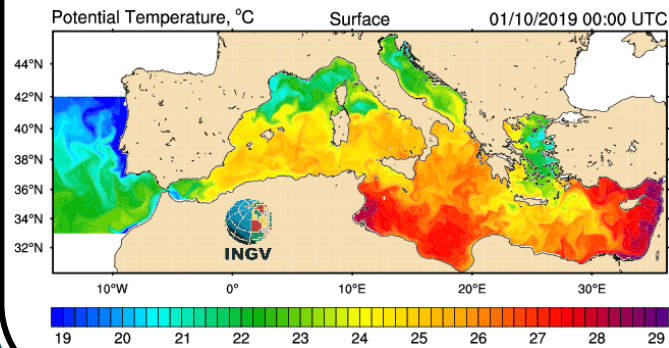
PROJECTIONS

Modeling products

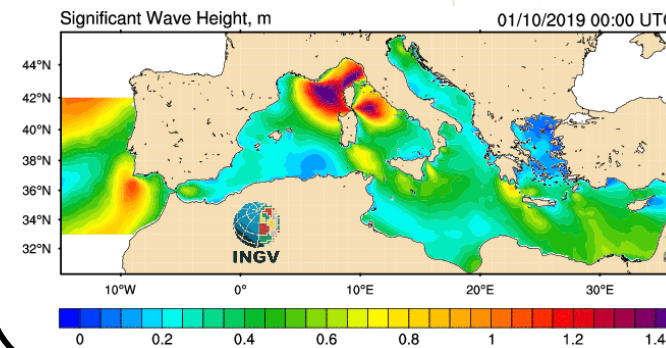
Forzante Atmosferico



Modello Circolazione



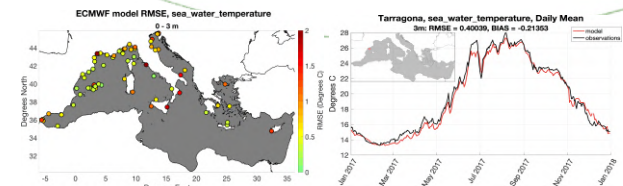
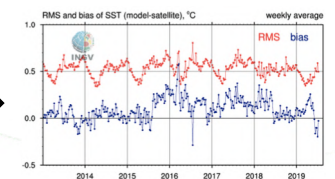
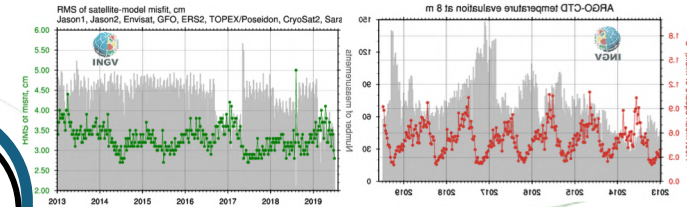
Modello d'Onda



2-way hourly coupling

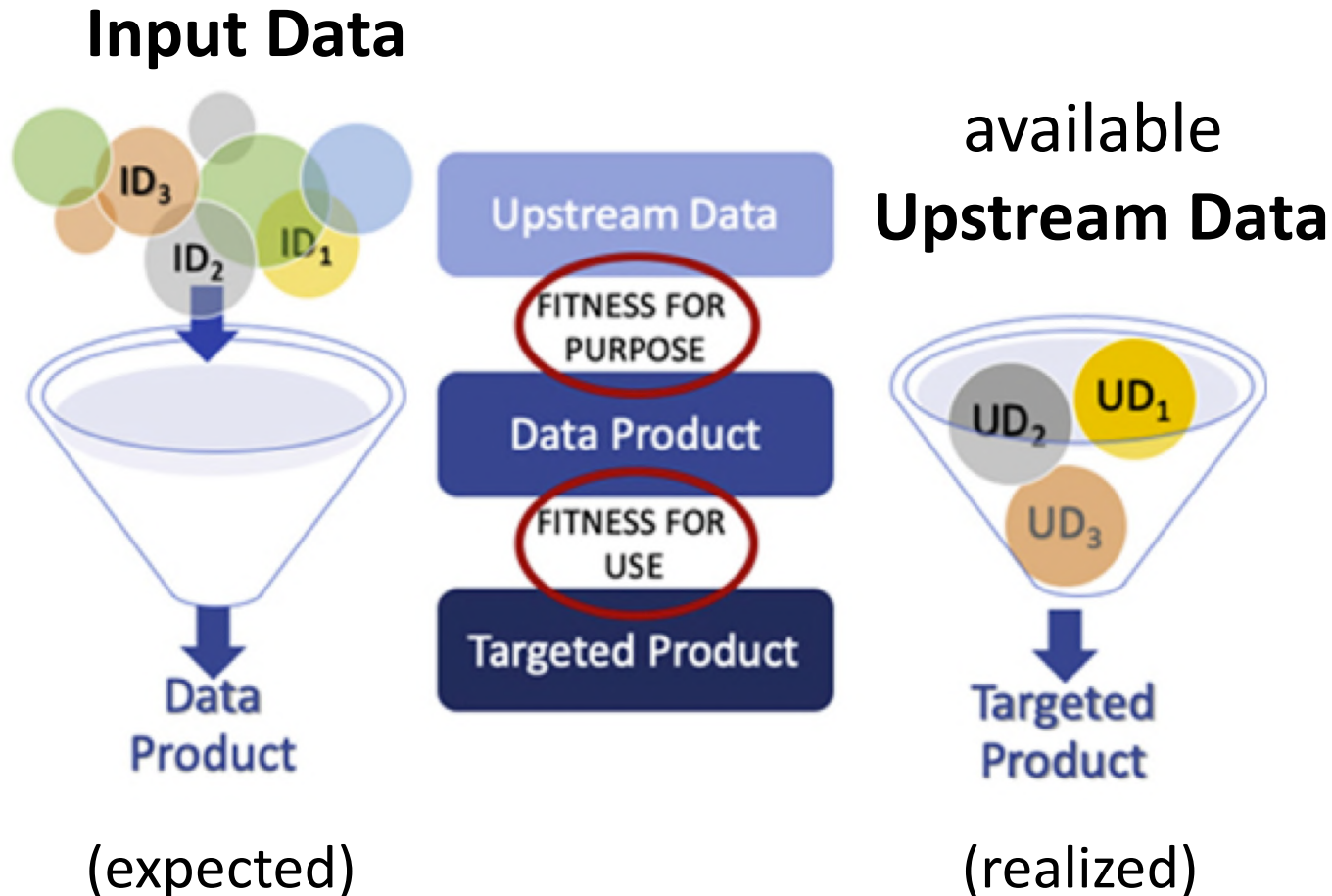
output

Sistema Cal/Val



Assimilazione Dati
SLA, in situ profili T e S

Quality Assessment



- User requirements define the **Data Product Specification** and the necessary **Input Data** to generate it
- the realized **Targeted Product Description** compared to the preliminary specification provide a measure of fit-for-use
- **Upstream Data** are fit-for-purpose if adequate for the targeted product realization
- Quality assessment process might provide a feedback on the **adequacy of observing system** for specific products/applications

Simoncelli et al. (2022) <https://doi.org/10.1016/B978-0-12-823427-3.00001-3>



THANKS!

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Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”



Data Quality Assessment

 data adequacy, fit for use, fit for purpose

