EMODnet Thematic Lot n°3 – Physics

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Centralisation Phase

Interim Progress Report (2024)

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Contents

1. Introduction

The European Marine Observation and Data network (EMODnet) is a long-term marine initiative dedicated to facilitating the discovery and access to marine data and data products representing the following seven main themes: bathymetry, biology, chemistry, geology, human activities, physics, and seabed habitats. For each of these themes, EMODnet has created a gateway to a range of data archives. EMODnet Physics (www.emodnet-physics.eu) is one of the seven domain-specific projects and, through the effort done under the preparatory action (MARE/2010/02), the development (MARE/2012/10; EASME/EMFF/2016/006) and operational (EASME/2019/OP/0003) phases, has successfully designed, organized and is running (EASME/2020/OP/0006) operational services providing ocean physics data and data products built with common standards, free of charge and of restrictions. With the current phase, a further important milestone has been achieved: EMODnet Physics results are now integrated (centralized) into the EMODnet Central Portal (www.europa.emodnet.eu). With this renewal EMODnet Physics is called to keep operating the backend services that enable access to near real-time data and historical time series datasets on the physical conditions of European seas and oceans, to keep collaborating and providing additional sources of in-situ data to EMODnet and to the Copernicus program, to keep maintaining and updating the OGS tools for machine-to-machine data access and interoperability.

The available parameters cover temperature, salinity and currents profiles, 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 data recorded by fixed platforms (moorings, tide gauges, HF radars, etc.), moving platforms (ARGO, Lagrangian buoys, ferryboxes, etc.) and repeated observations (CTDs, etc.) are available. Data products are collections of in-situ data, reanalysis and trends of parameters, space and time aggregated in situ data and model outputs.

During previous designing and implementation phases, EMODnet Physics set up a highly appreciated data management and discovery system, in line with its stakeholders' requirements: the acquisition of the ocean physics parameters is largely an automated process based on a "federated" network infrastructure which is linking data providers and other marine data-aggregating infrastructures.
EMODnet Physics marine data infrastructure originated from the advancements made by the Global Ocean Observing System (GOOS) community, particularly the European component (EuroGOOS), in the development of operational physical oceanography capabilities: in line with the principle to "collect once and use many times" and to build on top of existing infrastructures, EMODnet Physics is federated with the other main European data aggregating infrastructures, namely, the Copernicus Marine Environment Monitoring Service - In Situ Thematic Assembly Centre - for operational data flow, SeaDataNet and its network of National Oceanographic Data Centers – for research quality delayed mode data, the International Council for the Exploration of the Sea, the Joint Technical

Commission for Oceanography and Marine Meteorology in situ Observations Program Support Centre (OceanOPS), as well as other specialized databases/infrastructures that match with the EMODnet Physics goals.

EMODnet Physics combines European marine data collection projects with international programs such as Argo, the Data Buoy Cooperation Group (DBCP), OceanSITES, the Global Ocean Ship-based Hydrographic Investigation Program (GO-SHIP), the Global Sea Level Observing System (GLOSS), and the Ship Observation Team (SOT), which comprises the Volunteer Observing Ship (VOS) and Ship of Opportunity Program (SOOP). Additionally, OceanGliders and tagged animals.

These marine data are made available in collaboration with Copernicus Marine Service-INSTAC, SeaDataNet-NODCs (SeaDataNet network of National Oceanographic Data Centers), ICES (International Council for the Exploration of the Sea), thematic platform networks within OceanOPS (Joint Technical Commission of Oceanography and Marine Meteorology - JCOMM - in situ Observations Program Support center), PANGAEA, etc. that collaborate all together in the framework of a federation created by EMODnet Physics.

However, it is important to acknowledge that the primary investigators, marine technicians, ship's crew, and volunteers who have made and continue to make numerous oceanographic measurements, often under challenging conditions, are responsible for the quality and quantity of the oceanographic data. The institutions that maintain the platforms and the projects that plan, fund, and execute field campaigns and operational ocean monitoring are responsible for the spatial and temporal coverage of the oceanographic profile data. The data managers are responsible for preserving and ensuring the reusability of the data. This vast network, maintained and updated over time, deserves credit for the aggregated data collections available in EMODnet Physics.

Moreover, in collaboration and coordination with the EMODnet Secretariat, the EMODnet Steering Committee and the Technical Working Group the EMODnet Physics is determining how well the data meets the needs of users from industry, public authorities and scientists

With this legacy, representing and collaborating with a wide network of international experts in the marine domain, the EMODnet Physics core consortium (ETT, MARIS, IFREMER, SMHI and ICES) is now supporting the EMODnet program towards its new phase and goals. EMODnet Physics partnership has dedicated important efforts to build gateways to national, regional and thematic data repositories. A comprehensive network has been developed during the years and the actual project is involving about 400 between institutes and providers from all over Europe and beyond and more than a handred thousand datasetshave been linked and are accessible.

EMODnet Physics updated its data infrastructure to improve system performance, facilitate service maintenance, and implement centralization and results are now integrated into the EMODnet Central Portal (www.emodnet.eu).This report highlights milestones from this implementation phase:

- Tools for improving and updating machine-to-machine layers and interoperability according to common standards and directives have been updated.
- The acquisition of ocean physics parameters largely relies on an automated, federated network infrastructure linking data providers and marine data-aggregating infrastructures.
- New datasets and observing platforms have been ingested and made accessible. Operational platforms, such as ARGO, drifting buoys, moorings, tide gauges, river stations, deliver data regularly, with some collecting a single parameter and contributing to a single thematic collection, while others collect multiple parameters and contribute to multiple thematic collections. The Central Portal lists approximately 18500 ARGO, 27000 drifting buoys, 4170 tagged sea mammals, 4300 tide gauges, 1400 river gauge stations, 2500 unmanned vehicles (gliders, sailing drones, etc.), 5400 vessels (including fishing vessels, ferryboxes, and data from ocean race ships), and more than 3,000,000 CTD profiles under the Physics theme.
- Data flows from citizen science are almost ready to be operationally ingested/integrated.
- EMODnet Physics supports international committees on data interoperability and the ocean data value chain, such as the OceanPrediction DCC - Ocean Forecasting Co-design Team and the Global Ocean Observing System (GOOS) Observations Coordination Group (OGC) group on low-cost technologies for ocean data collection.
- EMODnet Physics supports global communities, including the Southern Ocean Observing System (SOOS), and contributes to studies on climate change understanding and the Intergovernmental Panel on Climate Change (IPCC).

EMODnet Physics participated in about 50 events, including initiatives focused on cost-effective technologies and citizen science (e.g., European Marine Days, Jamboree, Hackathons, IMDIS, etc.), which have proven to be valuable data providers, helping to fill marine data gaps and improve time and spatial resolution of coastal areas. The report also proposes future ideas and recommendations.

2. Update on the Tasks

Task 1. Maintain and improve a common method of access to data held in repositories

One primary aim of EMODnet Physics is to provide single access to in situ operational data as collected by fixed and moving in situ platforms. EMODnet Physics does not operate any platforms; instead, it serves as the final step in gathering oceanographic data for public dissemination. Data from key European oceanographic repositories and marine infrastructures (such as EuroGOOS, Copernicus Marine Service INSTAC, and SeaDataNet NODCs) are integrated with other available data sources, including the ICES database, PANGAEA repository, the Permanent Service for Mean Sea Level, the SONEL - GNSS data assembly center for Global Sea Level, the Global Sea Level Observing Service, and the European Multidisciplinary Seafloor and Water Column Observatory (EMSO). A comprehensive network has been developed during the years and it is involving about 400 between institutes and providers from all over Europe and beyond and more than a hundred thousand datasets have been linked and are accessible. While interacting and integrating these repositories, EMODnet Physics encourages the adoption of the CC-BY license for data products. The main types of In-Situ observing systems available in EMODnet Physics are:

- Drifting Argo Floats for the measurement of temperature and salinity profiles down to ~2000m and, by tracking them, mean subsurface currents.
- Research vessels which deliver complete suites of multidisciplinary parameters from the surface to the ocean floor (very sparse and intermittent spatial coverage and at very high cost of operations).
- XBTs (Expendable bathythermographs) by research vessels and ships of opportunity underway for the measurement of temperature and salinity profiles to ~450-750m depth.
- Fixed stations and Moorings capable of measuring different parameters continuously over long periods of time.
- Ferry-Box and other regional ship of opportunity measurement programs for surface transects which may include temperature, salinity, turbidity, chlorophyll, nutrient, oxygen, pH and algal types.
- The network of tide gauges, which provides long term reference and validation sea level data.
- Gliders, which complement floats and moorings and are able to perform transects of physical and biogeochemical parameters from the surface down to 1000m.
- Surface drifters are cheap and light-weight platforms that passively follow the horizontal flow at the surface via a drogue/sail.
- Surface autonomous vehicles, which collect sea-air interface parameters
- Sea mammals borne instruments for transects and profiles on temperature and salinity
- River stations for river outflow data (direct measurement or from river gauging data)
- High Frequency Radars which are land stations collecting sea surface current fields

The following tables summarize well the progresses.

Table 1. Platforms on EMODnet Physics (01/07/2020)

ARGO Floats	CTDs	Drifting Buoys	Ferryboxes and Ship	gliders	sea mammals	mini loggers	moorings	radar	river stations	tide gauges
5448	779444	14623	322	226	2141	182	4065	156	680	3504

Table 2. Platforms on EMODnet Physics (23/08/2021)

ARGO Floats	CTDs	Drifting Buoys	Ferryboxes and Ship	gliders	sea mammals	mini loggers	moorings	radar	river stations	tide gauges
8356	2371105	14879	332	226	2381	196	3483	157	877	3675

Table 3. Platforms on EMODnet Physics (01/08/2023)

ARGO Floats	CTDs	Drifting Buoys	Ferryboxes and Ship	gliders	sea mammals	mini loggers	moorings	radar	river stations	tide gauges
13110	3061433	19400	440	276	2814	213	5006	164	971	5483

Table 4. Platforms on EMODnet Central Portal - Physics (13/08/2024)[1]

ARGO Floats	CTDs	Drifting Buoys	Ferryboxes and Ship	Gliders missions	sea mammals	mini loggers	moorings	Radar (radials)	river stations	tide gauges
20813	2446945[2]	26972	8054	2499	4172	760	4034	340	2551	4304

Deliverable D2.01 provides the full list of available resources and the already identified stations that are going to be added in coming months (data gaps).

These repositories may employ different methodologies, data models, formats, data licenses, and interoperability tools. EMODnet Physics has developed and maintains tools to interoperate with these repositories and integrate these federated sources into thematic data collections. For each source, a special connection module may be required to process the source's metadata and data, making it ready for inclusion in EMODnet Physics collections and the Central Portal (see also Task 4).

The organization of a common method to access data in repositories also encompasses the promotion of common vocabularies and metadata (Table 5), the adoption of common standards and procedures to ensure data interoperability, and the engagement of new communities and stakeholders to unlock data and address gaps in time and space.

Deliverable D2.03 outlines the minimum set of metadata and recommended vocabularies.

[1] https://data-erddap.emodnet-physics.eu/erddap/tabledap/EP_PLATFORMS_METADATA.html

[2] https://data-erddap.emodnet-physics.eu/erddap/tabledap/EP_PLATFORMS_METADATA_CTD.html

Table 5. applicable standards

Metadata field	Vocabulary exists	Link to vocabulary	Vocabulary governance
Platform id		https://www.ocean-ops.org/ https://vocab.ices.dk/?ref=1399	OCEANOPS/WMO ICES, (other international trusted inventories e.g., GRDC, etc.)
Owner/provider Institution	Yes	https://edmo.seadatanet.org/	SeaDataNet
Variable group	Yes	http://vocab.nerc.ac.uk/collection/P33/current/	BODC:NVS EMODnet Physics
variable names	Yes	http://vocab.nerc.ac.uk/collection/P09/current/ http://vocab.nerc.ac.uk/collection/P02/current/ http://vocab.nerc.ac.uk/collection/P01/current/ http://vocab.nerc.ac.uk/collection/P07/current/ https://cfconventions.org /Data/cf-standard-names/79/build/cf-standard-name-table.html	BODC:NVS CF Standard Name Table v29
unit	yes	https://vocab.nerc.ac.uk/collection/P06/current/	BODC:NVS
Quality Flag Scheme	yes	http://www.oceansites.org/docs/oceansites_data_format_reference_manual.pdf https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=L20	OceanSITES SeaDataNet
Time	yes	ISO8601	ISO
Datum	Yes	WGS84	ISO
Country	yes	ISO3166	ISO
License	Yes	https://creativecommons.org/	CC
INSPIRE	Yes	ISO 19115	ISO/INSPIRE

Data collections are organized according to the dedicated controlled vocabulary, P333 (hosted in NERC Vocabulary Service of the British Oceanographic Data Center - NVS-BODC service), and each P33 data collection includes two (e.g., one for time series, one for profiles) or more P01 collections. For example, the Water Salinity and Conductivity theme (NVS::P33::WARERSALINITY) includes: sea water salinity (NVS::01::PSAL), sea water electrical conductivity (NVS::01::CNDC), sea water density (NVS::01::DENS), and sound velocity in sea water (NVS::01::SVEL). For each parameter, we may have time series or profiles.

This dynamic vocabulary primarily pertains to parameters theme. It is continuously updated, and when a new term is required, the following workflow is applied:

[3] https://vocab.nerc.ac.uk/collection/P33/current/.

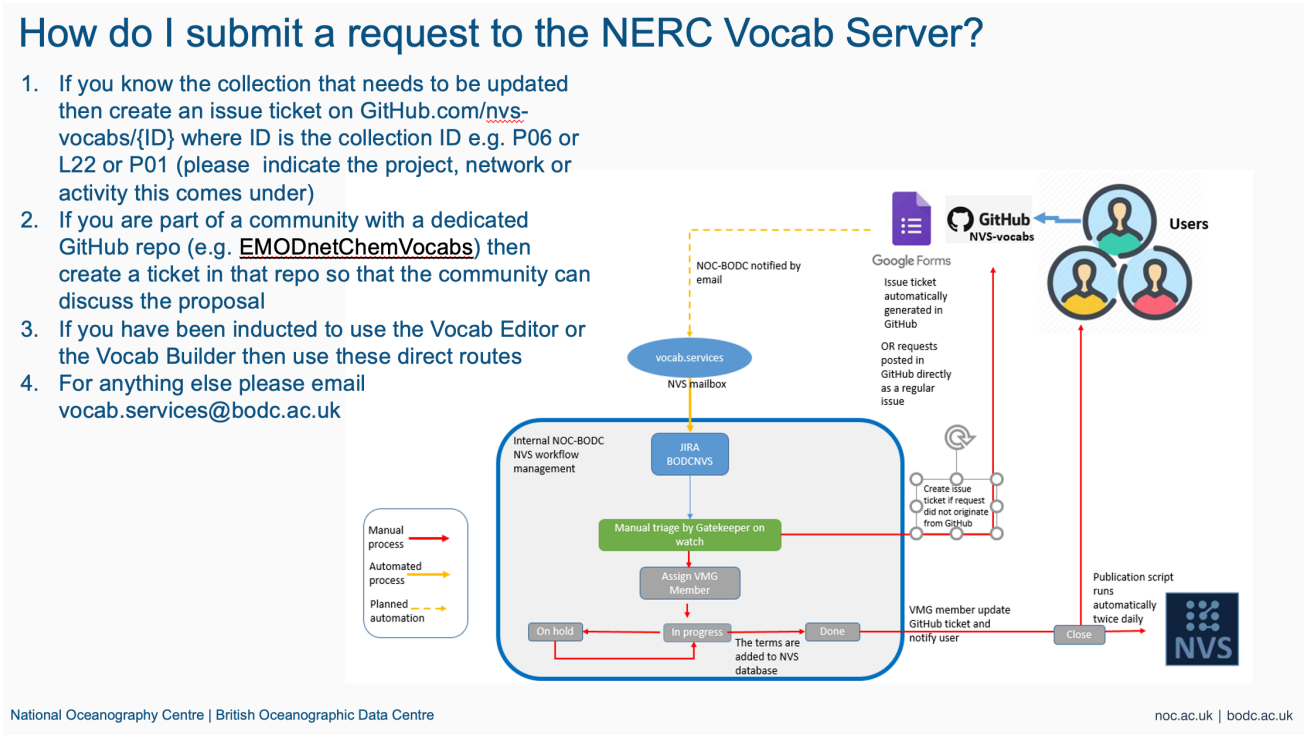

Figure 1. NVS new term submission procedure

Table 6 lists the available P33 collections[4]

Table 6. Availble P33 collections:

ERD_EP_CARBONSYSTEM_INSITU_METADATA	EMODnet Physics - Collection of Carbon System (SDN:P33::CARBONSYSTEM) variables - MultiPoint Observation - METADATA
ERD_EP_CURRENTS_INSITU_METADATA	EMODnet Physics - Collection of Currents (SDN:P33::CURRENTS) variables - MultiPoint Observation - METADATA
ERD_EP_TS_DOXY_NRT_METADATA	EMODnet Physics - Collection of dissolved oxygen (DOXY) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_DISSOLVEDOXYGEN_INSITU_METADATA	EMODnet Physics - Collection of Dissolved Oxygen (SDN:P33::DISSOLVEDOXYGEN) variables - MultiPoint Observation - METADATA
ERD_EP_TS_VGHS_NRT_METADATA	EMODnet Physics - Collection of generic significant wave height (Hs) (VGHS) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_METEOROLOGICAL_INSITU_METADATA	EMODnet Physics - Collection of Meteorological (SDN:P33::METEOROLOGICAL) variables - MultiPoint Observation - METADATA
ERD_EP_OPTICAL_INSITU_METADATA	EMODnet Physics - Collection of Optical Properties (SDN:P33::OPTICAL) variables - MultiPoint Observation - METADATA
EP_PLATFORMS_METADATA	EMODnet Physics - Collection of platforms metadata
ERD_EP_PR_PSAL_NRT_METADATA	EMODnet Physics - Collection of practical salinity (PSAL) Profiles - MultiPointProfilesObservation - METADATA
ERD_EP_TS_PSAL_NRT_METADATA	EMODnet Physics - Collection of practical salinity (PSAL) TimeSeries - MultiPointTimeSeriesObservation - METADATA

[4] https://data-erddap.emodnet-physics.eu/erddap/index.html.

ERD_EP_RIVER_INSITU_METADATA	EMODnet Physics - Collection of River (SDN:P33::RIVER) variables - MultiPoint Observation - METADATA
ERD_EP_TS_RVFL_NRT_METADATA	EMODnet Physics - Collection of river flow rate (RVFL) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_TS_DENS_NRT_METADATA	EMODnet Physics - Collection of sea density (sigma-theta) (DENS) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_SEALEVEL_INSITU_METADATA	EMODnet Physics - Collection of Sea Level (SDN:P33::SEALEVEL) variables - MultiPoint Observation - METADATA
ERD_EP_PR_TEMP_NRT_METADATA	EMODnet Physics - Collection of sea temperature (TEMP) Profiles - MultiPointProfilesObservation - METADATA
ERD_EP_TS_TEMP_NRT_METADATA	EMODnet Physics - Collection of sea temperature (TEMP) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_TS_TEMP_DOXY_NRT_METADATA	EMODnet Physics - Collection of sea temperature from oxygen sensor (TEMP_DOXY) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_PR_PSAL_TEMP_NRT_METADATA	EMODnet Physics - Collection of sea temperature, practical salinity (PSAL_TEMP) Profiles - MultiPointProfilesObservation - METADATA
ERD_EP_TS_PSAL_TEMP_NRT_METADATA	EMODnet Physics - Collection of sea temperature, practical salinity (PSAL_TEMP) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_TS_CHLT_NRT_METADATA	EMODnet Physics - Collection of total chlorophyll (CHLT) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_WATERSALINITY_INSITU_METADATA	EMODnet Physics - Collection of Water Salinity and conductivity (SDN:P33::WATERSALINITY) variables - MultiPoint Observation - METADATA
ERD_EP_WATERTEMPERATURE_INSITU_METADATA	EMODnet Physics - Collection of Water Temperature (SDN:P33::WATERTEMPERATURE) variables - MultiPoint Observation - METADATA
ERD_EP_TS_VDIR_NRT_METADATA	EMODnet Physics - Collection of wave direction rel. true north (VDIR) TimeSeries - MultiPointTimeSeriesObservation - METADATA
ERD_EP_WAVES_INSITU_METADATA	EMODnet Physics - Collection of Waves (SDN:P33::WAVES) variables - MultiPoint Observation - METADATA
ERD_EP_WINDS_INSITU_METADATA	EMODnet Physics - Collection of Winds (SDN:P33::WINDS) variables - MultiPoint Observation - METADATA

Moreover, EMODnet Physics has started a crucial process to update its metadata and include links to Ocean Best Practice (organized under the OBPS). Figure 2 shows the progress towards this development as presented by Munoz et al at IMDIS 2024.

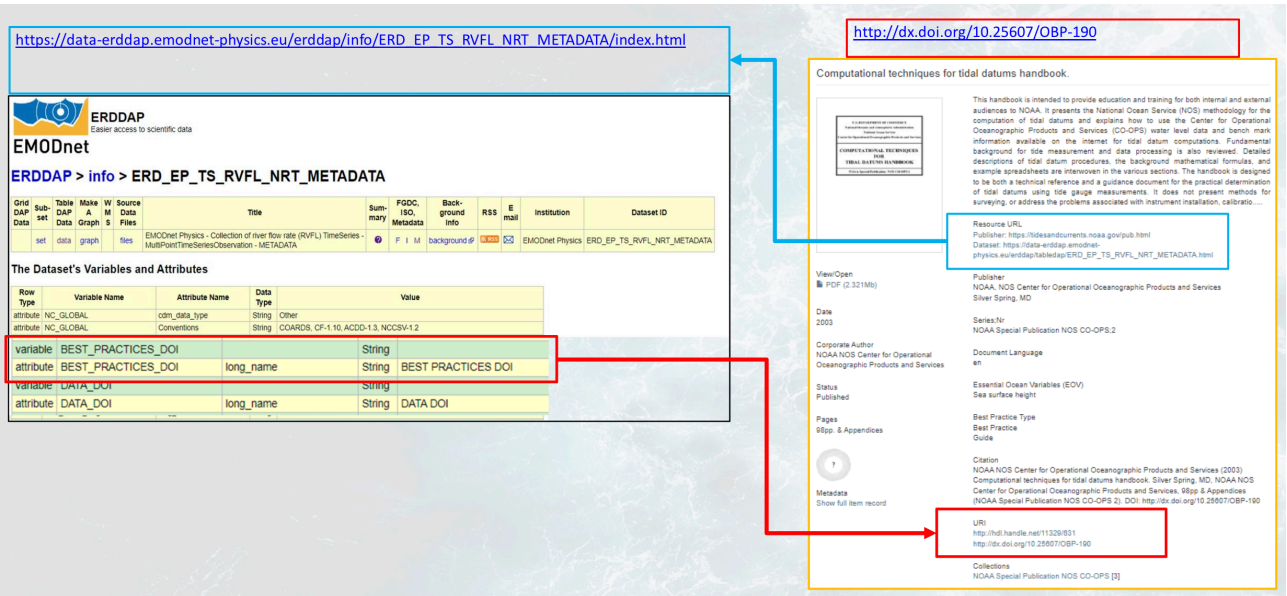

Figure 2. OBPS & EMODnet Physics

Making operational data available in Physics is particularly important for providing a single platform to view what, where, and how data is collected at sea. This also reduces duplication of effort among agencies, improves data quality, and lowers geographic information-related costs. This effort makes oceanographic data more accessible to the public and fosters key partnerships to increase data availability. However, new data sources may not always fully comply with applied standards (e.g., adoption of common Quality Check/Quality Flag - QC/QA procedures at the source, adoption of standardized metadata, etc.). The development of such procedures may not always align with the timelines of data providers, potentially conflicting with the momentum of engaging new providers.

Workflows and procedures were optimized to support two main types of ingestions: the first concerns delayed mode data for which the established pipeline forwards data to an expert data center selected from a network of 50 assigned data centers (e.g., National Oceanographic Data Center), based on data theme and country of submission, as well as EMODnet-specific thematic data centers (EU HFR node, River Outflow Assembly Center, etc.). The second type concerns real-time (RT) and near real-time (NRT) data flow from operational oceanographic platforms whose operators would like to include their data and streams in the EMODnet Physics offer. This ingestion process consists of two phases: Phase 1 aims at connecting the new data and operator as soon as possible, and the data is ingested/linked “as is”. Phase 2 is completed when data is fully digested by partner infrastructures (either national, European, or international assembly center), including more metadata and adopting prevailing format standards. This workflow is applied to both delayed mode data and operational oceanography data flows, which also include an intermediate level where new data are organized into harmonized data collections.

The transition from phase 1 to phase 2 requires further elaboration (e.g., adoption of common QC/QF at the source, adoption of standardized metadata, etc.). It may not always be possible, and the inclusion of operational near real-time data into harmonized collections may not yet meet the requirements for research-quality data stewardship. Therefore, phase 2 includes two sub-levels: the first level is reached when the operational data source is included in an operational data collection (e.g., the Copernicus Marine Service In Situ TAC, EU HFR NODE, etc.), and the second level (research quality) is achieved when the data is included in the SeaDataNet collection, along with the assignment of a Common Data Index (CDI) to the dataset. (Figure 3).

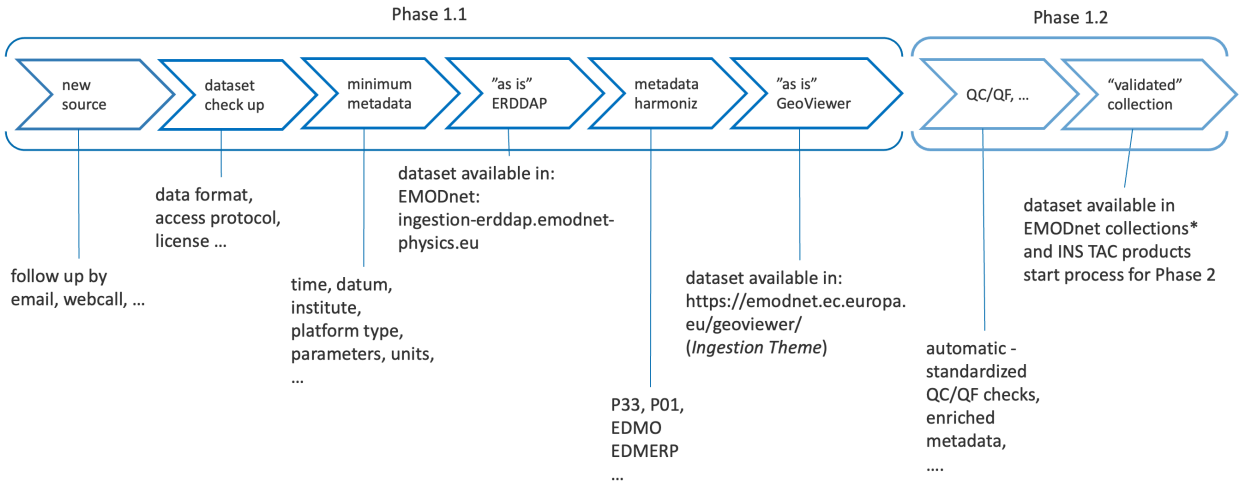

Figure 3. New workflow for the operational data ingestion into Physics

The methodology has been defined within the Marine In situ Collaboration Technical Working Group (MIC TWG)[5], which was established between EMODnet Physics, EMODnet Ingestion and Chemistry, Copernicus Marine Service In Situ TAC, EuroGOOS office, EuroGOOS Task Teams, SeaDataNet/SeaDataCloud, and other relevant partners.

The promotion of this common basis also involves organizing workshops with data providers and emerging platform network communities (e.g., citizen science projects, data from smart sensors in fishing nets). These events aim to introduce and discuss the EMODnet scope, how providers can contribute, and the necessary metadata and data formats, along with long-term perspectives to support the evolution of EMODnet.

Task 2. Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space

EMODnet Physics offers a range of products, including in-situ data, reanalysis, trends, aggregations in space and/or time, and model outputs. In-situ data can be delivered either in near-real-time or with a delay, or after processing. EMODnet Physics data and products are accessible for search, visualization, and download in a manner that conceals the physical location of the data source from the user, although data provenance is always declared. This activity also involves generating several products and making optimal use of existing ones from the EMODnet Physics network (including SeaDataNet, Copernicus Marine Service, ICES, SONEL, etc.). With the Central Portal (CP) operational, the flow from data source to products into the CP follows the following process:

1. Data "as is". These data are ingested and organized in the EMODnet Physics backend. The EMODnet Physics backend (erddap.emodnet-physics.eu, geoserver.emodnet-physics.eu) offers these data to

[5] MIC WG is working on the further harmonization of standards, procedures and workflow for ingesting and sharing operational data

central portal by means of standard M2M protocols (WMS, WFS). Download is possible via the Central Geoviewer that requests data packages to EMODnet Physics. EMODnet Physics forward these requests the data to original sources.

2. Data collections. In situ data is organized per theme (temperature, salinity ...). Metadata is using harmonized and controlled vocabularies (see annex). This level also corresponds to Ingestion Phase 1. These data are organized in the EMODnet Physics backend. The EMODnet Physics prod environment backend (prod-erddap.emodnet-physics.eu, prod-geoserver.emodnet-physics.eu) offers these data to central portal by means of standard M2M protocols (WMS, WFS). Download is possible via the Central Geoviewer that requests data packages to EMODnet Physics.
3. Research quality data. These datasets are fully validated by theme experts (e.g., SeaDataNet network of NODCs, PSMSL, Copernicus Marine Service Reanalysis, ICES, etc.). These data correspond to the Ingestion Phase 2. These data are hosted into specialized DB. Download of these packages are possible via external links.
4. Products. Research quality data are used to make themes products - e.g., temperature, salinity climatology; sea level trend map, etc. These products may be gridded or not. These products are usually developed by EMODnet Physics partner projects/programs (e.g., Copernicus Marine, BlueCloud2026, GLODAP, ICES, etc.). These products are included into EMODnet Physics backend (prod-erddap.emodnet-physics.eu, prod-geoserver.emodnet-physics.eu) and cached into the EMODnet central ERDDAP (erddap.emodnet.eu/erddap/index.html).

As described, EMODnet Physics has successfully designed, organized, and is running operational services that provide ocean physics data and data products built with common standards, free of charge, and without restrictions. The available parameters cover temperature, salinity, and current profiles, sea level trends, wave height and period, wind speed and direction, water turbidity (light attenuation), underwater noise, river flow, and sea-ice coverage. Some of these parameters are also processed to create more complex and comprehensive products. Product management is organized into thematic teams (see WP1) whose expertise helps identify if a product is suitable for its intended purpose and how it can be utilized by a critical mass of beneficiaries. The following thematic products are available:

- ***Temperature and Salinity in the water column***

Temperature is a crucial component of the climate system and exhibits variability in the water column. Sea-surface temperature (SST) has a significant impact on energy, momentum, and gas exchanges between the ocean and atmosphere. Daily variations in SST can exceed 3°C and lead to changes of over 10 Wm-2 in the surface energy budget in the tropics and subtropics. Subsurface ocean temperature is a fundamental observation for understanding various ocean phenomena influencing climate, including ocean stratification, circulation, mixed layer dynamics, water mass properties, and coastal shelf-open ocean exchange. Profiling subsurface temperature observation systems also contribute to in-situ validation of satellite observations of surface temperature. Changes in ocean temperature, for instance, can impact the growth rate of farmed fish, as well as the distribution and abundance of wild fish stocks and other economically and socially valuable marine species.

Salinity observations play a role in monitoring the global water cycle, ocean density, mass, and more. These in-situ data are essential inputs for many ocean models, for validating and calibrating remote sensing observations, and for understanding the ocean's role in the global climate system.

At a global scale, EMODnet collects in-situ data from the Global Ocean Observing Systems (GOOS) networks (Argo, Data Buoy Cooperation Panel - DBCP, OceanSITES, Global Ocean Surface Underway Data - GOSUD, OceanGliders, Global Ocean Ship-based Hydrographic Investigations Program - GOSHIP) and main international (US World Ocean Database - WOD, US National Data Buoy Center - NDBC, Integrated Marine Observing System - IMOS) and European (SeaDataNet, International Council for the Exploration of the Sea - ICES, Copernicus Marine Service INS TAC) aggregators. The most important source of profile data is the Argo network (about 4000 platforms cycling every 10 days) and its extensions to Deep Ocean and BioGeoChemical parameters. It is complemented by XBT lines (about 50 lines, half active in 2018) and sea mammals in high latitudes. In delayed mode, the GOSHIP CTD lines (60 lines planned) and other research cruise observations from US National Oceanographic Data Center - NODC and CLIVAR (Climate and Ocean - Variability, Predictability, and Change) and Carbon Hydrographic Data Office - CCHDO are included (notably, during the previous contract more than 7400 XBT stations points and 57 ADCP routes were included).

For time-series data, the most important source of observations is the Data Buoy cooperation Panel - DBCP network, operating more than 1400 drifters and 20 Arctic buoys, as well as more than 400 moorings providing both atmospheric and oceanographic data. It is complemented by the GOSUD and VOS network on voluntary observing ships, which provide both SST/SSS (sea surface salinity) and Surface Carbon data. The Argo network also provides time series of temperature and salinity at the surface and at drifting depths, along with derived velocity information.

EMODnet Physics provides in-situ observations from various catalogues, both European and international (including Marine Mammals Exploring the Oceans Pole to Pole - MEOP, Southern Ocean Observing System - SOOS, Deep Ocean Observing System - DOOS, etc.), linking different platforms with a wide range of spatial and temporal scales. The EMODnet Physics data collection includes moorings, which offer high temporal resolution at specific locations but have limited spatial resolution due to array density; gliders and tagged animals that provide higher spatial resolution depending on endurance and instrument characteristics; profiling floats (ARGO) that deliver temperature profiles typically from 0-2,000 meters; casts from ship-based Conductivity-Temperature-Depth (CTD) observations along research voyage tracks, providing temperature observations throughout the water column; Expendable probes (xBT) dropped from a network of volunteer commercial vessels along major shipping routes, observing temperature to several hundred meters depth on a roughly seasonal repeat schedule; and surface loads and ferryboxes repeated transects, which offer high-resolution sea surface temperature datasets.

Using these in situ data, it is possible to analyze trends, create maps, and generate gridded data products. Examples include the CORA (Coriolis Ocean Dataset for Reanalysis), developed by IFREMER for the Copernicus Marine Service and regularly updated (annually), and the SeaDataNet Regional Climatology products, developed by SeaDataNet partners using DIVA software and periodically updated

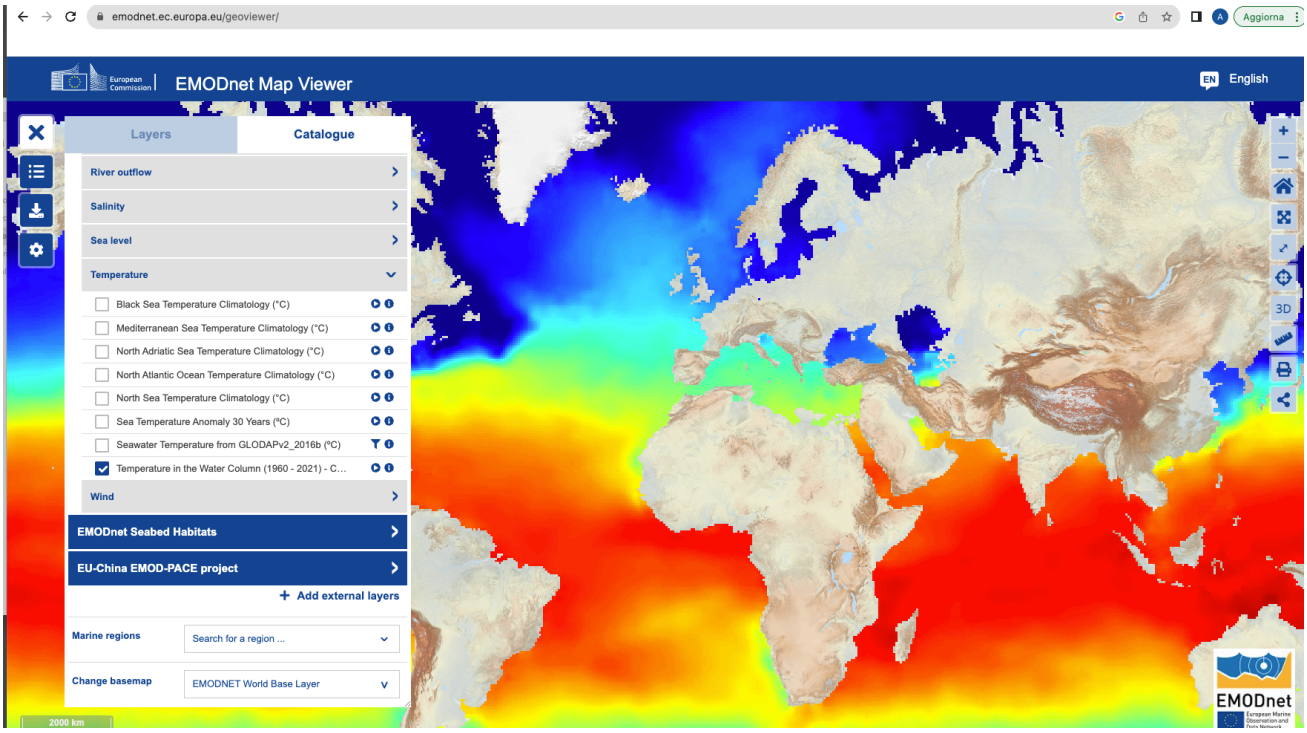

Figure 4. The Coriolis Ocean Dataset for Reanalysis under the Physics area

A near real time picture of the sea surface temperature and salinity is made available by a dedicated web interactive page. This product will be soon available into the Central Portal.

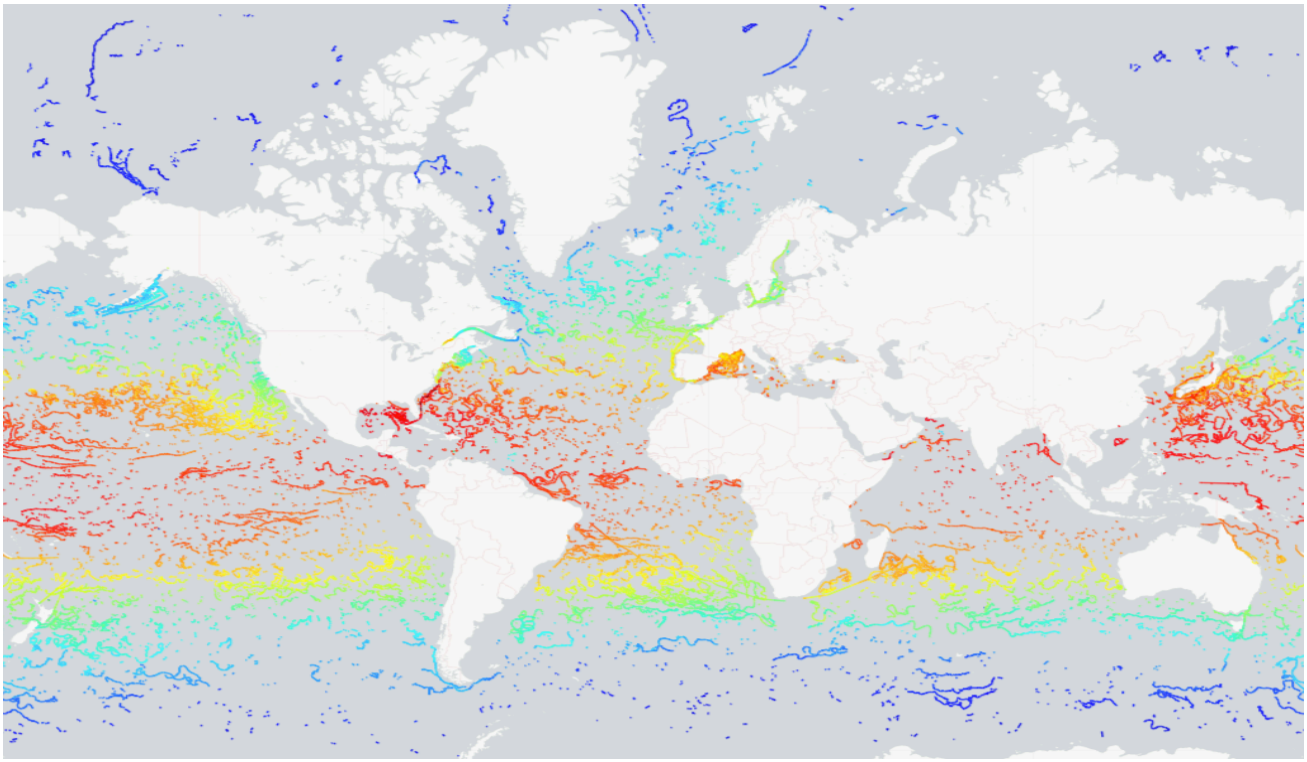

Figure 5. NRT temperature (integration time 60days) as collected by in situ stations

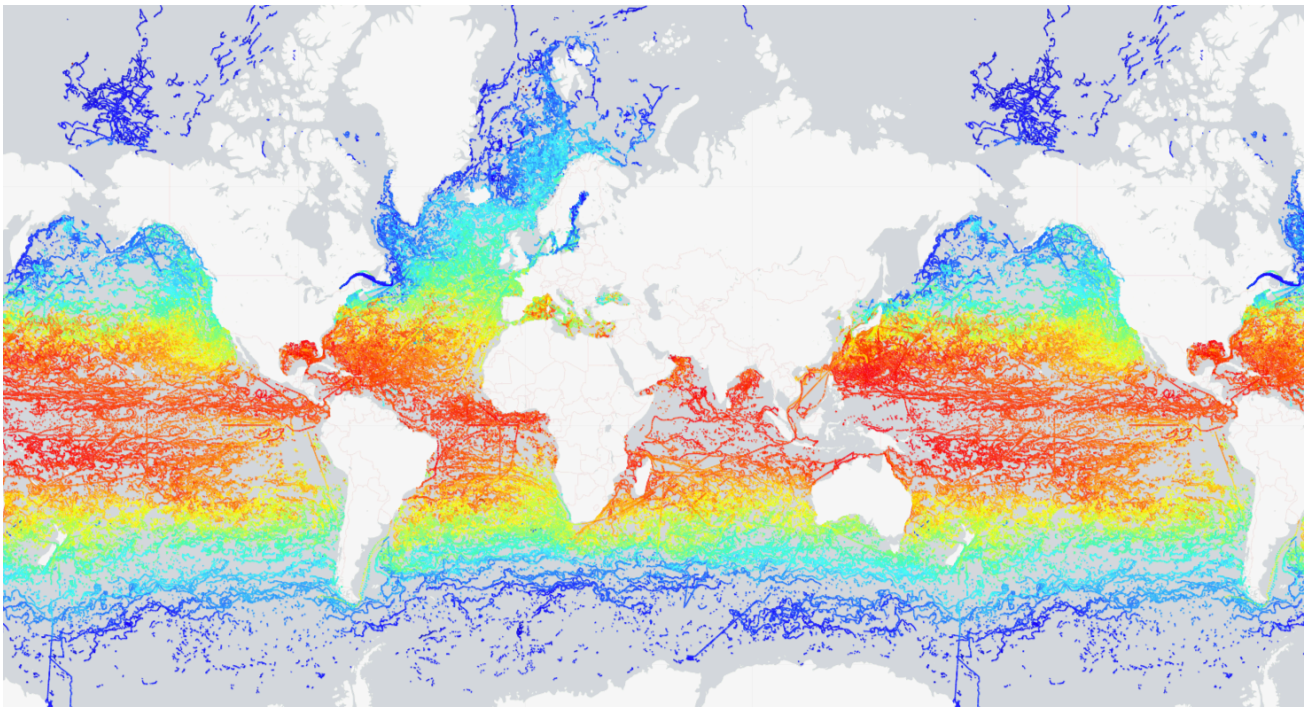

Figure 6. NRT temperature (integration time 12Months) as collected by in situ stations

- ***Sea Surface Currents***

The general circulation of the ocean surface plays a significant role in the transport of heat, salt, passive tracers, and ocean pollutants. Ocean currents, in conjunction with atmospheric currents, contribute to redistributing equatorial heat content towards the poles. There are two main types of sea currents: surface wind-driven currents and the thermohaline circulation. The existing surface current observing systems, such as moorings and Lagrangian drifters, capture a substantial portion of this range. EMODnet Physics combines these observations with land-based High-Frequency (HF) radar observations, which provide a high-resolution tool (albeit with limited spatial coverage) for improved understanding of surface currents, eddies, air-sea fluxes, and exchanges between coastal waters and the open ocean. The EMODnet Physics HFR catalogue, which includes approximately 150 antennas, combines the European HFR node observation capacity with global sources, making it one of the most comprehensive sources of HF Radar observations worldwide

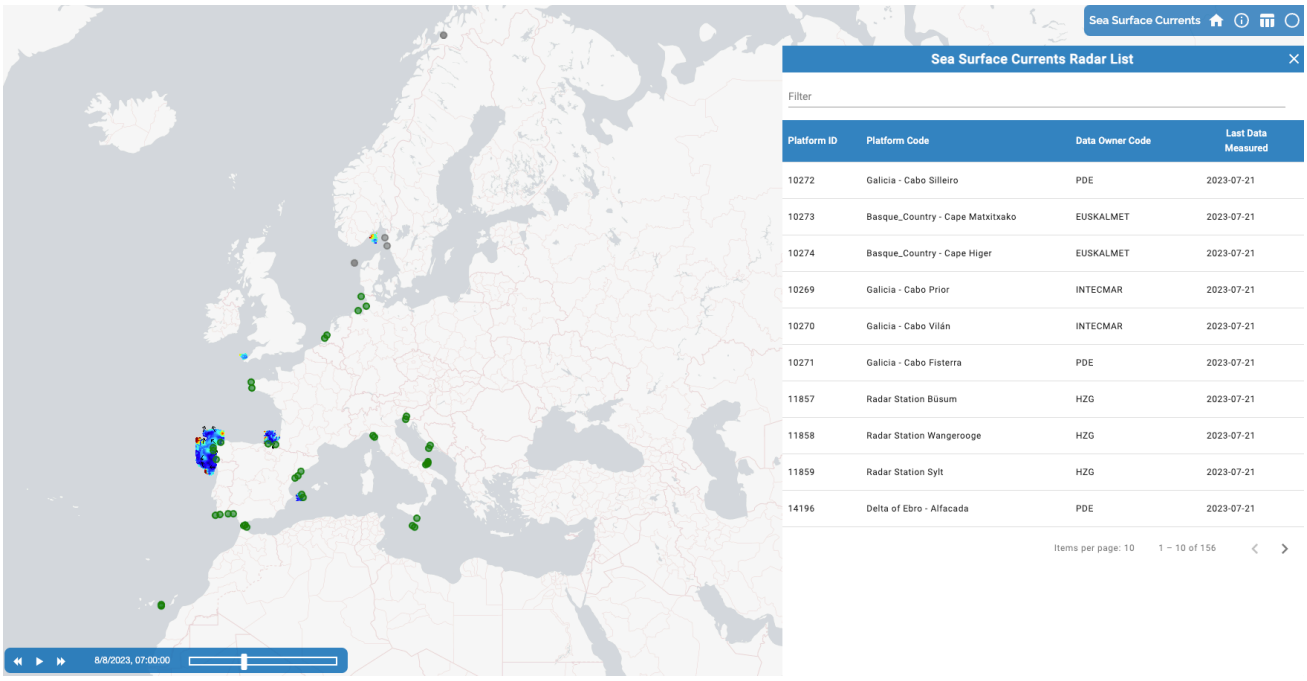

Figure 7. HFR and sea surface currents

- ***Sea Level***

Sea level is considered an Essential Ocean Variable by the Global Ocean Observing System (GOOS). Measurements of sea level along coasts have been conducted since the 19th century using tide gauges. Tide gauges remain a key method for observing trends in mean sea level, assessing extreme events, making tidal predictions, supporting geodetic applications, and facilitating harbor operations and navigation. Tide gauge measurements are increasingly important for new warning systems for tsunamis and storm surges, as coastal inundation and storm surges can lead to significant flood events and the destruction of property and infrastructure. Sea level is regarded as one of the most crucial Essential Climate Variables (ECVs), given that its projected evolution over the next few decades is predicted to pose challenges for millions of people, particularly those in vulnerable areas. Continuous monitoring of sea level trends is essential, and EMODnet Physics incorporates different data collections:

- European Tide Gauge Stations (EuroGOOS - Tide Gauge task team), which constitute a network of approximately 500 operational stations providing hourly data. These data undergo near-real-time quality control (NRTQC) to identify spikes.
- The UNESCO IOC Sea Level Monitoring Service, which comprises a network of over 1,250 operational tide gauges providing near-real-time data that contributes to international tsunami networks. These data are available "as is" and are not quality controlled or intended for research purposes.
- The Global Sea Level Observing Systems (GLOSS) core network, consisting of around 300 stations that form the foundation of the global in-situ sea level network. This network ensures even sampling of coastal sea level variation at various time scales.
- JRC-TAD tsunami array devices, a network of over 1,000 smart sensors that monitor real-time sea level status at a frequency of one minute, supporting tsunami warning services.

- The GLOOS Fast Delivery (FD) and Research Quality (RQD) tide gauge data, operated by the University of Hawaii Sea Level Centre (UHSLC). The database includes 574 stations. FD data are released within 1-2 months of data collection and undergo basic quality control focusing on large level shifts and obvious outliers. FD data is replaced by RQD data as it becomes available, usually 1-2 years after FD.
- The Permanent Service for Mean Sea Level (PSMSL) global sea level database, which provides long-term sea level change information from tide gauges and bottom pressure recorders. The database comprises over 2,350 stations and contains monthly and annual mean sea level values.

These in-situ data are processed by the Permanent Service for Mean Sea Level -PSMSL expert center, which provides relative sea level trend and sea level anomalies products. The relative sea level trends measured by tide gauges reflect local changes in water level plus local vertical land motion. However, these trends are not corrected for land movement. Tide gauge trends are relative to a fixed point on land and can be influenced by land movements caused by earthquakes or ground-water withdrawal. These in-situ trends are part of the EMODnet Physics products collection in the EMODnet Geoviewer.

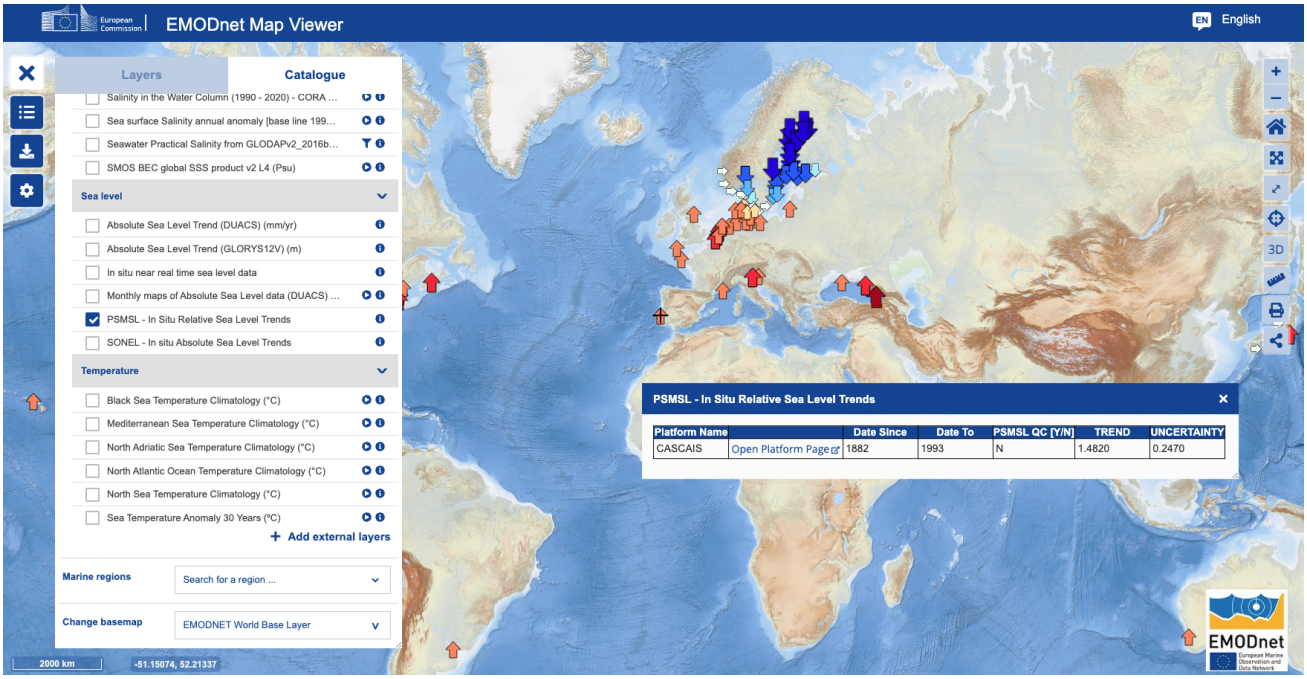

Figure 8. in situ sea level trends (PSMSL)

The absolute sea level is processed using geodetic data from in situ stations (Système d'Observation du Niveau des Eaux Littorales - SONEL). SONEL serves as the GNSS data assembly center for the Global Sea Level Observing System (GLOSS), developed under the auspices of the IOC/UNESCO. Based on the SONEL product, EMODnet Physics offers an absolute sea level trend product. EMODnet Physics also includes gridded and reanalysis products developed by CMCC for EMODnet Physics. The map is based on SSALTO/DUACS altimeter products produced and distributed by the Copernicus Marine Service. The satellite trends reflect changes in sea surface height, with most of the spatial variation resulting from the influence of winds blowing over the ocean

- ***Wave (height and period) - Sea State and Wind (speed and direction)***

Sea state refers to the characterization of waves and swells, including their height, wavelength, period, and directional wave energy flux. It is widely recognized that sea state significantly impacts marine safety, marine transport, and the potential for damage to structures. However, the availability of in-situ wave and wind observations remains limited. EMODnet Physics provides access to these data by integrating multiple data sources, such as the Data Buoy Cooperation Panel, OceanSITES, EuroGOOS regional observations in Europe, and more, into a single catalogue. Operational data are aggregated to provide a synoptic dynamic view of sea state conditions.

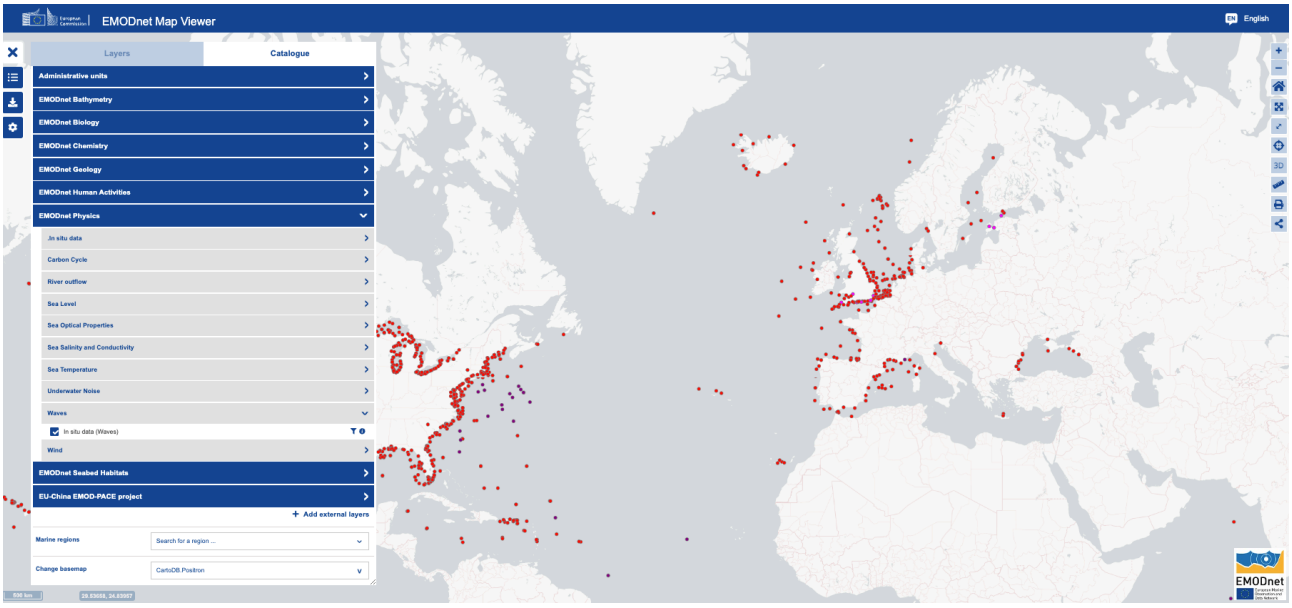

Figure 9. Wave stations in EMODnet Physics

- ***River Runoff Data***

River runoffs exert a strong influence on their neighboring coastal areas in various ways, such as modifying water stratification, introducing significant fluctuations in circulation patterns, and modulating the impact of upwelling events. However, uncertainties arise due to the global decline of hydrometric networks, which affects the availability of river runoff data and information on water properties like temperature and salinity. Typically, climatology products of rivers are imposed at the land boundaries of coastal or regional ocean models, overlooking the inter-annual variability in flow and associated properties of rivers. This omission limits our understanding of river dynamics and their impact on coastal areas. River flow fluctuations, from low to high levels, occur frequently and rapidly due to heavy rainfall, disrupting plant life and animal reproduction. These factors are crucial for coastal area management and improved forecasting systems.

EMODnet Physics serves as an in-situ hub for accessing operational river runoff data, offering thousands of stations (Figure 10). Notably, this achievement was made possible by a recent collaboration with the WMO Hydrological Observing System (WHOS), enabling interoperability with their system. This collaboration is another outcome of proactive networking activities in Ingestion and Physics. River runoff data can be accessed

through the EMODnet Geoviewer and an advanced product that includes detailed river catchment information. The EMODnet Physics River Runoff operational product is developed in collaboration with +ATLANTIC CoLAB. The research-quality river data database is operated by the Global Runoff Data Center (GRDC). EMODnet Physics includes a subset of GRDC data, focusing primarily (though not exclusively) on coastal areas and possibly near river mouths

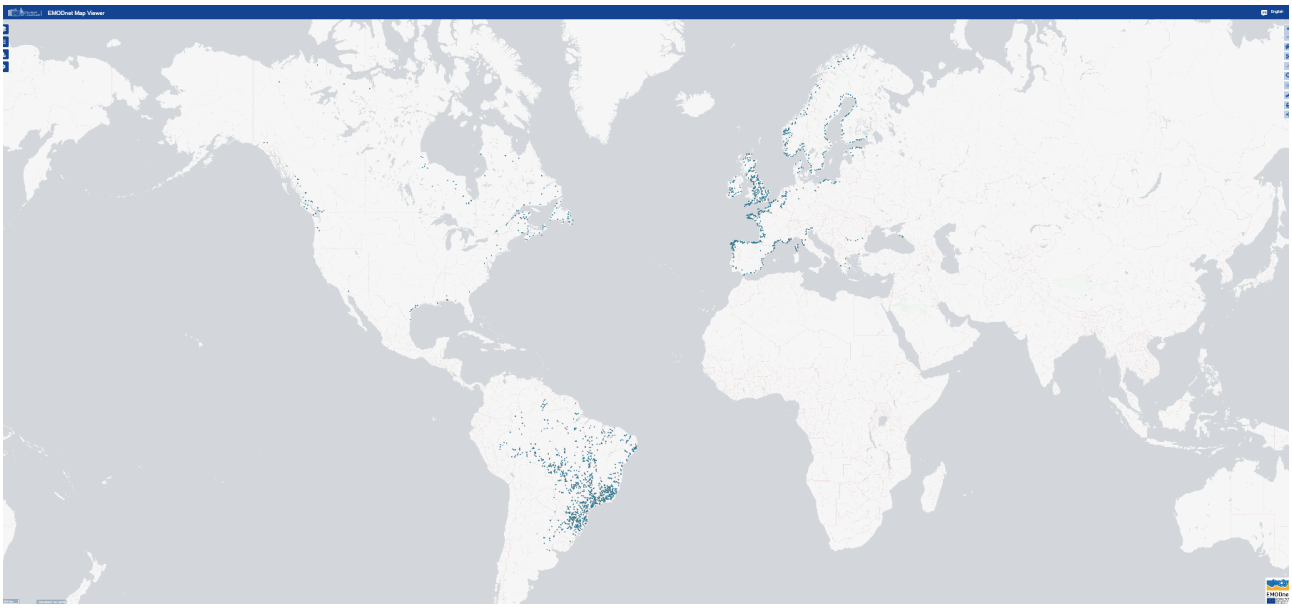

Figure 10. River outflow in situ data.

- ***Water Clarity (Light Attenuation)***

Light attenuation is a significant parameter for determining the photic zone, which refers to the zone with sufficient light for photosynthesis. It is essential for understanding total primary production and the distribution between pelagic and benthic primary production. In addition to working on in-situ data collection of water clarity data, including the availability of a database for parameters such as turbidity, EMODnet Physics offers a Total Suspended Matter (TSM) product. The TSM product represents the percentage of suspended particles (not dissolved) and is presented as a gridded product. It is based on the CoastColour L2W Concentrations Data, obtained from the OC4 algorithm for clear and moderately turbid waters, as well as the CoastColour v1 neural network. The L2W product is then remapped onto a regular grid while maintaining a full resolution of 300 meters. This allows for the generation of products covering European sea basins on a monthly average basis. The TSM product, developed by CNR – ISMAR for EMODnet Physics, covers the period from 2003 to 2012. It has started to be updated with recent data only on major rivers (Danube, Po, Rhone, Ebro, Guadalquivir, Tejo, Douro, Garonne, Loise, Seine, Rhine, Elbe) mouth. The RROI (river regions of interest) are going to be fully released progressively in 2023.

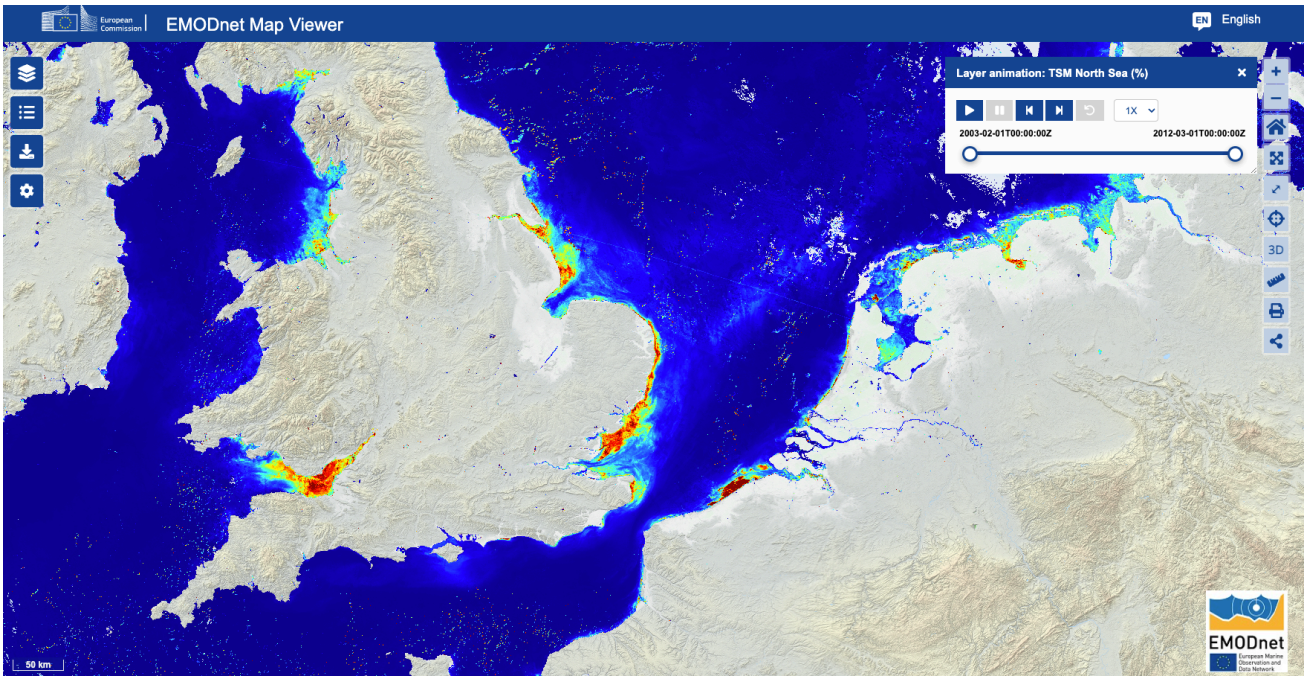

Figure 11. Optical properties – total suspended matter.

- ***Underwater Noise***

Underwater noise, which has adverse effects on the health of marine species and biological productivity, is gaining attention as a form of pollution. Maritime traffic serves as the main source of continuous noise, while impulsive noise sources include pile driving during construction, seismic exploration using air guns, explosions, and sonar systems. EMODnet Physics provides two products related to underwater noise: the collection of impulsive noise events and the atlas of sites for continuous noise monitoring. The impulsive noise events are compiled nationally from registers of licensed events, such as pile driving, controlled explosions from naval operations, and other activities that release energy. Most Member States provide these data to the Regional Sea Conventions, contributing to regional assessments of MSFD descriptor 11.1.1 (Low and mid-frequency impulsive noise). Regional registries, operated by ICES (HELCOM, OSPAR) and Centro Tecnologico Naval (Mediterranean Sea), are unified and made available through EMODnet Physics. These efforts aim to enhance understanding and assessment of underwater noise impacts in different regions.

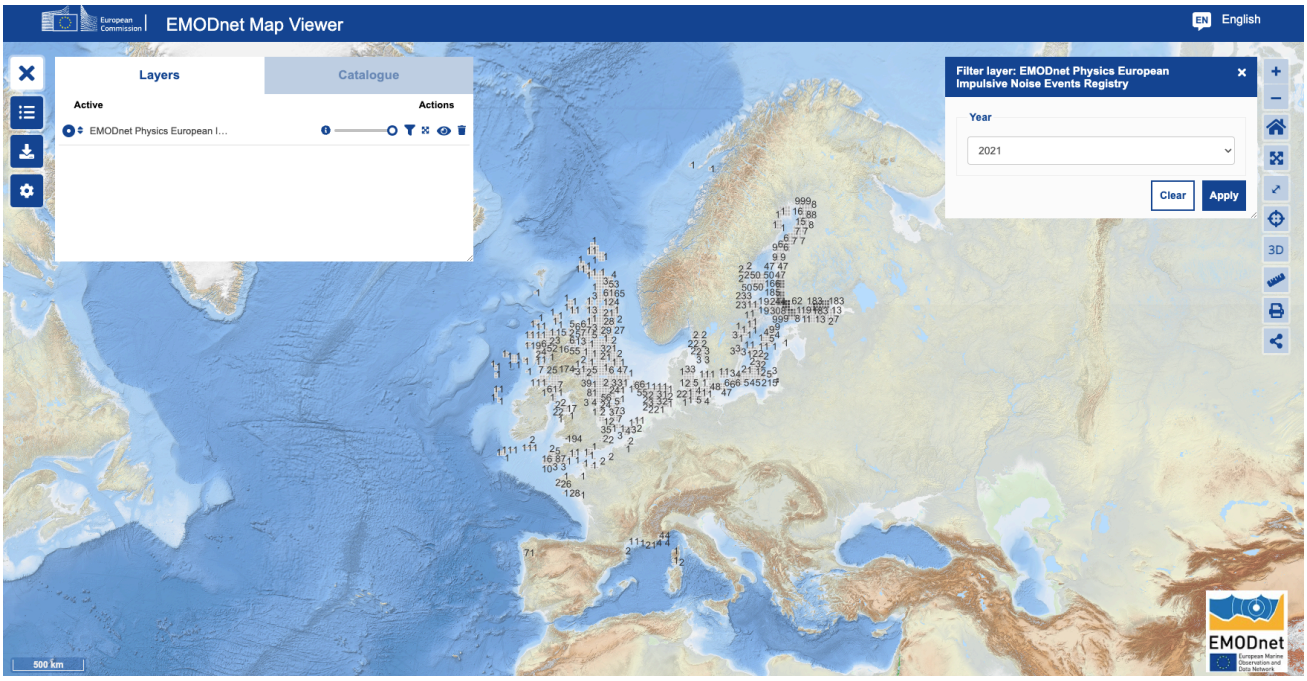

Figure 12. Impulsive noise events.

Besides updating these products, EMODnet Physics has started working on datasets from the CINEA/2022/OP/0019 project, which develops a digital catalogue of individual sound signatures from the marine underwater soundscape in shallow seas. The sound signature catalogue and maps of recording stations and sound signature tracks will be discoverable from the central portal in coming months.

- ***Sea Ice data***

Sea ice extent and thickness are rapidly decreasing, particularly in the Arctic. This loss of sea ice can have long-lasting effects on the cold branch of the global thermohaline circulation. EMODnet Physics incorporates in-situ data collections from various sources, including the International Arctic Buoy Cooperation Program, the Woods Hole Ice-Tethered Profiler Program, and icebreakers and research vessels operating in the Arctic area (ARICE). Additionally, EMODnet Physics supports the Southern Ocean Observation System (SOOS) by providing the data backend infrastructure to host and make Southern Ocean data accessible.

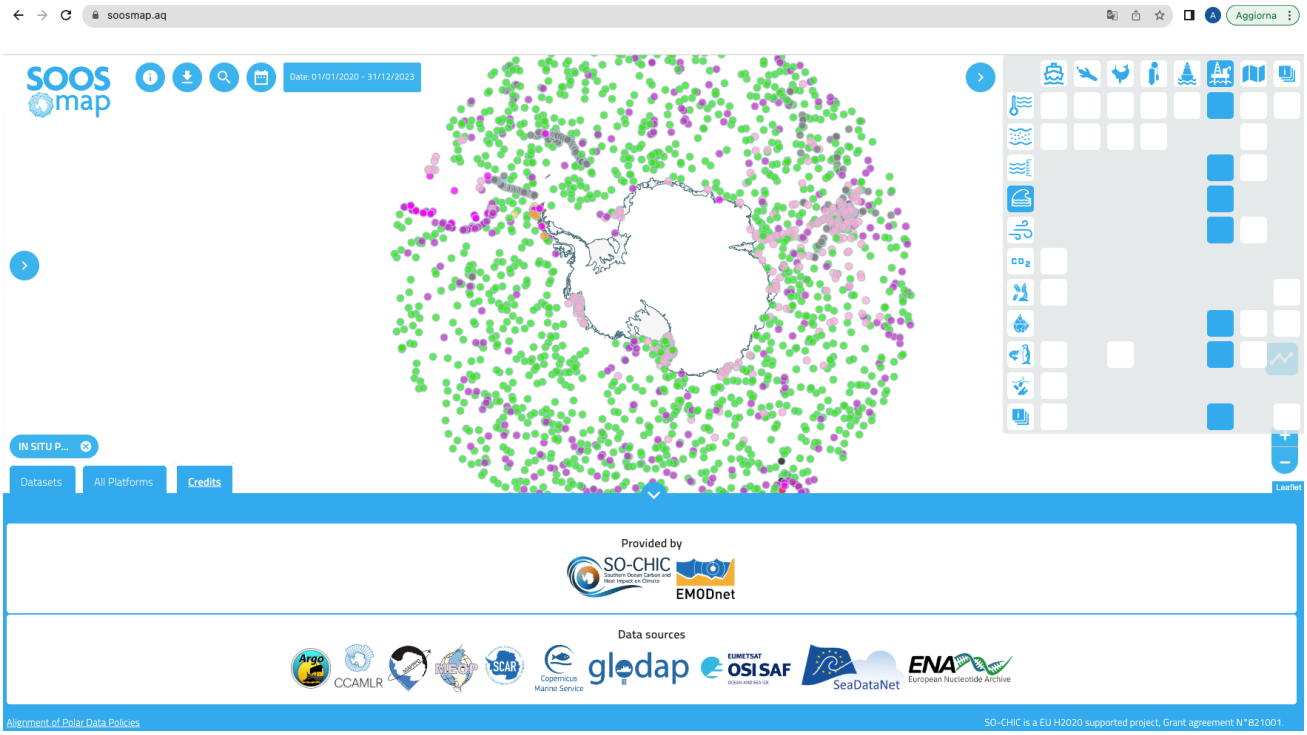

Figure 13. SOOSmap (www.soosmap.aq).

The positions of the platforms are superimposed on the sea ice extent[6] in both the Arctic and Antarctic Oceans.

[6] Sea ice extent is derived from the SEAICE_GLO_SEAICE_L4_NRT_OBSERVATIONS_011_001 product, which was developed by SIW-METNO-OSLO-NO for the Copernicus Marine Service.

Task 3. Develop procedures for machine-to-machine connections to data and data products

As already described in Task 1 and Task 2, EMODnet Physics continues to work on and optimize the FAIRness of its data flow and data management. The FAIR concept pertains to data and services that should be findable, accessible, interoperable, and reusable, for both machines and people, with a particular emphasis on machines. Technological advancements offer innovative opportunities for new forms of science, which is one of the driving forces behind the European Open Science Cloud (EOSC). It's worth noting that the EMODnet Physics coordinator is appointed as an EOSC-FAIR Champion (https://fair-impact.eu/eosc-fair-champions).

However, as previously mentioned (refer to Task 1), this requires well-described, accessible data that conforms to community standards. Machine-to-machine procedures consist of tools to establish connections from the source to EMODnet Physics and tools to implement interoperability from EMODnet Physics to third parties. A data source may provide data in various transport formats, different time granularities (hourly data, daily data, etc.), in real-time/near-real-time or delayed mode, using different data publishing services (FTP, OAI-PMH, webREST, etc.). EMODnet Physics operates services that facilitate the connection and linking to these various sources (also see Task 4).

As mentioned earlier, data product delivery modes range from real-time and near real-time to validated long-term time series. EMODnet Physics data infrastructure is logically divided into three layers: 1) Data layer, which includes all the machinery to collect and update in-situ data from sources, as well as new thematic products. 2) Application layer, which organizes data in a consistent manner to make it consumable. 3) Service layer, which exposes services to the Central Portal and users. Furthermore, to better support the Central Portal with consumable and interoperable thematic data layers, the infrastructure includes both a staging and a production environment. The tools adopted for data services and catalogues are ERDDAP, GeoServer, ncWMS, and GeoNetwork. Notably, to serve the Central Portal at its best and manage the different workflows (“as is”, validated, research quality, etc.), EMODnet Physics is running multiple ERDDAP instances.

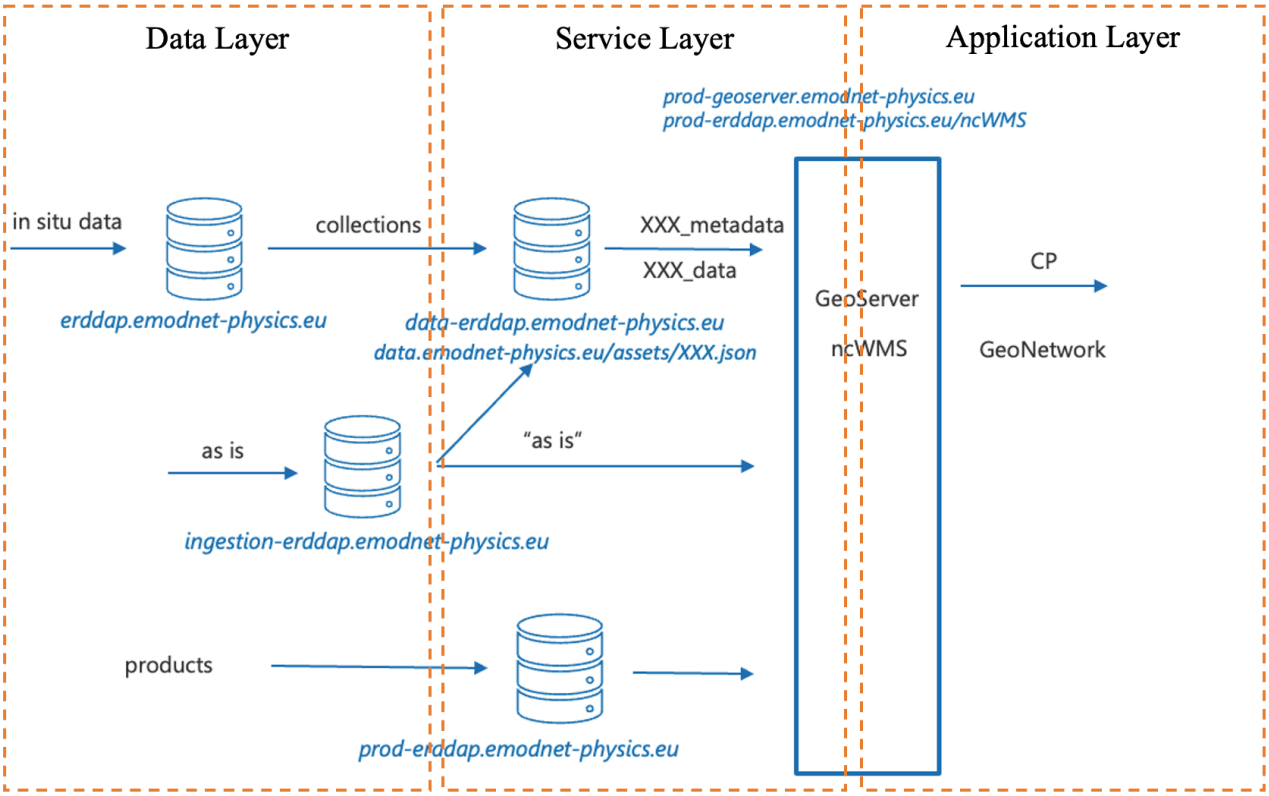

Figure 14. Simplified EMODnet Physics backend services infrastructure.

In this infrastructure, the ingestion-erddap.emodnet-physics.eu provides users with an easy way to interact with the latest ingested RT collections. The data-erddap.emodnet-physics.eu includes collections where data are normalized according to EMODnet Physics standards (P33, P01, WGS84, etc.) and coupled with a metadata dataset for full quality, provenance, and legacy description. This way, data end up in dedicated collections, which are offered to the Central Portal under specific WMS layers.

The EMODnet GeoServer (prod-geoserver.emodnet-physics.eu) provides the Central Portal with WMS/WFS layers. For the in-situ data and collections, the layer offers the position of the platform (type of platform), and the WFS provides the platform page HTML (metadata and charts). The HTML pages are populated with data from the collections in the ERDDAP (data-erddap) and are fully discoverable from the Central Portal. These pages provide users with metadata, plots, download features, platform products (e.g., monthly averages or wind plots), additional info and links, as well as statistics on the use of data from that platform. Data quality information is available in connection with datasets.

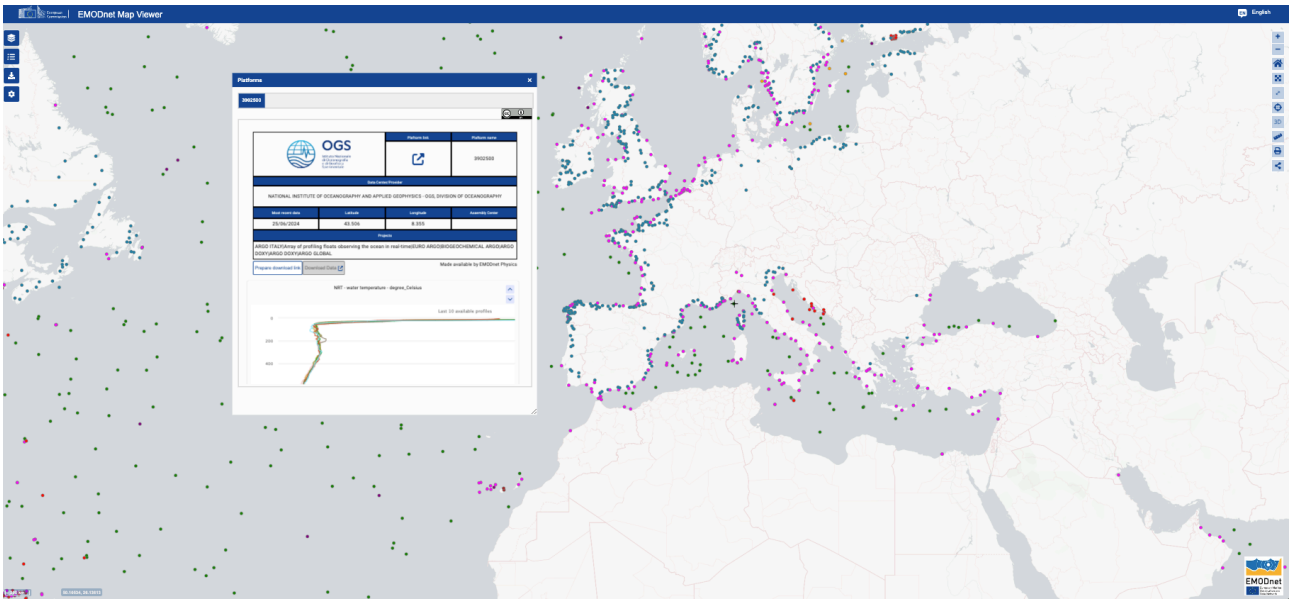

Figure 15. EMODnet Physics platform pages in the EMODnet Central Portal

The data are made available free of charge and free of restrictions of use (under the CC-BY license), providing the user with a smooth process to extract both near-real-time and archived data for a particular parameter with a single command.

This task involves collaboration with EMODnet Ingestion to support EMODnet Physics stakeholders with interoperability issues. Specifically, this involves organizing and providing software tools for implementing operational data exchange. The team is continuing the work on ERDDAP (the EMODnet Physics – ERDDAP Docker is maintained on the GitHub page https://github.com/EMODnet-Physics) and supporting newcomers to adopt it (see e.g. Figure 16), and the Discovery Access Broker (DAB), which largely contributed to interoperate with WHOS (see Figure 17).

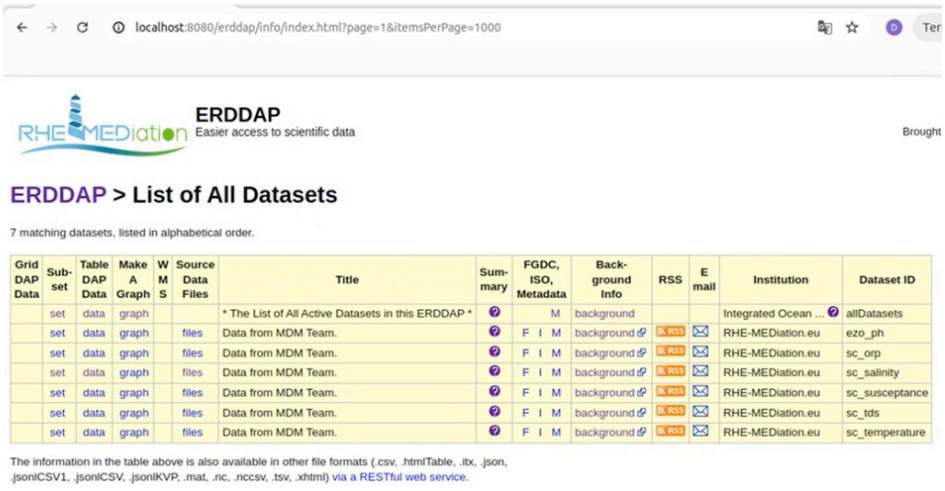

Figure 16. RHE-MEDiation prj working on ERDDAP

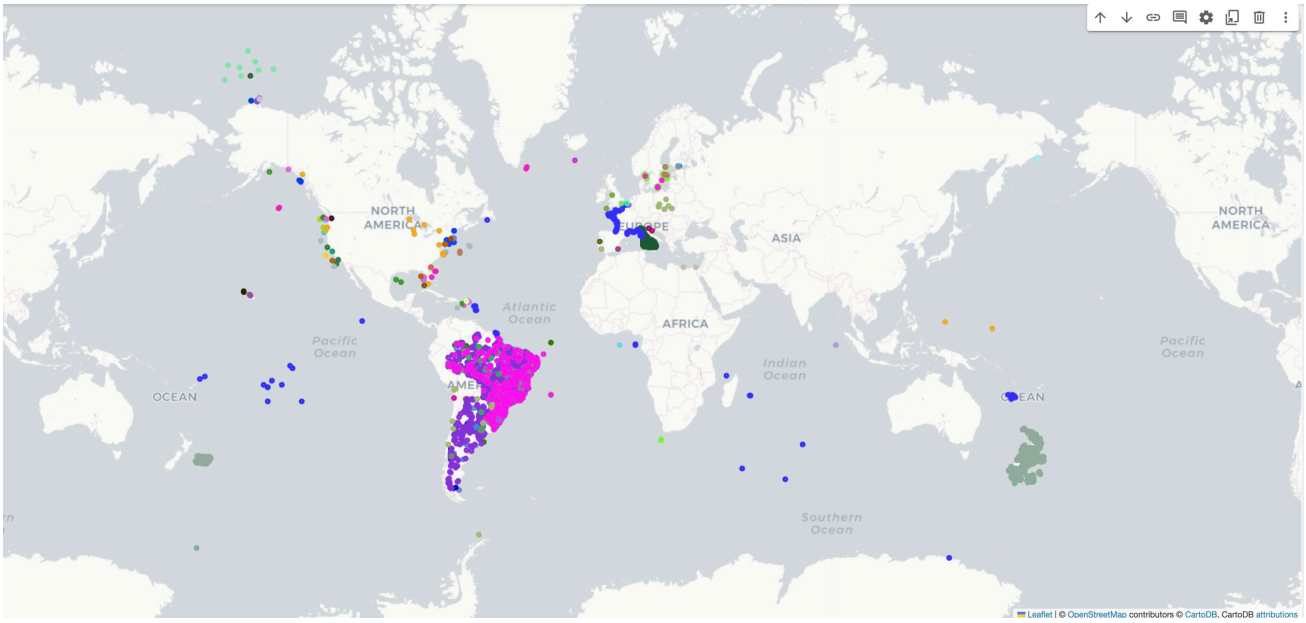

Figure 17. Snapshot of the ingestion of as-is datasets where WHOS data are in pink

The following table presents the downloadable volume, where some themes have seen significant increases, while others have been cleaned of duplicates (e.g., temperature), and some have been refined to include only parameters that fall within the scope of Physics (e.g., Optical Properties now includes only platforms that collect turbidity or light attenuation).

Table 7. Downloadable volume[7]

Parameters/Themes	Downloadable Volume 01/03/2019	Downloadable Volume 10/07/2020	Downloadable Volume 10/07/2023	Downloadable Volume 1/07/2024	Downloadable Volume 10/08/2024
Water Temperature	340187	825273	3067655	6309244	2486552
Water salinity	262176	745064	3065008	6288465	2465334
Currents	5388	6245	18072	23007	36375
Optical Properties	96215	97380	1830	20267	20274
Sea Level	3760	4320	5641	5700	5708
Meteorological	11256	13056	11101	29685	29879
Biochemical	181789	203581	96206	97548	51733
Carbon System					2181
Dissolved Oxygen					43751
Waves	1363	1597	1158	16455	16703

[7] The unit is the number of available platforms offering the Parameter/Theme. To note that some drops in figure may be related to cleaning of duplicates or reassignment of inner parameter to a different theme, e.g. CNDC (conductivity) is now properly mapped under Salinity, Rivers (last 2 columns) were cleaned

Winds	1622	1775	1046	11381	11388
River	636	679	927	1241	1241
Underwater noise	3	3	5	5	5

As the user can see, there is a significant drop in temperature and salinity in the water column. By cleaning and synchronizing the metadata, we identified point values that were previously considered as single stations, although they belonged to the same cast. The reported value is now more accurate, as it considers a single cast (profile) as the unit for download.

Task 4. Contribute data, data products and content to a central portal that allows users to find, view and download data and data products

Task 4 goal is to improve the user experience when downloading in situ data from EMODnet Physics layers. All the necessary actions and developments are undertaken to contribute data, products, and content to the central portal, enabling users to find, view, and download data and products. Different sources are amalgamated into a single collection, which is then made accessible to the service and cataloguing layer. The service layer serves as the FAIR module, providing data and products to both internal consumers (Physics and Central Portal through the prod-env) and external consumers

As an example, when the user selects the 'in situ' layer from Physics, the central viewer displays the positions of the in-situ platforms. If the user selects a platform, the viewer loads the platform box that fetches the data from the Physics backend. These data are presented as an HTML page within the box, which is a production of EMODnet Physics. This tool was enhanced in terms of the clarity of metadata presentation and updated with a new data downloading feature that offers users data in various formats, such as netCDF, the community-standard format, in addition to the already available CSV format.

For a comprehensive list of data collections and products see WP2 and deliverables D2.01 and D2.05.

Task 5. Contributing content to dedicated spaces in Central Portal

This task involves activities aimed at assisting the Central Portal team in promoting and facilitating the centralization phase and advancing the harmonization of the EMODnet single identity. These activities encompass organizing static contents within the physics area in the emodnet.ec central space (https://emodnet.ec.europa.eu/en/physics), engaging stakeholders to present use cases (https://emodnet.ec.europa.eu/en/use-cases), and providing support for compiling the EMODnet annual reports (v.2023 has been just published[8] - June 2024)

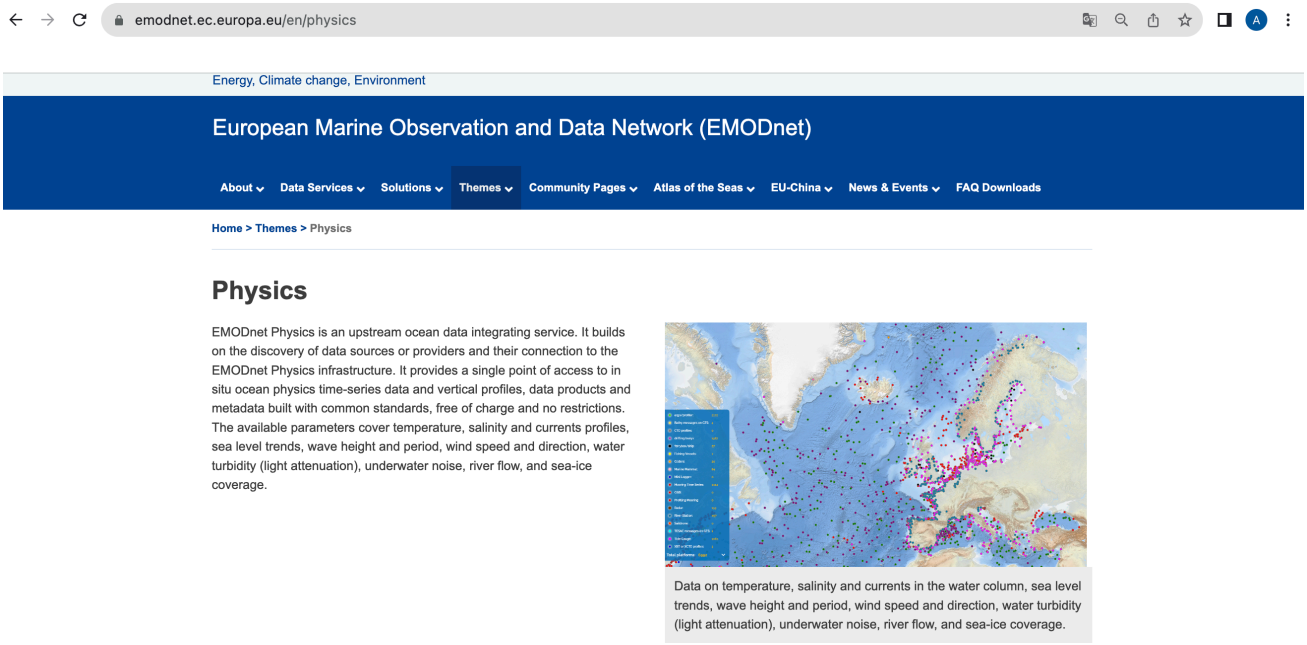

Figure 18. https://emodnet.ec.europa.eu/en/physics

[8] https://emodnet.ec.europa.eu/sites/emodnet.ec.europa.eu/files/public/reports/EMODnet_AnnualReport_Apr2024.pdf

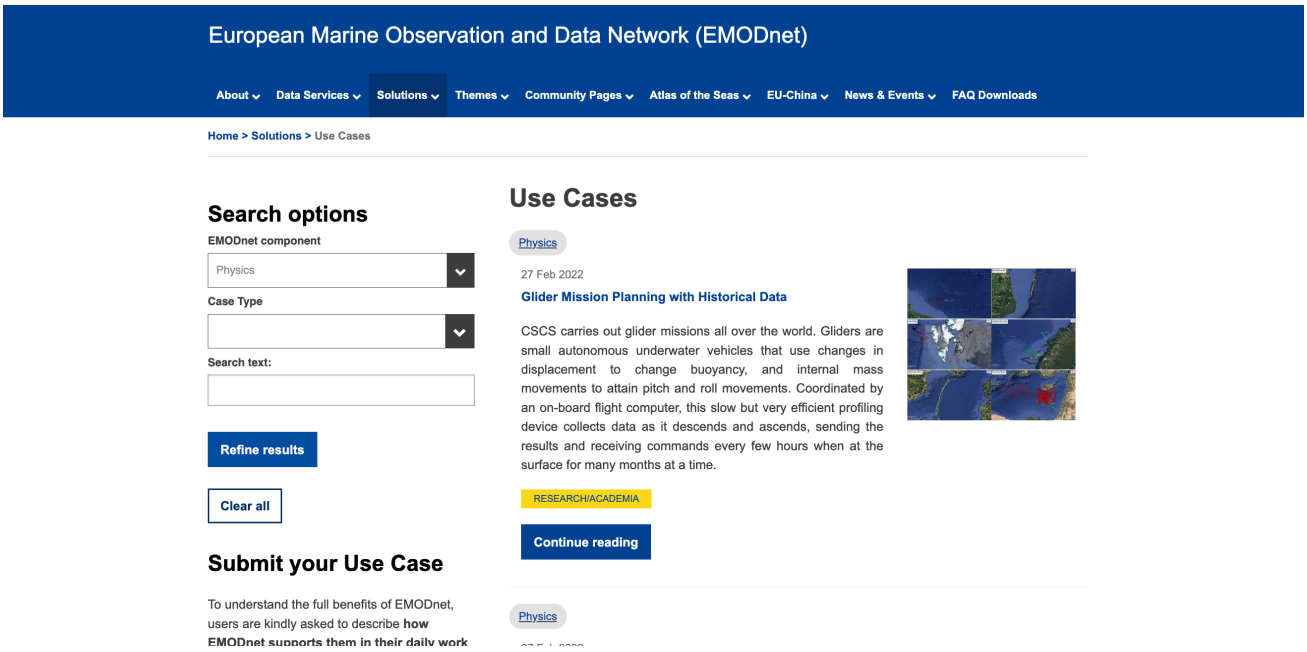

Figure 19. EMODnet Physics use cases[9]

This task also includes the maintenance of the Physics subset of the EMODnet Central catalogue. In line with the Central Portal specifications, EMODnet Physics catalogue is based on GeoNetwork that is a catalogue application to manage spatially referenced resources. It provides powerful metadata editing and search functions as well as an interactive web map viewer (https://geonetwork-opensource.org/) and, besides the other features, its metadata editor support ISO19115/119/110 standards. The maintenance includes improving the quality of the metadata in accordance and compliance with the EMODnet Central Portal GeoNetwork Catalogue needs.

[9] https://emodnet.ec.europa.eu/en/use-cases?field_portal_taxonomy_tid=28&body_value=

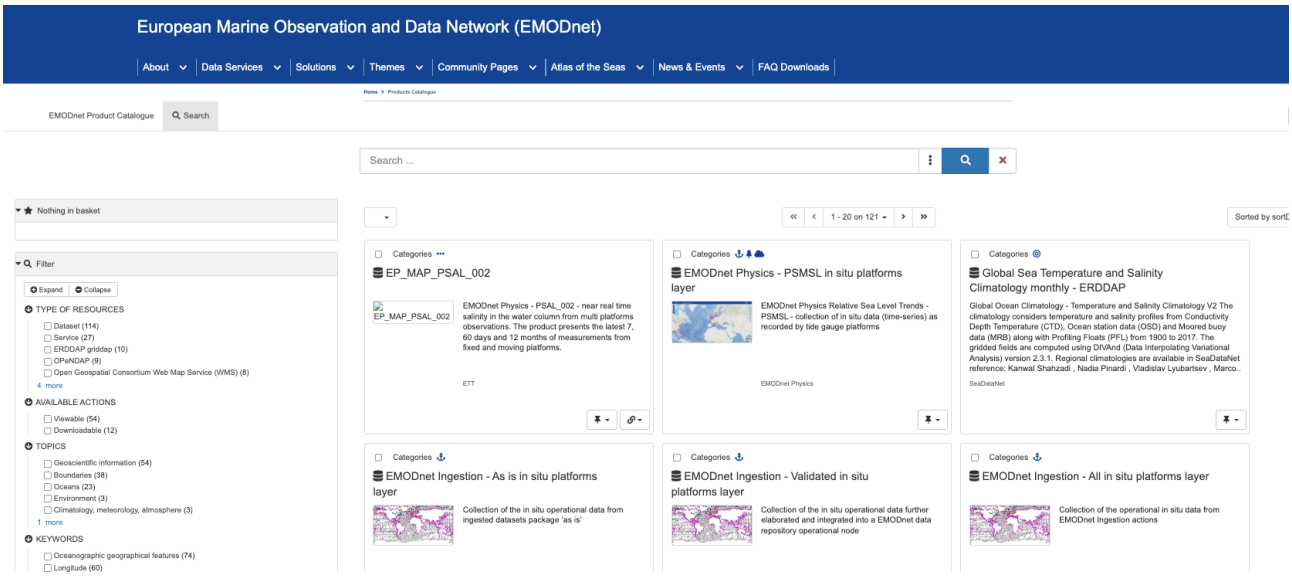

Figure 20. EMODnet Physics products in the central catalogue

Importantly, this task involves promotional and dissemination activities in joint events and meetings. EMODnet Physics is particularly active in this regard, having participated in more than 50 events. The team is actively participating to the main marine related conferences and congresses (e.g., European Geoscience Union annual conferences, International Conference on Marine Data and Information Systems, European Marine Days, Ocean Business, EuroGOOS conferences, IMDIS, etc.) and proactively contributes to the ones that are organized by EMODnet (e.g., Jamboree[10], hackathons etc.).

Task 6. Ensure the involvement of regional sea conventions

Regional Sea Conventions (RSC) are organizational structures that assist Member States (MS) in coordinating actions to address specific environmental pressures and ecosystems. Additionally, RSCs serve as advisory and stakeholder boards for guiding the implementation of the Marine Strategy Framework Directive (MSFD). EMODnet Physics has actively engaged with RSCs, with a specific focus on addressing underwater noise, which is one of the emerging areas of particular concern. This collaboration has occurred within the framework of the Technical Group TG NOISE and by supporting the advisory and stakeholder board[11] of regional MSFD projects (…). The MSFD is reaching the end of its second cycle (deadline for reporting by MS was end 2022). The third cycle is starting in 2024, with first assessment of state, definition of GES and targets (Art. 8, 9, 10).

In this context, EMODnet Physics serves as the candidate European integration endpoint for accessing in-situ data required for assessments, such as underwater noise background recordings used to establish reference values. EMODnet Physics is fully prepared to connect and incorporate these new data products into its system.

[10] https://emodnet.ec.europa.eu/en/emodnet-partner-jamboree-2023

[11] Either the EMODnet Physics coordinator or ICES or both

Moreover, the European contract (CINEA/CD(2022)5010/PP/SI2.899121), titled "Catalogue of Underwater Sound Signatures from Shallow Seas," is developing an open-access digital repository of distinctive sound signatures from the underwater soundscapes of shallow seas. A sound signature is a unique acoustic pattern that can be used to identify and distinguish a particular sound source. The outcomes of this sound signature catalogue project align with the goals of EMODnet Physics regarding underwater noise data management and the two initiatives are already collaborating to include the catalogue project outcomes into the Physics area of the Central Portal.

Task 7. Contribute to the implementation of EU legislation and broader initiatives for open data

EMODnet partners have gained significant experience in organizing and processing data into validated and aggregated collections, which are valuable for stakeholders involved in the implementation of the Marine Strategy Framework Directive (MSFD). Particularly, EMODnet Physics is addressing a notable data gap (as shown in Figure 21 from the FP7 Perseus project) related to the availability of data for Indicator 7 (Alteration of hydrographical conditions) through river data and Indicator 11 (underwater noise) – see also Task 6.

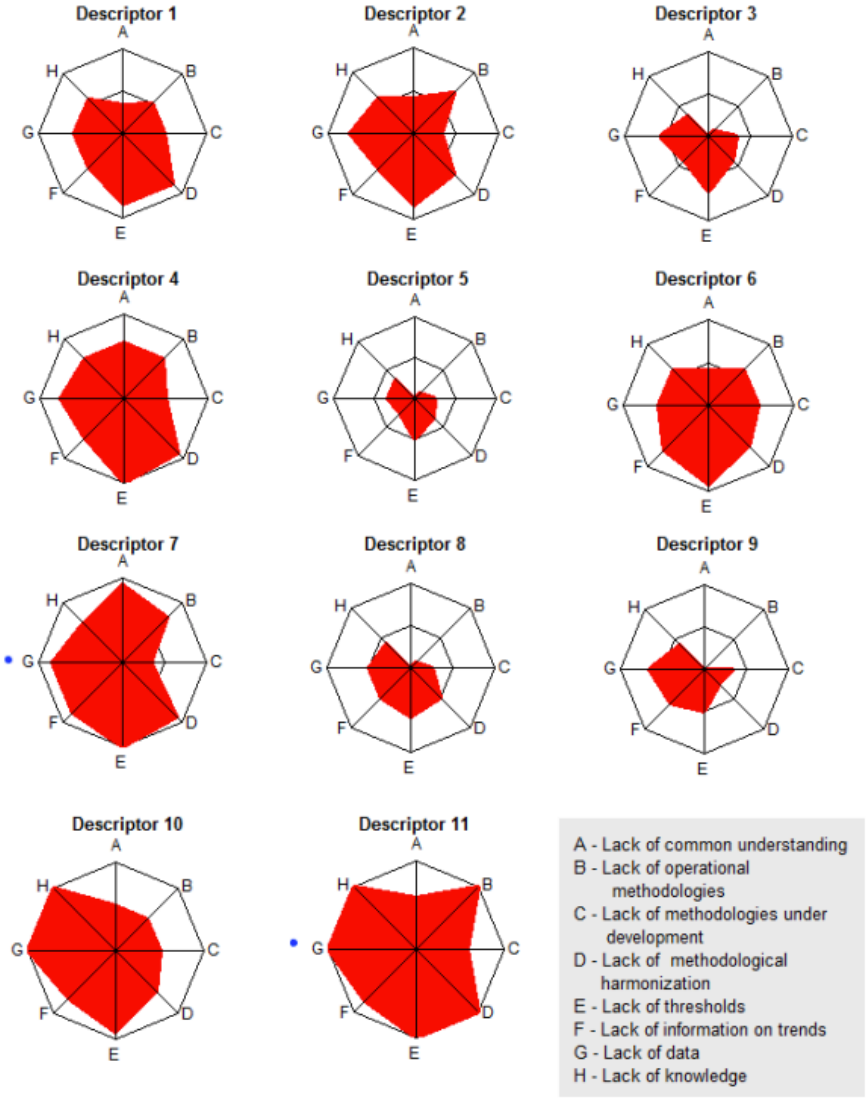

Figure 21. Gap analysis on MSFD from the Perseus project[12]

EMODnet Physics is making available useful and complementary data for many of the indicators e.g., D1 combines "climatic conditions" (i.e., temperature, salinity, ice cover, light attenuation, …) with the information of the quality and occurrence of habitats and the distribution and abundance of species[13]; D2 states that "Food web components are also subject to environmental and climate variation"; D5 identifies in rivers and runoff of rainwater one primary source for the organic nutrients responsible for the eutrophication of marine waters; D6 needs the characteristics (physical, chemical and biological) of the sea bottom to assess the sea-floor integrity; D7 is about the hydrographical conditions that are characterized by the physical

[12] http://www.perseus-net.eu/assets/media/PDF/deliverables/2840.pdf

[13] https://ec.europa.eu/environment/marine/good-environmental-status/descriptor-1/index_en.htm

parameters of seawater: temperature, salinity, depth, currents, waves, turbulence, turbidity (related to the load of suspended particulate matter).

Concerning D11 (underwater noise) the Directive defines two criteria (D11C1 for anthropogenic impulsive noise and D11C2 for anthropogenic continuous low-frequency noise) which consider the spatial distribution, temporal extent and the levels of anthropogenic noise, and the work is implemented through the Technical Group on Noise (TG-NOISE), in close collaboration with the Regional Seas Conventions (RSC). EMODnet Physics partners are involved in TG NOISE (ICES, CTN, are members and ETT is invited stakeholder) and are proactively participating in implementation of the monitoring framework and as reported in Task 6 the team is already working to include in the CP the outcomes of the CINEA/2022/OP/0019 project.

Moreover, as part of the EMODnet community, there is direct communication with GES assessment experts from DG Environment, EEA, and regional Sea Conventions (OSPAR, HELCOM, UNEP-MAP, and the Black Sea Commission). This communication occurs through regular participation in European Technical Groups (e.g., TG NOISE, …). The purpose of this activity is to engage with stakeholders, assist EU Member States in fulfilling reporting obligations (e.g., through involvement with TG-DATA, Member States Expert Group on Spatial Planning), maintain compatibility with European Open Data Portal, EOSC, Digital Earth, or other EU-wide initiatives.

This activity involves interacting with other relevant EU initiatives and parties, with a specific focus on disseminating data along coasts, aiming to establish seamless data provision between coastal land and sea. In this framework, EMODnet Physics contributes to a series of events, workshops, and documents (e.g., EuroSEA, European Marine Days, Copernicus Marine Service, EuroGOOS DataMEQ, etc.) on common standards and open-data (see Table 15 for the full list of events), as well as the promotion for open data (CC-BY).

It is worth reiterating that during the SOOS Symposium 2023, it was clearly stated that without a comprehensive understanding of the Southern Ocean, one cannot fully grasp the behavior of the Global Oceans. Therefore, the collaboration and contribution of EMODnet Physics to the SOOS community are key enabling factors. SOOS has made significant contributions to the IPCC and the latest COP26/27 reports. These SOOS reports rely on data available on the SOOSmap, whose backend is powered and maintained thanks to EMODnet Physics.

Task 8. Monitor quality/performance and deal with user feedback

Generally, the already described well level of collaboration among the different actors of data collection, validation, and integration is largely confirmed. EMODnet, and in particular EMODnet Physics, has helped shift the cultural attitude from considering "my data" to "our data." This shift in mindset, combined with the adoption of tools (standards and tools) to facilitate and enable interoperability, has contributed to making FAIRness a tangible concept.

The strong and daily collaboration with the Copernicus Marine Service IN SITU Thematic Assembly Center (MIC - marine in situ collaboration), facilitates interaction with all European and international actors, providing a

unified voice for the benefit of the two major European marine-related programs, EMODnet and Copernicus Marine (Figure 22).

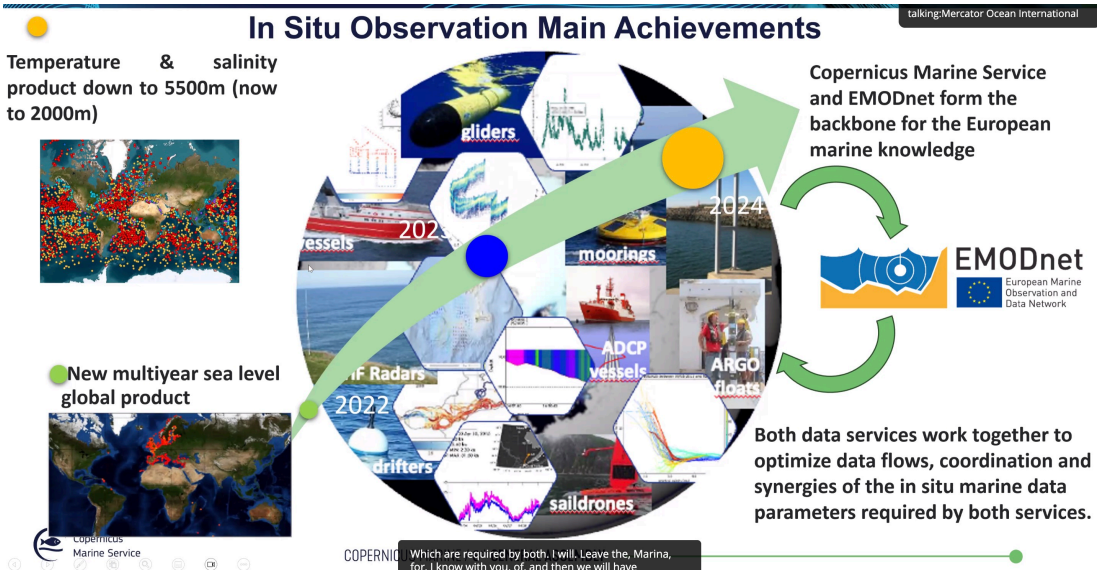

Figure 22. Silde from In Situ TAC achievements during the CMEMS GA

Moving towards more technical achievements, EMODnet Physics is making substantial contributions to refining the data management and dissemination pipeline. Being among the earliest adopters, integrators, and explorers of new technologies (such as HF radars, river data ERDDAP, Citizen Science data, and open data/tools access - Figure 23), the EMODnet Physics team is keeping gained recognition and support from the community.

Figure 23. Example of EMODnet Physics actions in international networking and data streaming/sharing

The ability to find, preview, download, and reuse data (both operational and research-based data) for scientific purposes and other applications has served a wide range of users from different sectors.

EMODnet Physics is consistently following the philosophy of making data just two clicks away from the user. This approach remains the same with the EMODnet Physics thematic area under the Central Portal. EMODnet Physics hosts very large collections (e.g., sea level, surface currents, etc.), providing users with an easy, single

platform to find the needed information. In the case of river runoff data, considering the recent collaboration and interoperability with WHOS (World Hydrological Observing System)[14], EMODnet Physics stands as the most important operational data platform offering river data (ETOOFS report 2022)[15]. Products that we value the most are the ones that are collecting a constant increase of users, namely: currents from HFR, wind, sea level, and river data. In addition, the strong cooperation and involvement of the team in thematic groups (e.g., EuroGOOS Working Groups and Task Teams) help collect stakeholders' feedback, understand needs, assess the fit-for-scope of the system, and implement corrective actions to better match the stakeholders' expectations.

EMODnet Physics also runs a service desk. Specifically, the help desk manages ticket workflows through EMODnet JIRA: when a user contacts either the Central Portal team or the thematic lot, a new ticket is created, enabling easy management and monitoring of requests. Requests are collected centrally through the Central Portal, and a JIRA ticket is recorded and passed to the thematic team. The system also facilitates internal (within the team) and external (between the team and users) communication channels, ensuring efficient and effective resolution of technical issues and feedback tailored to the user's expertise level. More specifically, once the JIRA ticket reaches the EMODnet Physics team, it follows the already implemented workflow, which includes a first level of interaction (help desk level 1). HDL1 provides the most exhaustive feedback within 24 hours. In case HDL1 cannot address the user request, a second level of expertise, HDL2, is involved in the process with the aim of providing the user with feedback as soon as possible. HDL2 involves the full partner network of experts and EMODnet Physics contributors.

[14] https://wmo.int/activities/wmo-hydrological-observing-system-whos

[15] E Alvarez Fanjul et al 2022

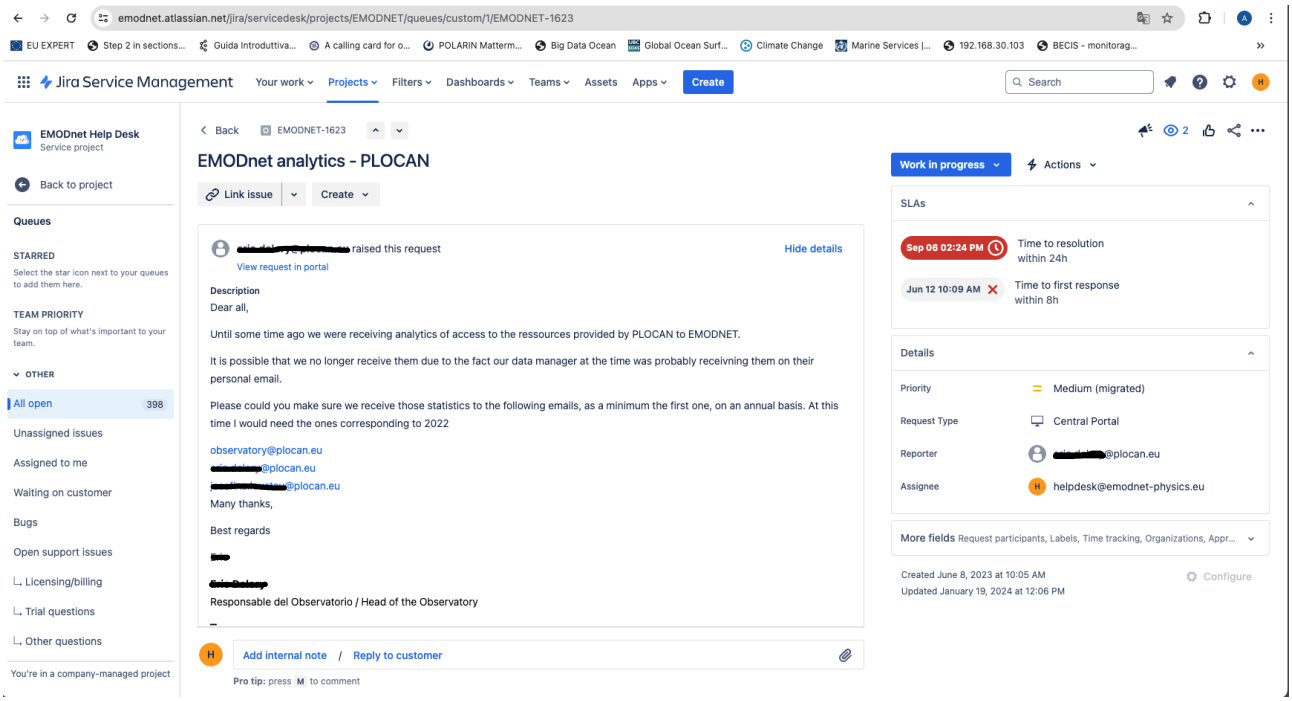

Figure 24. Example of a Central Portal to EMODnet Physics HD JIRA ticket

GDPR is applied to the management of user requests. Task 8 also monitors the status (availability) of the services, and since the entry into force of the Central Portal, it focuses on performance (https://monitor.emodnet.eu/) and users' interactions (Europa Analytics) with the Physics contents in the Central Space.

During the period there was a main down of the system due to a failure in the GeoServer serving the central portal. A new VM was promptly set up and configured, anyhow a test with multiple requests indicated that there are still some pending issues with the allocated memory. To overcome this, following the advice of the CP team, EMODnet Physics updated the memory to 32GB on both the VMs hosting ERDDAP and GeoServer.

Table 8. Milestones and Deliverables - EASME/EMFF/2020/3.1.11/Lot4/SI2.83861

Status of the Milestones and Deliverables listed in the workplan					
Milestone/Deliverable in numerical order	**WP**	**Date due**	**Status (To do/ Delivered/ Delayed)**	**Date delivered**	**If Delayed: reason for delay and expected delivery date**
D1.01: Annual assembly (Q2.2024)	WP1	31/12/2024	Delivered	27/11/2023	27th Nov 2023, back-to-back the EMODnet Jamboree
D1.02: Annual assembly (Q2.2025)	WP1	31/12/2025			
D1.03: EMODnet SC (Q4.2023)	WP1	31/12/2023	Delivered	01/12/2023	1st Dec 2023, back-to-back the EMODnet Jamboree
D1.04: Quarterly report Q3.2023	WP1	15/10/2023	Delivered	15/10/2023	
D1.05: EMODnet TWG (Q4.2023)	WP1	31/12/2023	Delivered	18/10/2023	18th Oct online
D1.06: EMODnet SC (Q1.2024)	WP1	31/12/2024	Delivered	29/04/2024	
D1.07: EMODnet TWG (Q1.2024)	WP1	31/12/2024	Delivered	13/03/2024	
D1.06.2: EMODnet SC (Q2.2024)	WP1	31/12/2024			
D1.07.2: EMODnet TWG (Q2.2024)	WP1	31/12/2024			
D1.08: EMODnet SC (Q2.2025)	WP1	31/07/2025			
D1.09: EMODnet TWG (Q2.2025)	WP1	31/07/2025			
D1.10: EMODnet event (Q4.2025)	WP1	31/07/2025			
D1.11: Quarterly report Q4.2023	WP1	15/01/2024	Delivered	15/01/2024	
D1.12: Quarterly report Q1.2024	WP1	15/04/2024	Delivered	15/04/2024	
D1.13: Quarterly report Q2.2024	WP1	15/07/2024	Delivered	15/07/2024	
D1.14: Quarterly report Q3.2024	WP1	15/10/2024			
D1.15: Quarterly report Q4.2024	WP1	15/01/2025			
D1.16: Quarterly report Q1.2025	WP1	15/04/2025			

Status of the Milestones and Deliverables listed in the workplan					
Milestone/Deliverable in numerical order	**WP**	**Date due**	**Status (To do/ Delivered/ Delayed)**	**Date delivered**	**If Delayed: reason for delay and expected delivery date**
D1.17: Quarterly report Q2.2025	WP1	15/07/2025			
D1.18: Annual progress report	WP1	23/08/2024	This report	20/08/2024	
D1.19: Final progress report	WP1	22/08/2025			
D1.20: Handover note	WP1	22/08/2025			
D1.21: Guideline on data ingestion procedures for new real time and near real time streams v.2024	WP1	23/08/2024	Annex to this report	20/08/2024	
D1.22: Guideline on data ingestion procedures for new real time and near real time streams v.2025	WP1	22/08/2025			
D1.23: Contribution to central space with background information and EMODnet Physics contents, Contribution to the EMODnet Annual report	WP1	22/08/2025			
D1.24: TGs - RSCs events attendance	WP2	22/08/2025			
D2.01: Data sources gap analysis v.2024	WP2	22/08/2024	Annex to this report	20/08/2024	
D2.02: Data sources gap analysis v.2025	WP2	22/08/2025			
D2.03: EMODnet Physics data management including metadata and metadata governance v.2024	WP2	22/08/2024	Annex to this report	20/08/2024	
D2.04: EMODnet Physics data management including metadata and metadata governance v.2025	WP2	22/08/2025			
D2.05: EMODnet Physics List of products v.2024	WP2	22/08/2024	Annex to this report	20/08/2024	
D2.06: EMODnet Physics List of products v.2025	WP2	22/08/2025			
D3.01: Tools and methods to implement interoperability v.2024	WP3	22/08/2024	Annex to this report	20/08/2024	

Status of the Milestones and Deliverables listed in the workplan					
Milestone/Deliverable in numerical order	**WP**	**Date due**	**Status (To do/ Delivered/ Delayed)**	**Date delivered**	**If Delayed: reason for delay and expected delivery date**
D3.02: Tools and methods to implement interoperability v.2025	WP3	22/08/2025			
D3.03: Maintenance and update of the back-end services and infrastructure	WP3	-			This activity is continuous and special actions or issues (if any) will be reported in the quarterly reports.

3. Work Package updates

WP1 – Project management, monitoring and reporting

Covering Task(s): task 5, task 6, task 8

WP1 is organized into 9 sub-tasks and includes 23 deliverables. It is designed to manage and coordinate all project activities, ensuring timely delivery and high-quality results and products. This involves convening project meetings, delivering reports, participating in EMODnet Steering committee and EMODnet Technical Working group meetings, and attending other EMODnet-related events organized by the Contracting Authority and the EMODnet Secretariat. Task 5 involves contributing content to dedicated spaces in the Central Portal, which has been promptly delivered, and the EMODnet Physics team is prepared to transition to the central system. Management activities also involve ensuring the involvement of regional sea conventions (task 6). Regional Sea Conventions (RSC) are structures that support Member States (MS) in coordinating actions on certain pressures and ecosystems. RSCs also serve as advisory/stakeholder boards for the Marine Strategy groups responsible for implementing the Marine Strategy Framework Directive (MSFD). Partners ICES and CTN actively support RCS in implementing tools for EU legislation, such as the recent change in the ICES Impulsive Noise data reporting format[16] his has been agreed upon by HELCOM and is currently in the process of being agreed upon by OSPAR. In addition to offering access to data and products that are essential for RSC assessments, the EMODnet Physics team partners actively participated and contributed to TGNOIS. Ensuring monitoring quality and performance and addressing user feedback (task 8) is an ongoing activity. This involves proactive participation in various international groups, advisory boards, and techno-scientific and educational events, including EuroGOOS Task Teams, Southern Ocean Observing System Data Management Steering Committee, Deep Ocean Observing System Data Management Working Group, SeaDataNet Technical Working Group, as well as projects like MyCoast and QuietSeas (see Table 15) to continue dedicating effort to consolidate and expand the gateways to national, regional, and thematic data repositories.

To better serve the increasing number of stakeholders and user communities, WP1 organized internal thematic working groups to provide more focused services for thematic communities. The active groups are River (ETT, OGS, CoLAB+), Sea Level (CMCC, IFREMER, ETT), Water Currents (AZTI, IFREMER), Temperature and salinity in the water column (IFREMER, CISC-BEC, ETT), Underwater noise (ICES, CTN, ETT), Wave and Wind (IFREMER, ETT). Further to this EMODnet Physics keeps collaborating and supporting key groups and project to facilitate new data to flow into the infrastructure. Some examples are SOOS (Southern Ocean Observing System) community, H2020 SOCHIC[17] project, European Polar Initiatives[18], HE OCEAN:ICE[19] project, the Italian Arctic Data Center. Central to these interactions is the collaboration with EMODnet Ingestion. Importantly,

[16] https://www.ices.dk/data/Documents/NoiseRegistry/NoiseRegister.zip

[17] http://www.sochic-h2020.eu/

[18] https://polar-data-forum.org/wp-content/uploads/2021/10/Book-Of-Abstracts_Final.pdf

19 https://ocean-ice.eu

WP1 also covers activities related to the Marine In-situ Collaboration Technical Working Group (MIC TWG) - see task 1.

WP2 – Data Access and Data Products

Covering Task(s): task 1, task 2, task 7

WP2 is organized in 5 sub tasks and 6 deliverables.

WP2 deals with the core data management activities in EMODnet Physics. WP2 runs the operational activities to maintain and update data collections. It also supports the identification of new potential sources. To engage and facilitate ingestion, EMODnet Physics (and Ingestion) provide guidance (Deliverable D1.21, Deliverable D2.03) and tools (e.g., ERDDAP Docker)[20] for preferred data and metadata formats. WP2 is dedicated to maintaining and improving a common method of accessing data held in repositories (task 1), as well as adding new data sources beyond European borders and creating products that offer users information about the distribution and quality of parameters in time and space (task 2). WP2 also contributes to the implementation of EU legislation and broader initiatives for open data (task 7), such as INSPIRE, MSFD, the European Open Data Portal, and Digital Earth.

WP2.1 Expanding data in time and space

A continuous action is to identify additional data sources that can contribute to the EMODnet Physics parameter portfolio, including sources like Argo, profiling floats, gliders, radar, CTD from ships, river flow, underwater noise, etc. This is done in collaboration with European programs and projects (such as Copernicus Marine Service INSTAC, SeaDataNet NODCs infrastructures, ICES, EMODnet Data Ingestion, etc.) and non-EU countries and initiatives. Once a source is identified, an ingestion workflow (see Task 1) moves the data through two ingestion phases: making the data available "as is" on EMODnet Physics and including the data into a wider harmonized data collection.

WP2.2 Common methods for ocean data management

EMODnet Physics provides data on changes in sea-level, horizontal velocity of the water column, ice cover, inflow from rivers, salinity of the water column, underwater sound (noise), temperature of the water column, water clarity (light attenuation), wave height and period, and wind speed and direction. These data are collected by a wide variety of fixed and mobile platforms, which can deliver and make data available through various tools and services. EMODnet Physics, as an integrator and broadcaster of federated sources, organizes this data into collections with links to the original sources. Another goal of this activity is to continue collaborating with network platform operators to improve and harmonize standards and data flow schemes, establishing common nodes that can be linked to EMODnet Physics to make data available. An example of this specific action is the collaboration with the PANGAEA technical team and initiatives related to citizen science data that are largely expanding the EMODnet Physics portfolio. Another example is the data exchange

[20] https://github.com/EMODnet-Physics/docker-erddap-install

established with the MOANA project[21] (New Zealand) after the attendance to the SOOS Symposium 2023 and thanks to the EMODnet Physics support to MOANA team to deploy an ERDDAP instance that was then federated to EMODnet Physics.

Figure 25. PANGAEA CTDs in EMODnet Physics

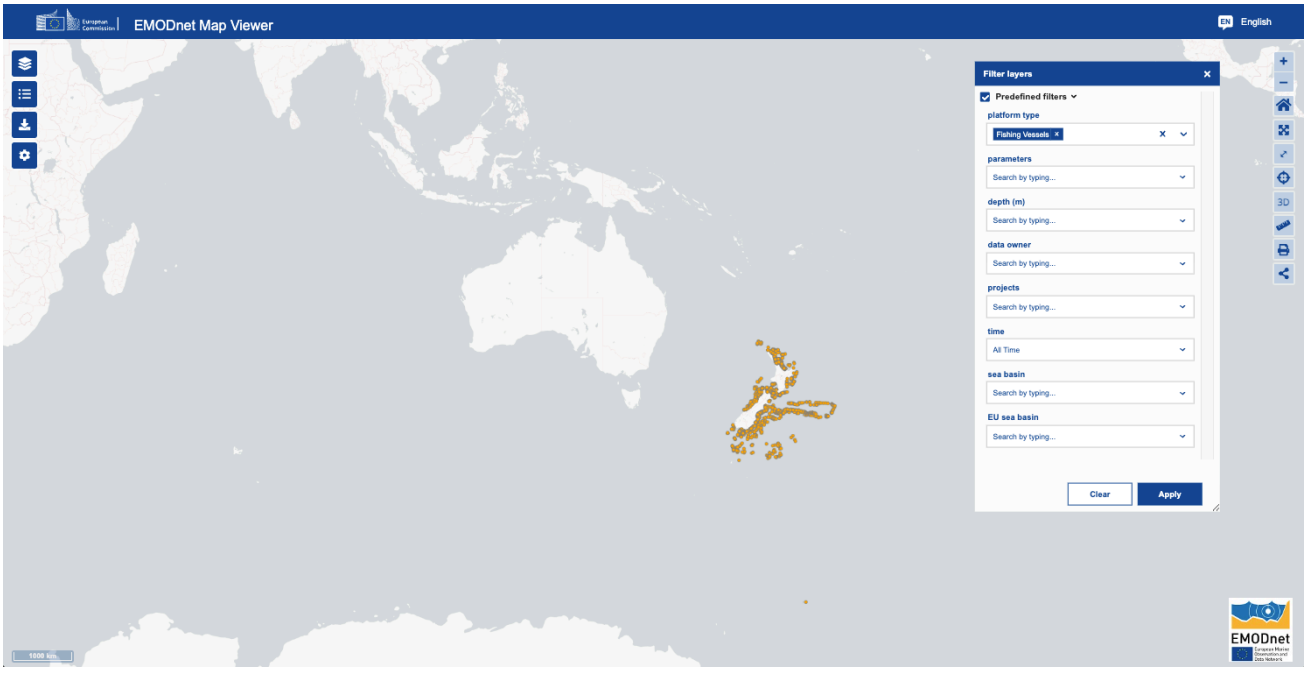

Figure 26. MOANA (Fishing vessels) data in EMODnet Physics

[21] https://www.moanaproject.org/

WP2.3. information about the distribution of parameters in time and space

Metadata provides detailed information about the availability and geographical extent of marine data, including descriptions of individual data sets and measurements with key fields such as what, where, when, how, and who. Metadata for data produced within the Copernicus Marine Service INSTAC and SeaDataNet NODCs adhere to ISO 19115 and ISO 19139 requirements. OceanOPS also maintains information on relevant data requirements for observations in support of GOOS, GCOS, and the World Weather Watch of WMO. There is a collaborative effort among European Marine Data Infrastructures to support new stakeholders and improve metadata tracking and information management.

Moreover, to implement better data-collection management, EMODnet Physics developed the P33 controlled vocabulary (hosted at BODC NVS).

P33 label	P33 code	VARIABLE NAME	P01	P02	P06	P07	P09	STANDARD_NAME	LONG NAME
Biogeochemical	BIOGEOCHEMICAL	AMON	AMONZZXX	AMON	UPOX	CFSN0802	AMON	mole_concentration_of_ammonium_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	BCCW	TBCCXXXX	BNTX	UCML		BCCW		number of bacteria cells in sea water
Biogeochemical	BIOGEOCHEMICAL	CHLT	CHLTVOLU	CPWC	UMMC	CF12S21	CHLT	mass_concentration_of_chlorophyll_in_sea_water	total chlorophyll
Biogeochemical	BIOGEOCHEMICAL	CPHL	CPHLZZXX	CPWC	UMMC	CF12S21	CPH1;CPHL	mass_concentration_of_chlorophyll_a_in_sea_water	total chlorophyll-a
Biogeochemical	BIOGEOCHEMICAL	FLU2	CPHLPM01	CPWC	UMMC		FLU2	mass_concentration_of_chlorophyll_a_fluorescence_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	FLU3	FLUOZZZZ	FVLT	UUUU		FLU3		
Biogeochemical	BIOGEOCHEMICAL	FLUO	FLUOZZZZ	FVLT	UUUU		FLUO		
Biogeochemical	BIOGEOCHEMICAL	NGDW	DINXZZZZ	TDIN	UPOX		TINW		Dissolved nitrogen
Biogeochemical	BIOGEOCHEMICAL	NODW	MDMAP008	TDNT	KGUM		NODW		Dissolved organic nitrogen
Biogeochemical	BIOGEOCHEMICAL	NTAW	MDMAP005	NTRA	KGUM	CFSN0515	NTAW	moles_of_nitrate_per_unit_mass_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	NTIW	MDMAP007	NTRI	KGUM	CFSN0516	NTIW	moles_of_nitrite_per_unit_mass_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	NTRA	NTRAZZXX	NTRA	UPOX	CFSN0806	NTRA	mole_concentration_of_nitrate_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	NTRI	NTRIZZXX	NTRI	UPOX	DDAEDBBI	NTRI	mole_concentration_of_nitrite_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	NTRZ	NTRZZZXX	NTRA	UPOX	DABDADJB	NTRZ	mole_concentration_of_nitrate_and_nitrite_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	PH25	PHTLSX25	ALKY	UUPH				
Biogeochemical	BIOGEOCHEMICAL	PHOS	PHOSZZXX	PHOS	UPOX	CF12N502	PHOS	mole_concentration_of_phosphate_in_sea_water	

P33 label	P33 code	VARIABLE NAME	P01	P02	P06	P07	P09	STANDARD_NAME	LONG NAME
Biogeochemical	BIOGEOCHEMICAL	PHOW	MDMAP007	NTRI	KGUM	CFSN0518	NTIW	moles_of_phosphate_per_unit_mass_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	PHYC	PHYCSPP4	PHYC	UNGL				
Biogeochemical	BIOGEOCHEMICAL	SLCA	SLCAZZXX	SLCA	UPOX	CFSN0810	SLCA	mole_concentration_of_silicate_in_sea_water	
Biogeochemical	BIOGEOCHEMICAL	SLCW	MDMAP012	SLCA	KGUM	CFSN0519	SLCW	moles_of_silicate_per_unit_mass_in_sea_water	
Carbon System	CARBONSYSTEM	ALKW	MDMAP014	ALKY	KGUM		ALKW	sea_water_alkalinity_per_unit_mass	Total alkalinity
Carbon System	CARBONSYSTEM	ALKY	ALKYZZXX	ALKY	UEQL	TZPEWAT3	ALKY	sea_water_alkalinity_expressed_as_mole_equivalent	Total alkalinity
Carbon System	CARBONSYSTEM	FCO2	FCO2XXXX	PCO2	UATM	S5KQHZRB	FCO2	fugacity_of_carbon_dioxide_in_sea_water	
Carbon System	CARBONSYSTEM	PCO2	PCO2XXXX	PCO2	UATM	CFSN0244	PCO2	surface_partial_pressure_of_carbon_dioxide_in_sea_water	
Carbon System	CARBONSYSTEM	PHPH	PHXXZZXX	ALKY	UUPH	CF14N56	PHPH	sea_water_ph_reported_on_total_scale	
Carbon System	CARBONSYSTEM	CORW						Dissolved organic carbon	
Carbon System	CARBONSYSTEM	TICW						Dissolved inorganic carbon	
Currents	CURRENTS	DRVA	LCDAWVRD	RFVL	UABB	CFV13N5	DRVA	direction_of_radial_vector_away_from_instrument	
Currents	CURRENTS	EWCT	LCEWZZ01	RFVL	UVBB	CFSN0650	EWCT	eastward_sea_water_velocity	
Currents	CURRENTS	HCDT	LCDAZZ01	RFVL	UABB	CFSN0727	HCDT	direction_of_sea_water_velocity	
Currents	CURRENTS	HCSP	LCSAZZ01	RFVL	UVBB	CFSN0334	HCSP	sea_water_speed	
Currents	CURRENTS	LRZA	LRZAZZZZ	LRZA	UVBB	CFSN0080	UVCT;VCSP	upward_sea_water_velocity	
Currents	CURRENTS	NSCT	LCNSZZ01	RFVL	UVBB	CFSN0494	NSCT	northward_sea_water_velocity	

P33 label	P33 code	VARIABLE NAME	P01	P02	P06	P07	P09	STANDARD_NAME	LONG NAME
Currents	CURRENTS	RDVA	LCSAWVRD	RFVL	UVBB	CFV13N15	RDVA	radial_sea_water_velocity_away_from_instrument	
Currents	CURRENTS	VCSP	LRZAZZZZ	LRZA	UVBB	CFSN0080	UVCT;VCSP	upward_sea_water_velocity	
Dissolved Oxygen	DISSOLVEDOXYGEN	DOX1	DOXYZZXX	DOXY	UPOX	CF12N801	DOXY;DOX1	volume_fraction_of_oxygen_in_sea_water	
Dissolved Oxygen	DISSOLVEDOXYGEN	DOX2	DOXMZZXX	DOXY	KGUM	CFSN0517	DOX2	moles_of_oxygen_per_unit_mass_in_sea_water	
Dissolved Oxygen	DISSOLVEDOXYGEN	DOXY	DOXYZZXX	DOXY	UPOX	CF14N29	DOXY;DOX1	mole_concentration_of_dissolved_molecular_oxygen_in_sea_water	
Dissolved Oxygen	DISSOLVEDOXYGEN	OSAT	OXYSZZ01	DOXY	UPCT	CFSN0623	OSAT	fractional_saturation_of_oxygen_in_sea_water	
Meteorological	METEOROLOGICAL	DEWT	CDEWZZ01	CHUM	UPAA	CFSN0723	DEWT	dew_point_temperature	
Meteorological	METEOROLOGICAL	ATMP	CAPHZZ01	CAPH	UPBB	CFSN0015	ATMP	air_pressure	atmospheric pressure at altitude
Meteorological	METEOROLOGICAL	ATMS	CAPAZZ01	CAPH	UPBB	Q9ZYSAOC	ATMS	air_pressure_at_sea_level	atmospheric pressure at sea level
Meteorological	METEOROLOGICAL	ATPT	APRESSTN	CAPH	HPAH	CFSN0201	ATPT	tendency_of_air_pressure	atmospheric pressure hourly tendency
Meteorological	METEOROLOGICAL	DRYT	CTMPZZ01	CDTA	UPAA	CFSN0023	DRYT	air_temperature	air temperature in dry bulb
Meteorological	METEOROLOGICAL	HOURLY_RAIN	CPRRRG01	CPRP	UMMM	CFSN0410	PRRT	rainfall_rate	
Meteorological	METEOROLOGICAL	NRAD	NTLRDZ01	LWRD	UFAA	CFSN0830	NRAD	surface_net_downward_radiative_flux	Net total incoming radiation
Meteorological	METEOROLOGICAL	PRRD	CPRRRG01	CPRP	UMMM	CFSN0559	PRRD;PRRT	lwe_precipitation_rate	Daily precipitation rate (liquid water equivalent)
Meteorological	METEOROLOGICAL	PRRT	CPRRRG01	CPRP	UMMM	CFSN0559	PRRD;PRRT	lwe_precipitation_rate	Hourly precipitation rate (liquid water equivalent)
Meteorological	METEOROLOGICAL	RELH	CRELZZ01	CHUM	UPCT	CFSN0413	RELH	relative_humidity	relative humidity

P33 label	P33 code	VARIABLE NAME	P01	P02	P06	P07	P09	STANDARD_NAME	LONG NAME
Meteorological	METEOROLOGICAL	SINC	CSLRZZXX	CSLR	UFAA	CFSN0275	SINC	surface_downwelling_shortwave_flux_in_air	Shortwave/solar incoming radiation
Meteorological	METEOROLOGICAL	WETT	CWETZZ01	CHUM	UPAA	CFSN0035	WETT	wet_bulb_temperature	Air temperature in wet bulb
Optical Properties	OPTICAL	CDOM	FLUOCDOM	HMSB	UUUU	6OP5LKSX	CDOM	concentration_of_colored_dissolved_organic_matter_in_sea_water_expressed_as_equivalent_mass_fraction_of_quinine_sulfate_dihydrate	
Optical Properties	OPTICAL	BACKSCATTERING							Light backscattering
Optical Properties	OPTICAL	BATH	MBANZZZZ	MBAN	ULAA	CFV13N17	BATH	sea_floor_depth_below_sea_surface	Bathymetric depth
Optical Properties	OPTICAL	LGH4	PARERXSD	VSRA	UMES	CFSN0284		surface_downwelling_photosynthetic_photon_flux_in_air	Surface incoming photosynthetic active radiation
Optical Properties	OPTICAL	LGHT	PARERXUD	VSRW	UMES	CFSN0676	LGHT	downwelling_photosynthetic_photon_flux_in_sea_water	Immerged incoming photosynthetic active radiation
Optical Properties	OPTICAL	LINC	LWRDZZ01	LWRD	UFAA	CFSN0279	LINC	surface_downwelling_longwave_flux_in_air	Longwave/atmospheric incoming radiation
Optical Properties	OPTICAL	RDIN	TLRDZZ01	LWRD	UFAA	CFSN0274	RDIN	surface_downwelling_radiative_flux_in_sea_water	Total incoming radiation
Optical Properties	OPTICAL	SCATTERING							Light scattering
Optical Properties	OPTICAL	TSMP	TSEDZZZZ	TSED	UMGL	CF12S23	TSMP	mass_concentration_of_suspended_matter_in_sea_water	
Optical Properties	OPTICAL	TUR2	ATTNZZ01	ATTN	UPRM		TUR2		light attenuation coefficient
Optical Properties	OPTICAL	TUR3	POPTZZ01	ATTN	UPCT		TUR3		light transmission
Optical Properties	OPTICAL	TUR4	TURBXXXX	TSED	USTU	7B3X6L2J	TUR6;TUR4;TUR5	sea_water_turbidity	turbidity
Optical Properties	OPTICAL	TUR6	TURBXXXX	TSED	USTU	7B3X6L2J	TUR6;TUR4;TUR5	sea_water_turbidity	Turbidity of water in the water body
Optical Properties	OPTICAL	TURMGL		TSED				sea_water_turbidity	turbidity

P33 label	P33 code	VARIABLE NAME	P01	P02	P06	P07	P09	STANDARD_NAME	LONG NAME
River	RIVER	RVFL	RFDSCH01	RVDS	CMPS	CFV10S3	RVFL	water_volume_transport_into_sea_water_from_rivers	river flow rate
Water Salinity and conductivity	WATERSALINITY	CNDC	CNDCZZ01	CNDC	UECA	CFSN0394	CNDC	sea_water_electrical_conductivity	
Water Salinity and conductivity	WATERSALINITY	DENS	SIGTEQ01	SIGT	UKMC	CFSN0333	DENS	sea_water_sigma_theta	
Water Salinity and conductivity	WATERSALINITY	PSAL	PSLTZZ01	PSAL	UUUU	CFSN0331	PSAL	sea_water_salinity	
Water Salinity and conductivity	WATERSALINITY	SVEL	SVELXXXX	SVEL	UVAA	CFSN0316	SVEL	speed_of_sound_in_sea_water	
Water Salinity and conductivity	WATERSALINITY	TEMP_DOXY	OXYTAAOP		UPAA	CFSN0199		temperature_of_sensor_for_oxygen_in_sea_water	
Water Salinity and conductivity	WATERSALINITY	ASAL		PSAL				sea_water_absolute_salinity	
Water Salinity and conductivity	WATERSALINITY	SIGMA_THETA	SIGTPR01					sea_water_sigma_theta	sea sigma-theta
Sea Ice	SEAICE								
Sea Level	SEALEVEL	ALTS	AHGTZZ01	AHGT	ULAA	8BFOBHU2	ALTS	height_above_mean_sea_level	Height above mean sea level
Sea Level	SEALEVEL	SLEV	ASLVZZ01	ASLV	ULAA	CF15N1	SLEV	water_surface_height_above_reference_datum	
Sea Level	SEALEVEL	SLVR	ASLVR101	ASLV	ULAA	CFV10N41	SLVR	sea_surface_height_correction_due_to_air_pressure_and_wind_at_high_frequency	residual sea level (observed - predicted)
Sea Level	SEALEVEL	WLEV	AHRVGRS1					instantaneous_water_level	Observed Instantaneous Water Level
Underwater Sound	UNDERWATERSOUND	SPL				CFSN0310		sound_pressure_level_in_water	Sound Pressure Level (20s integration time)
Underwater Sound	UNDERWATERSOUND	SPL125				CFSN0310		sound_pressure_level_in_water	Sound Pressure Level at 125Hz (20s integration time)
Underwater Sound	UNDERWATERSOUND	SPL2k				CFSN0310		sound_pressure_level_in_water	Sound Pressure Level at 2kHz (20s integration time)

P33 label	P33 code	VARIABLE NAME	P01	P02	P06	P07	P09	STANDARD_NAME	LONG NAME
Underwater Sound	UNDERWATERSOUND	SPL63				CFSN0310		sound_pressure_level_in_water	Sound Pressure Level at 63Hz (20s integration time)
Water Temperature	WATERTEMPERATURE	SSJT	TEMPSG01	TEMP	UPAA	CFSN0335	TEMP	sea_water_temperature	
Water Temperature	WATERTEMPERATURE	TEMP	TEMPPR01	TEMP	UPAA	CFSN0335	TEMP	sea_water_temperature	
Water Temperature	WATERTEMPERATURE	POTENTIAL_TEMP		TEMP				sea_water_potential_temperature	sea potential temperature
Waves	WAVES	GWDR	GWDRZZ01	GWDR	UABB	CFSN0384	VDIR	sea_surface_wave_from_direction	
Waves	WAVES	STHETA1				P9IY6NIQ		sea_surface_wave_directional_spread	
Waves	WAVES	STHETA2				P9IY6NIQ		sea_surface_wave_directional_spread	
Waves	WAVES	SWDR	GDSWZZ01	GWDR	UABB	CFSN0379	SWDR	sea_surface_swell_wave_to_direction	
Waves	WAVES	SWHT	GHSWZZ01	WVST	ULAA		SWHT		
Waves	WAVES	SWPR	GSZZXXXX	WVST	UTBB		SWPR		
Waves	WAVES	THETA1						sea_surface_wave_from_direction	
Waves	WAVES	THETA2						sea_surface_wave_from_direction	
Waves	WAVES	VAVH	GAVHZZ01	WVST	ULAA	CFSN0385	VAVH	sea_surface_wave_significant_height	
Waves	WAVES	VAVT	GTZHZZ01	WVST	UTBB	HEKWBIH1	VAVT	sea_surface_wave_significant_period	
Waves	WAVES	VCMX	GCMXZZ01	WVST	ULAA	JNQS0CMX	VCMX	sea_surface_wave_maximum_height	
Waves	WAVES	VDIR	GWDRZZ01	GWDR	UABB	CFSN0384	VDIR	sea_surface_wave_from_direction	
Waves	WAVES	VEMH	GCMXVS01	HEAV	ULAA	JNQS0CMX	VEMH	sea_surface_wave_maximum_height	Estimated maximum wave height
Waves	WAVES	VEPK	GEPKZZ01	WVSP	UMHZ	5Q0EA19T	VEPK	sea_surface_wave_energy_at_variance_spectral_density_maximum	
Waves	WAVES	VGHS	GTDHZZ01	WVST	ULAA	CFSN0385	VGHS	sea_surface_wave_significant_height	
Waves	WAVES	VGTA	GTAMZZ01	WVST	UTBB	SUM7H3HM	VGTA	sea_surface_wave_mean_period	

P33 label	P33 code	VARIABLE NAME	P01	P02	P06	P07	P09	STANDARD_NAME	LONG NAME
Waves	WAVES	VH110	GTDTZZ01	WVST	ULAA	WVROIAKU		sea_surface_wave_mean_height_of_highest_tenth	
Waves	WAVES	VHM0	HMZEZZ01	WVST	ULAA	CFSN0385	VHM0	sea_surface_wave_significant_height	
Waves	WAVES	VHZA	HZAVZZ01	WVST	ULAA	IRPTM00V	VHZA	sea_surface_wave_mean_height	
Waves	WAVES	VMDR	GMWDZZ01	GWDR	UABB	CFSN0384	VMDR	sea_surface_wave_from_direction	
Waves	WAVES	VMNL	GMNLZZ01	WVST	ULAA	IWJNFWBF	VMNL	sea_surface_wave_maximum_trough_depth	
Waves	WAVES	VMXL	GMXLZZ01	WVST	ULAA	UFJCG1TB	VMXL	sea_surface_wave_maximum_crest_height	
Waves	WAVES	VPED	GPEDZZ01	GWDR	UABB	I8P5MQ0F	VPED	sea_surface_wave_from_direction_at_variance_spectral_density_maximum	
Waves	WAVES	VPSP	GSPRZZ01	GWDR	UAAA	X37RPE7M	VPSP	sea_surface_wave_directional_spread_at_variance_spectral_density_maximum	
Waves	WAVES	VSMC	GTZAMAZ2	WVST	UTBB		VSMC		
Waves	WAVES	VSPEC1D						sea_surface_wave_variance_spectral_density	
Waves	WAVES	VST1	WVSTZZ01	WVST	UUUU	RJVTH20O	VST1	sea_surface_wave_maximum_steepness	
Waves	WAVES	VT110	GTZHTN01	WVST	UTBB	N532TGCF		sea_surface_wave_mean_period_of_highest_tenth	
Waves	WAVES	VTDH	HSTKDP01	WVST	ULAA	CFSN0385	VTDH	sea_surface_wave_significant_height	
Waves	WAVES	VTM02	GTZAM2ZZ	WVST	UTBB	CFV8N75		sea_surface_wave_mean_period_from_variance_spectral_density_second_frequency_moment	
Waves	WAVES	VTM10	GTZAMIZZ	WVST	UTBB	CFV8N74		sea_surface_wave_mean_period_from	

P33 label	P33 code	VARIABLE NAME	P01	P02	P06	P07	P09	STANDARD_NAME	LONG NAME
								_variance_spectral_density_inverse_frequency_moment	
Waves	WAVES	VTMX	GTZMZZ01	WVST	UTBB	E41IV2XW	VTMX	sea_surface_wave_maximum_period	
Waves	WAVES	VTPK	GTPKZZ01	WVST	UTBB	CFV13N31	VTPK	sea_surface_wave_period_at_variance_spectral_density_maximum	
Waves	WAVES	VTZA	GTZAZZ01	WVST	UTBB	SUM7H3HM	VTZA	sea_surface_wave_mean_period	
Waves	WAVES	VTZM	GTHMXX01	WVST	UTBB	OCVYVB2M	VTZM	sea_surface_wave_period_of_highest_wave	
Waves	WAVES	VZMX	GZMXZZ01	WVST	ULAA	JNQS0CMX	VZMX	sea_surface_wave_maximum_height	Maximum zero crossing wave height (Hmax)
Winds	WINDS	GDIR	EGTDZZ01	EWSB	UABB	LIZMDSCX	GDIR	wind_gust_from_direction	
Winds	WINDS	GSPD	EGTSZZ01	EWSB	UVAA	CFSN0039	GSPD	wind_speed_of_gust	
Winds	WINDS	WBFO	WMOCWFBF	EWSB	UUUU	CFV7N45	WBFO	beaufort_wind_force	
Winds	WINDS	WDIR	EWDAZZ01	EWSB	UABB	CFSN0036	WDIR	wind_from_direction	
Winds	WINDS	WSPD	EWSBZZ01	EWSB	UVAA	CFSN0038	WSPD	wind_speed	
Winds	WINDS	WSPE	ESEWZZXX	EWSB	UVAA	CFSN0653	WSPE	eastward_wind	
Winds	WINDS	EWSB		EWSB				wind strength and direction	
Winds	WINDS	WTODIR		EWSB				wind_to_direction	wind to direction relative true north
Winds	WINDS	WSPN	ESNSZZXX	EWSB	UVAA	CFSN0461	WSPN	northward_wind	

WP2.4. Contribute to the implementation of EU legislation and broader initiatives for open data

The EMODnet community maintains open and direct communication with GES assessment experts from DG Environment, EEA, and regional Sea Conventions (OSPAR, HELCOM, UNEP-MAP, and the Black Sea Commission). This communication occurs through regular participation in European TGs, particularly in the TG NOISE. EMODnet Physics continues to update its products to support EU legislation and maintains collaborations with other relevant EU initiatives and organizations, with a particular focus on open data and interoperability (as also detailed in WP3).

Moreover, as largely reported EMODnet Physics contributes to several international initiatives on open standards and open data.

WP2.5. Data Products

Central to the scope of EMODnet Physics is the production of products derived from one or more data sources, which provide users with information about the distribution and quality of parameters in time and space. EMODnet Physics offers a range of products, including collections of datasets, reanalysis, gridded products, which may vary in continuity. Some products, such as maps, are continuous in time and space, while others, like in situ datasets, are discontinuous by nature. More specifically, in situ data are collected in locations that may be far from each other, some platforms collect in situ data sporadically (e.g., gliders, CTDs), any sensor failure requiring intervention will result in time discontinuities from the moment of failure until the issue is resolved. The organization of products is carried out by the product-working groups (as outlined in WP1). These groups may utilize key existing products, such as SeaDataNet climatology, or develop specific products tailored for EMODnet Physics, such as the River DB. As described in earlier sections, these products are organized to ensure discoverability through the central portal. The list of available products in EMODnet Physics is presented in Deliverable D2.01 and D2.05, Table 9 presents ongoing actions on published products.

Table 9. EMODnet Physics data and products (on CP Geoviewer) status and planning:

Theme	**Product name**	**status**	**Planned actions/next delivery**
Carbon Cycle	Seawater alkalinity - GLODAPv2_2016b (micro-mol kg-1)	This product is presenting the Alkalinity. GLODAP Data is gridded by DIVA.	None.
River outflow	River outflow	This product layer groups all the platforms collecting river outflow. The layer shows the position of the recording station and on clicking the platform page (presenting station metadata and latest data) is popped up. The product layer offers filtering options.	
Sea level	In situ platform	This product layer groups all the platforms collecting sea level. The layer shows the position of the recording station and on clicking the platform page (presenting station metadata and latest data) is popped up. The product layer offers filtering options.	Published Figure 27
Sea level	Absolute Sea Level Trend (GLORYS12V) (m)		None.

Theme	Product name	status	Planned actions/next delivery
Sea level	Absolute Sea Level Trend (DUACS) (mm/yr)		None.
Sea level	SONEL - In situ Absolute Sea Level Trends		None.
Sea level	Monthly maps of Absolute Sea Level data (DUACS) (m)		None.
Sea Optical Properties	In situ platform	This product layer groups all the platforms collecting sea optical properties. The layer shows the position of the recording station and on clicking the platform page (presenting station metadata and latest data) is popped up. The product layer offers filtering options.	To be added to the CP staging system. CP to use the specific filters specification json.
Sea Optical Properties	TSM Baltic Sea (%)		None.
Sea Optical Properties	TSM Mediterranean Sea (%)		None.
Sea Optical Properties	TSM North Sea (%)		None.
Salinity and Conductivity	In situ platforms	This product layer groups all the platforms collecting sea surface salinity and salinity in the water column. The layer shows the position of the recording station and on clicking the platform page (presenting station metadata and latest data) is popped up. The product layer offers filtering options.	To be added to the CP staging system. CP to use the specific filters specification json.
Salinity and Conductivity	Monthly climatology (SDN.V2)	Updated the product (now global instead of many regionals). Template changed: the user can select the specific month to be loaded.	Published Figure 28.
Salinity and Conductivity	Climatology (CORA)	Made available in two versions, one to be visualized in the Geoviewer and one to be offered for download.	Download is not yet compliant with CP requirements as it points to an external page for managing the sub setting. The team is working on a method to provide the CP a list of files to overcome the sub setting page.
Salinity and Conductivity	Mediterranean Sea Salinity Climatology (PSU)	Out of date: SDN.V1	removed.
Salinity and Conductivity	North Atlantic Ocean Salinity Climatology (PSU)	Out of date: SDN.V1	removed.
Salinity and Conductivity	North Sea Salinity Climatology (PSU)	Out of date: SDN.V1	removed.

Theme	Product name	status	Planned actions/next delivery
Salinity and Conductivity	Sea surface Salinity annual anomaly [base line 1990-2020] (PSU)		None.
Salinity and Conductivity	Seawater Practical Salinity from GLODAPv2_2016b (PSU)		None.
Salinity and Conductivity	SMOS BEC global SSS product v2 L4 (Psu)		None.
Temperature	In situ platforms	This product layer groups all the platforms collecting sea surface temperature and temperature in the water column. The layer shows the position of the recording station and on clicking the platform page (presenting station metadata and latest data) is popped up. The product layer offers filtering options.	To be added to the CP staging system. CP to use the specific filters specification json.
Temperature	Monthly climatology (SDN.V2)	Updated the product (now global instead of many regionals). Template changed: the user can select the specific month to be loaded.	published
Temperature	Climatology (CORA)	Made available in two versions, one to be visualized in the Geoviewer and one to be offered for download.	Download is not yet compliant with CP requirements as it points to an external page for managing the sub setting. The team is working on a method to provide the CP a list of files to overcome the sub setting page.
Temperature	Black Sea Temperature Climatology (°C)	Out of date: SDN.V1	removed.
Temperature	Mediterranean Sea Temperature Climatology (°C)	Out of date: SDN.V1	removed.
Temperature	North Atlantic Ocean Temperature Climatology (°C)	Out of date: SDN.V1.	removed.
Temperature	North Sea Temperature Climatology (°C)	Out of date: SDN.V1.	removed.
Temperature	Sea Temperature Anomaly 30 Years (ºC)		None.
Temperature	Seawater Temperature from GLODAPv2_2016b (ºC)		None.

Theme	Product name	status	Planned actions/next delivery
Underwater Noise	EMODnet Physics Continuous Noise fix platforms		None.
Underwater Noise	EMODnet Physics European Impulsive Noise Events Registry		None.
Waves	In situ platform	This product layer groups all the platforms collecting waves. The layer shows the position of the recording station and on clicking the platform page (presenting station metadata and latest data) is popped up. The product layer offers filtering options.	Published
Wind	In situ platform	This product layer groups all the platforms collecting waves. The layer shows the position of the recording station and on clicking the platform page (presenting station metadata and latest data) is popped up. The product layer offers filtering options. This product should replace the current available one (In situ wind speed and direction)	To be added to the CP staging system. CP to use the specific filters specification json.

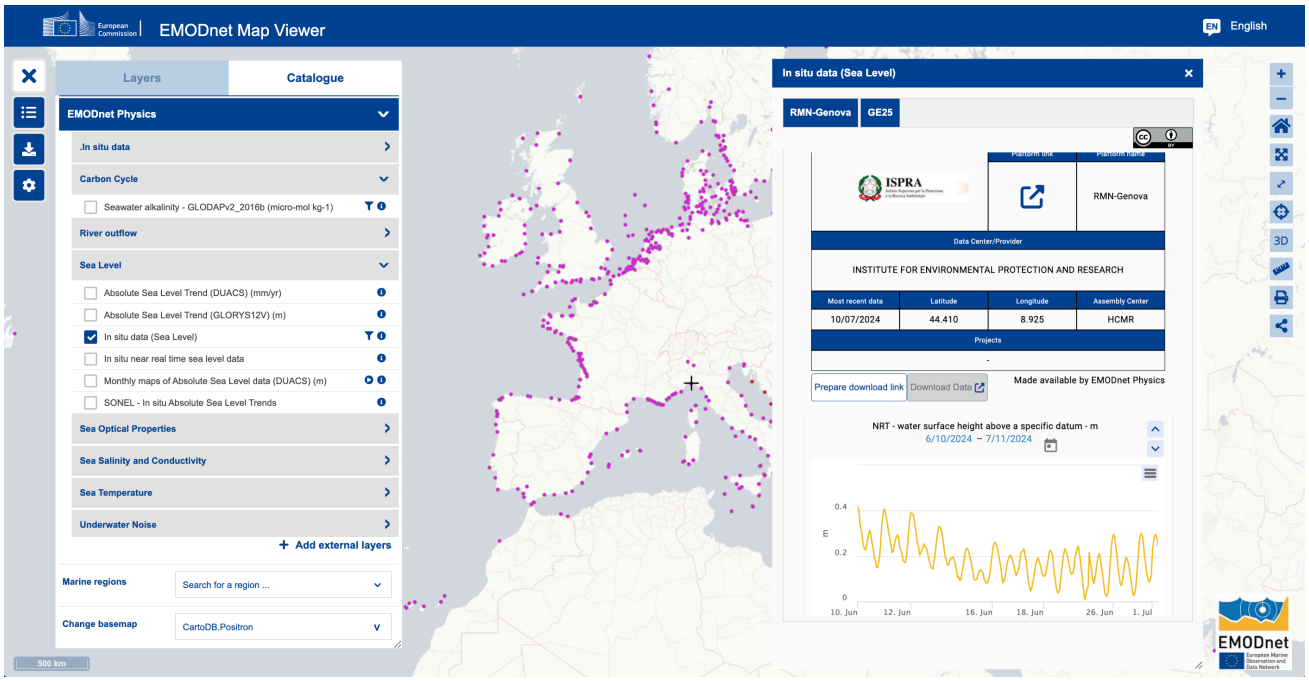

Figure 27. Sea Level

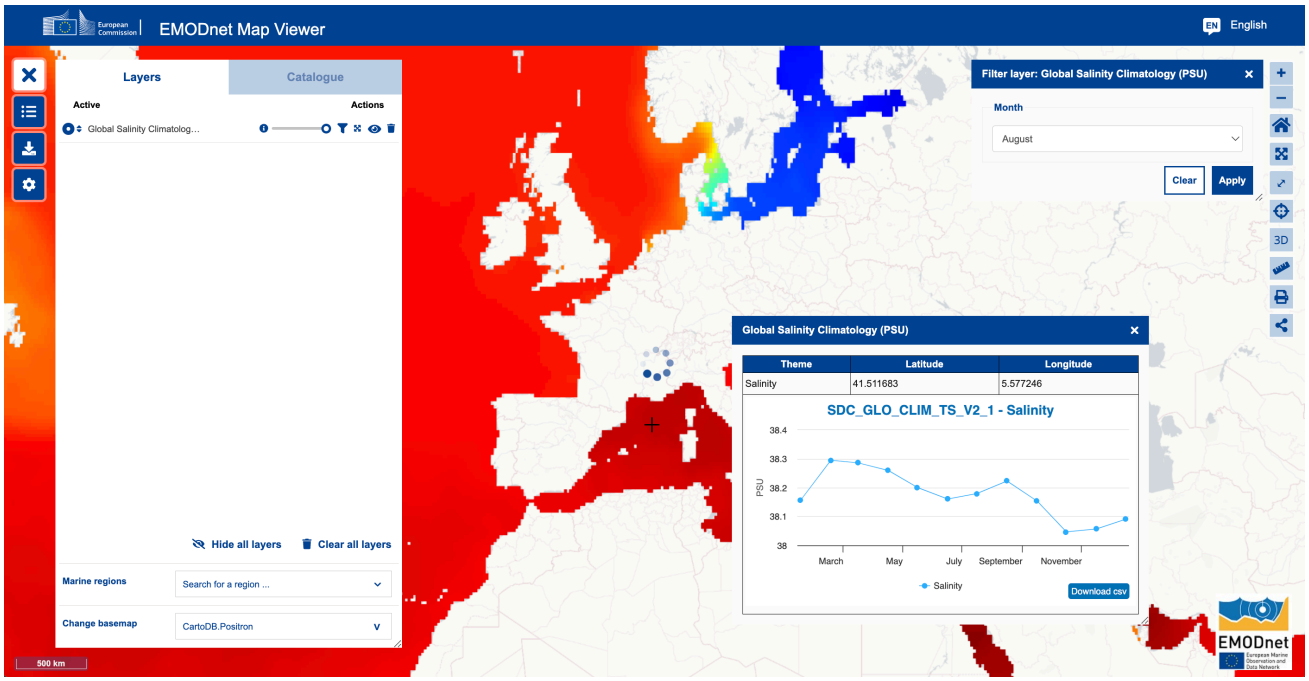

Figure 28. Salinity in the Water Column, Climatology

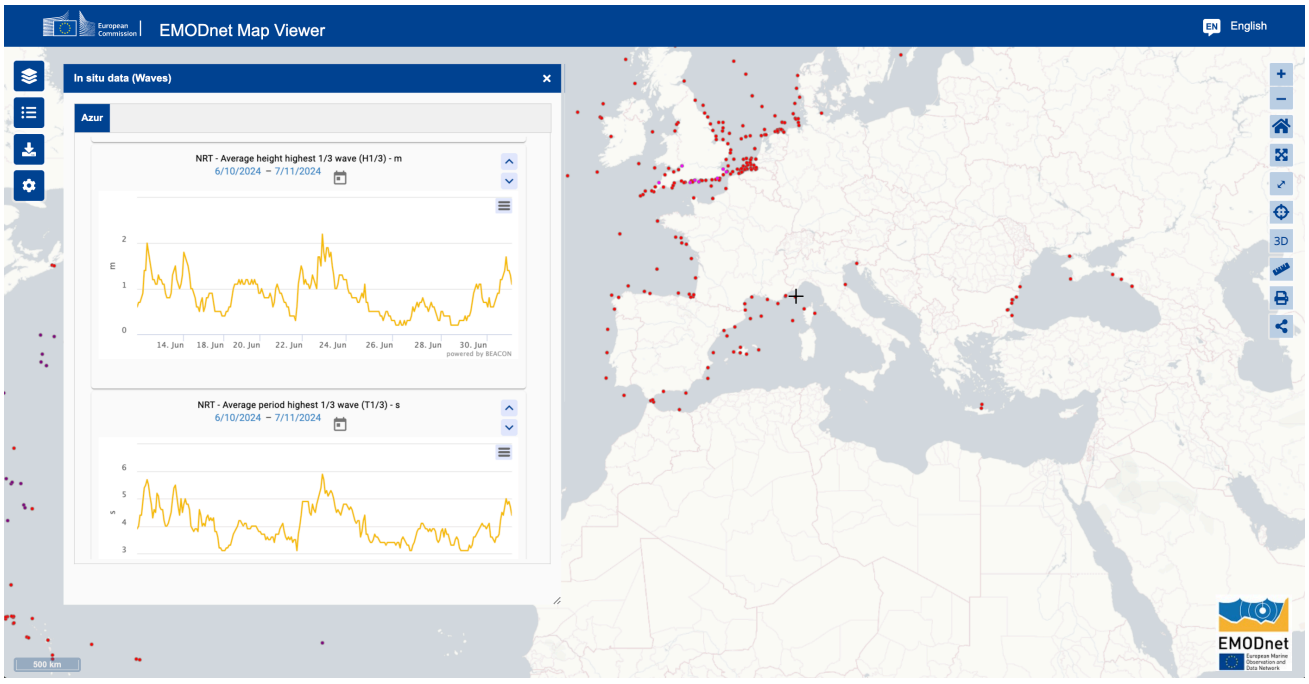

Figure 29. In situ Waves

WP3 – Catalogue, interoperability, service interfaces, and Central EMODnet

Covering Task(s): task 3, task 4

WP3 is organized in 4 sub tasks and 3 deliverables

WP3 focuses on working and optimizing the FAIRness of its data flow and data management. The FAIR concept emphasizes that data and services should be Findable, Accessible, Interoperable, and Re-usable, catering to both machines and humans. The work in WP3 involves 2 key tasks: Development of procedures for machine-to-machine connections to data and data products (task 3), and Contribution of data products and content to a central portal, ensuring that users can easily find, view, and download data and data products (task 4). These activities are essential to ensure that EMODnet Physics data and products adhere to FAIR principles and can be effectively utilized by a wide range of users and applications.

WP3.1 EMODnet Physics machine-to-machine (M2M) and interoperability features

Interoperability is a two-way concept: it involves data flow from sources to EMODnet Physics and from EMODnet Physics to users. Here are the key aspects of interoperability in both directions:

1) from Sources to EMODnet Physics: The primary goal is to facilitate the adoption of common tools and vocabulary among data sources. Examples of this effort is the consolidation of a docker version of ERDDAP and the promotion of the DAB for the EMODnet community. As already reported, there Is an increasing number of EMODnet Physics stakeholders that are following EMODnet Physics recommendations and adopting these technologies.

2) from EMODnet Physics to Users: This aspect focuses on organizing data collections and products in a way that aligns with standards such as INSPIRE, OGS, and other easily consumable services (e.g., ERDDAP/ncWMS). Additionally, it involves linking consolidated databases (e.g., PANGAEA) and presenting these collections to match the needs and preferences of EMODnet users and stakeholders.

Deliverable D3.01 presents key elements to interoperate with and consume EMODnet Physics data

WP3.2 EMODnet Physics back-end maintenance

This task focuses on the maintenance and update of the current EMODnet Physics (back-end) infrastructure to provide the Central Portal with data and products. EMODnet Physics back-office infrastructure is based on a private cloud system with several virtual machine running specific services to connect EMODnet Physics federated sources and to make data and products available and accessible, via the central Portal.

This infrastructure includes ncWMS, ERDDAP, GeoServer, FPT server, etc., in order to make the system ready to receive and offer access to data, meta-data and data products directly through machine-to-machine connections. These tools are continuously updated to guarantee best performances towards the Central Portal.

WP3.3 EMODnet Physics Catalogue

This task complements task 3.2 and ensures that metadata can be easily discovered by the central portal and offer INSPIRE services. EMODnet Physics operates a GeoNetwork Instance with a user-friendly web interface for searching geospatial data, compliant with ISO19115/19119/19110 standards.

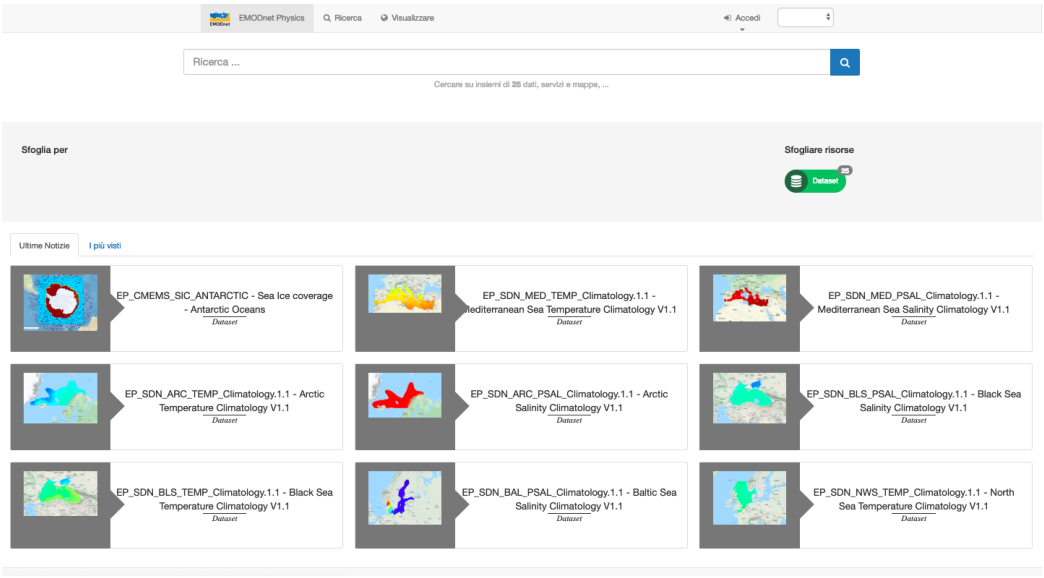

Figure 30. GeoNetwork catalogue for Physics

GeoNetwork is listing all the data-collections and products available in the EMODnet Physics domain.

WP3.4 Monitoring tools

This task operates the tools and actions not covered by tools described in task 1.6 to support WP1 in collecting the periodic performance monitoring indicators. More specifically, EMODnet Physics monitoring involves operating the Help Desk and tracking system performance. The Help Desk service is available from 9:00 to 17:00 CET/CEST, Monday to Friday, and deals with the user requests that, once collected by the Central Portal, are switched to EMODnet Physics HD under the JIRA system. During the reporting period the HD collected and solved 15 requests (Table 14).

More general comments and feedback are described in task 8 and in the final comments.

Monitoring also deals with technical-service monitoring that is performed centrally and includes OGC service performance monitoring (https://monitor.emodnet.eu/) and user interaction on the Central Portal (Europa Analytics), including shares on thematic areas and use cases.

4. Identified issues: status and actions taken

Table 10. Priority issues identified by CINEA/ DG MARE/ Secretariat

A. Priority issue(s) identified and communicated by CINEA/ DG MARE/ SECRETARIAT				
Priority issue	**Status (Pending/Resolved)**	**Action(s) taken / remaining actions planned**	**Date created**	**Date resolved**
EM-615 - Remove old Physics OGC Services (+from monitor.emodnet.eu)	Done	Removed	08/09/22	01/08/23
EM-610 - Centralisation Checklist for review	Done	Verified	11/03/22	09/08/23
EM-596 - EMODnet Physics Catalogue Service to Harvest	Done	Updated	10/08/23	10/08/23
EM-582 - Details on Platform Layer fro EMODnet Physics	Done	Updated	10/08/23	10/08/23
EM-573 - Adding Physics geoserver layers to metaGIS	Done	Added	16/03/22	11/08/23
EM-546 - Platform Pages in EMODnet Physics don't show the data that was filtered for	Done	Improved	11/08/23	15/08/23
EM-538 - Layer EP_HFR_CFM_EUROPE not working in Physics WMS	Done	Corrected	05/07/22	18/10/23
EM-530 - Physics - EMODnet Catalogue Tags	Done	Corrected	11/05/21	23/11/23
EM-510 - Control feature for time constraint on the platform layers	Done	Improved	12/12/23	11/01/24
EM-319 - Content Inventory Physics	Done	Updated	17/10/23	15/01/24
EM-210 - GetLegendGraphic not supported for High Frequency Radar WMS	Done	Updated	22/11/23	30/01/24
EM-189 - Bug in Physics GeoNetwork CSW service	Done	Fixed	05/03/24	11/03/24
EM-118 - Correct Legend for EMODPace sealevel Map	Done	Fixed	11/08/23	08/04/24
EM-87 - Physics - Web Services MetadataUrl and DataUrl fields	Done	Layers used in the European Atlas made available on the new Physics GeoServer	19/07/23	18/06/24

EM-53 - TWG3-Action 2: Physics to provide combined climatology products for European scale (not per sea basin) for integration in the viewer.	In Progress	Resolution is different in different basins, hence it cannot be merges as is. Waiting for BlueCloud to publish a new version of the SDN climatologies	12/11/20	

Table 11. Priority issues identified by Physics group

A. Issues / challenges identified by the thematic assembly group itself				
Priority issue / challenge	**Status (Pending/Resolved)**	**Action(s) taken / remaining actions planned**	**Date due**	**Date resolved**
EM-724 EMODnet Physics - Platforms filters improvement	Done	Modification of the Filters.json to better implement the filters		12/03/2024 17:43
EM-896 TSM - Mediterranean Sea - visualization improvement	Done	Removal of sparse data to improve product representation		29/03/2024 11:26
EM-914 Platform Layer Legend Error	Done	Fix of layers in Legend Platform, by fixing the data owner tab (removal of duplications and typos)		17/01/2024 12:50
EM-920 PSMSL - In Situ Relative Sea Level Trends to be remuved	Done	Removal of layer PSMSL - In Situ Relative Sea Level Trends		28/02/2024 13:07
EM-921 Alkalinity name changing	Done	Updated name from Alkalinity to Carbon Cycle		28/02/2024 12:58
EM-937 Sea mammals platforms proxy problem	Done	Check on proxy (sea mammal platform), platforms with filters not always visible		04/03/2024 16:00
EM-892 EMODnet Physics - New platform filter endpoint	Done	Establishment of new endpoint for the platform filter, change of the URL and Json file name		12/03/2024 17:43
EM-863 CORA Climatology Data Download error	Resolved	Update of download link for CORA dataset		02/04/2024 6:07 PM
EM-908 EMODnet Physics - New layer - Sea Level Platforms	Resolved	New layer added		11/04/2024 2:17 PM
EM-909 EMODnet Physics - New layer - Waves Platforms	Resolved	New layer added		02/05/2024 5:29 PM
EM-911 EMODnet INGESTION - New Ingestion layer - As is Platforms	Pending	New layer added		
EM-912 EMODnet INGESTION - New Ingestion layer - Validated Platforms	Pending	New layer added		
EM-946 Layer animation: requests made after removing and adding a layer	Pending	Control of layer animation, after noticing strange behaviour		
EM-947 EMODnet Physics: Seawater alkalinity - GLODAPv2_2016b GetFeatureInfo error	Resolved	Fix the profile graph that was not displayed has been fixed		18/04/2024 1:01 PM

EM-948 EMODnet Physics: Seawater alkalinity - GLODAPv2_2016b Wrong Download link	Resolved	The download link has been corrected		02/04/2024 11:40 AM
EM-949 EMODnet Physics: Seawater Practical Salinity from GLODAPv2_2016b GetFeatureInfo error	Resolved	Fix the profile graph that was not displayed has been fixed		02/04/2024 1:25 PM
EM-950 EMODnet Physics: Seawater Practical Salinity from GLODAPv2_2016b Wrong Download link	Resolved	The download link has been corrected		02/04/2024 6:04 Pm
EM-951 EMODnet Physics: SMOS BEC global SSS product v2 L4 (Psu) Time Fix	Resolved	Time dimension has been fixed		04/04/2024 2:33 PM
EM-952 EMODnet Physics: SMOS BEC global SSS product v2 L4 (Psu) Wrong Download	Pending	The problem of multiple files download has been solved		
EM-953 EMODnet Physics: Seawater Temperature from GLODAPv2_2016b Wrong Download link	Resolved	The download link has been corrected		02/04/2024 5:45 PM
EM-954 EMODnet Physics: Seawater Temperature from GLODAPv2_2016b GetFeatureInfo error	Resolved	Fix the profile graph that was not displayed has been fixed		02/04/2024 1:34 PM
EM-955 EMODnet Physics - Salinity Climatology layer replacement	Resolved	Salinity climatology local layers replaced with one single global layer		18/04/2024 4:55 PM
EM-956 EMODnet Physics - Temperature Climatology layer replacement	Resolved	Temperature climatology local layers replaced with one single global layer		19/04/2024 3:42 PM
EM-961 EMODnet Physics - Seawater alkalinity error in descroption	Resolved	Corrected the layer description		11/04/2024 2:17 PM

5. Allocation of project resources

Table 12. Resource allocation

Information on the allocation of project resources	
Categories	Resource usage[22] (%)
Making data and metadata interoperable and available	23,5
Preparing data products	11,5
Preparing web-pages, viewing or search facilities	12,9
Managing user feedback	9
Project management	20,9
Outreach and communication activities	20,9
Others	1,4

Table 13. Resource allocation

Categories	Involved Tasks
Making data and metadata interoperable and available	1,3
Preparing data products	2
Preparing web-pages, viewing or search facilities	2
Managing user feedback	8
Project management	4,5,6,7
Outreach and communication activities	4,5,6,7
Others	1,2,6

[22] Provide the workings of your calculations, *i.e.* percentage allocation of the total amount awarded.

6. User feedback

User feedback was collected through the HD user form until EMODnet Physics was centralized. Since January 2023, this service has been discontinued.

HD requests are now collected centrally, forwarded to thematic teams, and managed via JIRA tickets. Recent tickets are listed in Table 10. More general comments and feedback are described under Task 8 and in the final comments

Table 14. User feedback

Overview of user feedback and/or requests received in this period							
Date	**Organisation**	**Type of user feedback (e.g. technical, case study, etc.) and short description of the feedback received**	**Means of contact**	**Response time**	**Status of user query: resolved/pending**	**Measures taken to resolve the query**	**Status: if not (yet) resolved/pending, explain reason why and expected timeline**
8/6/203	PLOCAN	Technical (HD) EMODNET-1623	HD	>48h	Pending	We provided any possible information	It has not been possible to provide support because of the dismantling of the analysis services. New metrics (from the CP) have to be identified.
8/4/2024	CNR	Technical (HD) EMODNET-1799	HD	<48h	Pending	Support provided	We did not get any further feedback, although it's pending we consider it closed
2/5/2024	ULIEGE	Technical (HD) EMODNET-1772	HD	>48h	Resolved	Provided description and guide	
27/5/2024	private	Technical (HD) EMODNET-1820	HD	<48h	Resolved	Support provided	

7. Meetings/events held/attended & planned

Table 15. Meetings/events held/attended

A. Meetings/events Organized and attended					
Date	Location	Type event	Indicate if a ppt was given	Meeting attended (A) / organised (O)	Short description and main results (# participants, agreements made, etc.)
14/8/2023	Hobart, Tasmania, Australia	workshop	yes	A	SOOS Symposium
19/8/2023	Hobart, Tasmania, Australia	meeting	no	A	SOOS DMSC
28/8/2023	web	technical working group	yes	A	GOOS - Low cost technology TWG
29/8/2023	web	internal - meeting	No	A	EMODnet Vision 2030-2035 & Communication strategy
4/9/2023	Oslo, Norway	summer school	Yes	A	NAUTILOS Summer School
13/9/2023	web	internal - meeting	No	A	EMODnet: achievements
13/9/2023	web	internal - tech meeting	Yes	A	NAUTILOS - TIB (data management)
19/9/2023	Paris, France	workshop	No	A	EuroSEA Annual Assembly + EuroSEA WS
26/9/2023	web	workshop	Yes	A	EMODnet for Business
27/9/2023	Toulose, France	workshop	No	A	Ocean Predict Task Team
28/9/2023	Gothenburg, Sweden	meeting	yes	A	CMEMS INSTAC Stakeholder + MIC coordiantion
3/10/2023	Galway, Ireland	conference	Yes	A	EuroGOOS Conference 2023
5/10/2023	The Hague, The Netherlands	workshop	No	A	FAIR-IMPACT
18/10/2023	web	internal - tech meeting	Yes	A	EMODnet Technical working group
16/10/2023	Brussels, Belgium	technical working group	No	A	TG NOISE
23/10/2023	Paris, France	meeting	Yes	A	SO-CHIC and OCEAN:ICE General Assemblies and joint workshop
26/10/2023	Valencia, Spain	workshop	Yes	A	ERASMUS MARIS Days
1/11/2023	web	forum	No	A	Polar Data Forum
7/11/2023	Rome, Italy	Technical meeting	No	A	BlueCloud2026 technical meetings and General Assembly
15/11/2023	Madrid, Spain (+web)	workshop	Yes	A	CRUISING FOR OCEANS - SHARING EFFORTS TO RESTORE OUR SEAS
16/11/2023	Venice, Italy	conference	No	A	AIVP Conference
16/11/2023	Brussels, Beljum + web	meeting	no	A	25th TG NOISE meeting
27/11/2023	Brussels, Belgium	Meeting	Yes	A	EMODnet Physics Annual Meeing
29/11/2023	Brussels, Belgium	conference	Yes	A	EMODnet Jamboree

1/12/2023	Brussels, Belgium	Meeting	No	A	EMODnet SC
27/11/2023	Faro, Portugal	meeting	no	A	NAUTILOS General Assembly - EMODnet is a key stakeholder and was invited to present and discuss on metadata, ingestion and data flow
19/12/2023	Rome, Italy	workshop	no	A	ONTM annual conference
08/01/2024	Bergen, Norway	Meeting		A	OLAMUR project Annual Meeting – EMODnet is a key project's stakeholder. OLAMUR DMP is in line with EMODnet Ingestion/Physics recommendations
23/01/2024	web	Meeting		A	EMODnet Central Portal meeting with EMODnet Ingestion
18/02/2024	New Orleans, US	Conference		A	OSM24, held in New Orleans, La., 18-23 February 2024, brought together almost 6,000 attendees to share science, meet collaborators, and enjoy time together. Ingestion and international collaboration were discussed during the event
21/02/2024	web	Meeting		A	MIC periodic meeting. Discussion on operational data flows, harmonised metadata etc. to support both EMODnet and Copernicus Marine Service
28/02/2024	web	Workshop	yes	A	EMODnet webinar for European Research and Innovation and Mission: Restore our Ocean and Waters projects
29/02/2024	web	Workshop		A	EMODnet stakeholder workshop explores harmonised data management in offshore licensing procedures
05/03/2024	Amsterdam, Netherlands	Meeting	yes	A	BlueCloud2026 – STC, discussion on data federation and harmonised data management
12/03/2024	web	Meeting	yes	A	EMODnet Technical working group meeting
12/03/2024	London, UK	Conference		A	Oceanology International London. With over 8,000 attendees targeted for 2024, it is a must-attend event for those involved in exploring, monitoring, developing or protecting the world's oceans. Ingestion and international collaboration were discussed during the event
13/03/2026	Copenhagen, Denmark	Meeting		A	OBSSEA4CLIM project kick off meeting. EMODnet is a key project's stakeholder. OLAMUR DMP is in line with EMODnet Ingestion/Physics recommendations
03/04/2024	Malta	Meeting	yes	A	EMODnet Ingestion Plenary meeting, presentation of the annual results and future goals.
08/04/2024	Barcelona	Meeting	yes	A	Beyond the Climate Change: Sustained Observation in support of the Blue Economy
15/04/2024	Creta	Conference + workshop	yes	A	Nautilos Summer Course.
23/04/2024	Web	Webinar	yes	A	BlueCloud2026 - Making Marine Data FAIR: FAIR assessment of marine data & information. The second in a series of three Blue-Cloud 2026 Training Academy webinars on FAIR Data

					Principles. With input by EMODnet, Copernicus Marine and several leading marine Research Infrastructures, the Horizon Europe Blue-Cloud initiative developed a collaborative web-based environment that enables open and simplified access to an unprecedented wealth of marine data resources and interoperable tools.
17/04/2024	Bremerhaven, Germany	Conference	yes	A	Kick off Polarin - Antonio Novellino gave a presentation about the contribution that ETT will give in Polarin mentioning the experience of the company in EMODnet.
29/04/2024	Web	Internal meeting		A	EMODnet Steering Committee – periodic meeting between hematic assembly groups, data providers, and stakeholder organisations, working together to ensure the coordination, integration, and effective dissemination of marine data across Europe.
02/05/2024	Genova, Italy	Webinar	yes	A	Seminar on Data Management - University of Genova - Seminar on data management. A seminar to present best practices, tools, and strategies for effective data handling in research and academia. Although the students were from Biomedical Engineering courses, EMODnet was largely discussed as an example of how to manage data and work towards FAIRness.
09/05/2024	Genova, Italy	Conference	yes	A	“Glocal Comunicazioni," the Ligurian edition of the Digital Journalism Festival discussed the multidimensionality of the digital era and its communication, covering every aspect from journalism, corporate, and institutional communication to scientific dissemination. EMODnet was discussed as one example of this multidimensional dialogue.
27/05/2024	Bergen, Norway	Conference	yes	A	IMDIS - International Conference on Marine Data and Information Systems. Antonio Novellino gave 2 presentations titled "EMODnet near real time river data and land boundary condition services” and “A first roadmap for data management solutions of low-cost ocean observing technology” in which he talked about EMODnet.
06/06/2024	Palma, Balearic Islands, Spain	Conference		A	MARTECH - Presentation of the projects of RAISE Spoke 3 in which EMODnet was mentioned for marine data management.
11/06/2024	web	Internal meeting	yes	A	SOOS Scientific Commitee As a co-chair of the SOOS DMSC, Antonio Novellino presented on the recommended data management practices for the SOOS community. EMODnet is a consolidated infrastructure and an element that each SOOS partner can rely on.

12/06/2024	Brussels, Belgium	Conference	yes	A	Digital Ocean Forum 2024 - EMODnet was presented along with other projects in which EMODnet is involved.
21/06/2024	Genova, Italy	Workshop	yes	A	Presentation about EMODnet to the cadets of the Maritime Academy of Panama during the visiting program at the Italian Academy.
29/07/2024	Genova, Italy	Training	yes	A	Lesson on EMODnet
SUM				**O**	**Total # of meetings organised = 0**
SUM				**A**	**Total # of meetings attended = 51**

Table 16. Meetings/events planned

A. Meetings/events planned in the future				
Date	Location	Type event (meeting, training (workshop), etc.)	Meeting to be attended (A) / organised (O)	Short description and main expected outcomes
September	Copenhagen, DK	OCEAN:ICE Annual meeting		
September	Copenhagen, DK	EMODnet Chemistry Annual meeting		
October	web	EMODnet for Business WS		
October	Brussels, Belgium	TG NOISE meeting		
October	web	EMODnet TWG		
October	Paris, France	SO-CHIC Annual Assembly		
October	Porto, Portugal	NAUTILOS General Assembly		
November	Genova, Italy	Science Festival		
November		BlueCloud 2026 General Assembly		
November	Lisbon, Italy	AIVP workshop		

8. Communication assets

Table 17. Communication products

A. Communication products				
Date	Communication material	Short description (of the material, title, …) of the asset	Main results	Name of event at which material was disseminated (if applicable)

With the Central Portal up and running, most of the communication assets (posts, news, etc) are now passing and promoted centrally. EMODnet Physics actively contributes to the central communication with quarterly updates. Central posts are also tagged and re-distributed in socials-professional channels (e.g. Linkedin).

Table 18. Planned communication

B. Planned communication products			
Date	Communication material	Short description (of the material, title, …) and/or link to the asset	Main results expected

Table 19. Publications

C. (Co-)Authored peer-reviewed publications in this project phase					
Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
	e.g. paper; conference proceedings; book chapter; …				
2024	proceedings	A Novellino, V Pizziol, R Bordoni… - Constructing an open library containing a curated and continuously growing digital catalogue of individual sound signatures from the marine underwater …			Y
2024	proceedings	A Novellino, R Bordoni, V Pizziol… - Enhancing social well-being and economic prosperity by reinforcing the effectiveness of protection and restoration management in mediterranean MPAs			Y
2024	proceedings	BM Scotto, A Novellino, G Besio, AL Loarca - Multi-model statistical system for monitoring the dispersion of pollutants: Mediterranean case study			Y
2024	proceedings	G Dapueto, F Misurale, BM Scotto… - Advances technological platforms for sea monitoring and forecasting: RAISE project			Y
2024	report	J Nolan, L Cronne, AER Hassoun, I Lips, A Blanco… - Study for reporting obligations for ocean observation			Y
2024	proceedings	B Maddalena Scotto, A Novellino… - Multi-model statistical system for monitoring the dispersion of pollutants: Mediterranean case study			Y
2024	Guideline	JF Borsani, M Andersson, M Andre, A Azzellino, M Bou… - Setting EU Threshold Values for continuous underwater sound		10.2760/690123	Y
2024	proceedings	V Pizziol, A Novellino, P Gorringe, J Brils… - LandSeaLot-Let's observe together			Y
2023	Paper	SO-CHIC consortium, JB Sallée… - Southern ocean carbon and heat impact on climate		https://royalsocietypublishing.org/doi/10.1098/rsta.2022.0056	Y
2023	Paper	SA Ciliberti, EA Fanjul, J Pearlman… - Evaluation of operational ocean forecasting systems from the perspective of the users and the experts		https://doi.org/10.5194/sp-1-osr7-2-2023	Y
2023	Paper	B Mourre, E Clementi, G Coppini, L Coppola… - Mediterranean observing and forecasting systems		https://doi.org/10.1016/B978-0-12-823692-5.00001-7	Y
2023	Paper	AR Janssen, P Bricher, K Payne, R Badhe… - Polar Data Forum IV–An Ocean of Opportunities		https://doi.org/10.5334/dsj-2023-018	Y

2023	report	D Obaton, C Liétard, A Novellino, A Giorgetti - EuroSea data integration			Y

Table 20. Publications

D. Other/non-peer reviewed types of publications (co-)authored in this project phase					
Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
	e.g. paper; conference proceedings; book chapter; …				

A simple search in google scholar shows more than 1000 documents between papers and projects deliverables using/citing EMODnet Physics.
https://scholar.google.com/scholar?hl=it&as_sdt=0%2C5&q=EMODnet+Physics&as_ylo=2021

We also used the "Publish or Perish" web scraper tool[23] (on google scholar) to list papers using <EMODnet> and later than <2023> as a search keywords. The result lists 200 papers about or citing EMODnet (full list in attach), a more refined search shows about 40 on EMODnet Physics or consuming EMODnet Physics data.

For a comprehensive overview of publications referring to/making use of EMODnet data and/or data products, please consult Google Scholar.

[23] https://harzing.com/resources/publish-or-perish

9. Monitoring indicators

Table 21. Monitoring Indicators

Comments on the progress indicators in the indicators spreadsheet		
Progress indicator	Means of collecting figures	Comment
1. Current status and coverage of total available thematic data A) Volume and coverage of available data	Matomo/ server logs	EMODnet Physics input data is sparse, and for this indicator, we consider the "platform" as the "unit" for monitoring assessment. A platform is a logical system that hosts data, where data may consist of a single dataset (e.g., a profile in the case of CTD), a time series (e.g., a sea-level station), or a series of profiles (e.g., ARGO). For indicator 1.A, we report the percentage variation in the number of platforms for the given basin. It's worth noting that some platforms may move from one basin to another. Since we report figures based on the latest position, the percentages are significantly influenced by this movement. EMODnet Physics integrates data from several sources, which can result in duplicates in the system. Cleaning duplicates is an ongoing activity and also affects the percentage of available platforms. When a duplicate is identified, the two sources are linked to the same dataset to show full provenance. Some of the platforms that were originally categorized under 'Other Seas' are now classified under the Caribbean Sea. We continued cleaning duplicates. This process is not yet completed. Importantly, as reported, we moved to the new controlled NVS::P33 vocabulary for sub-theme management that is determining re-mapping of the data sources. As an example: Atmospheric parameters are now meteorological, water conductivity is grouped with salinity and density, etc. Although this affects the stats of trends in some themes, it is a very important updated to better match both Central Portal and stakeholders needs. During the reporting period some new stations have been added (and, where possible, cleaned). For indicator 1.B, since the Central Portal is now up and running, EMODnet Physics cannot capture specific traffic on the map viewer. Therefore, we can only provide the overall volume of downloaded data.
What is your opinion on the data coverage within EMODnet for your thematic?		EMODnet Physics is meeting expectations well. It continues to incorporate new data sources and develop sub-thematic products, further enhancing its coverage. While the current coverage is already good, the ongoing effort to add datasets in various dimensions and establish connections with new programs and initiatives, both within and beyond the European area, remains crucial and requires maximum commitment from the EMODnet Physics team and network. The available coastal data is still very limited and new data sources (e.g. Citizen Science projects) have to be approached some use cases (e.g. diving community) may represent a new use case for proofing the

		concept. Metadata on Wind data should be improved. In situ underwater noise is still very limited. Data on Ice should include new data type (e.g. cameras). We need some focus actions to link in some other integrators (e.g. SIOS). We are keeping working on the available CTDs in INSTAC (already starting flowing see e.g. the number of the platform providing temperature and salinity in the water column).
B) Usage of data since the start of the project phase		The Physics team can only report on the overall volume of downloaded data when it is mediated by the EMODnet Physics backend (as some products are cached centrally, EMODnet Physics cannot track this volume). Previously, the volume of data downloaded for each theme was calculated using an algorithm that considered the number of viewed map pages. However, since EMODnet Physics is no longer hosting the map viewer, this indicator can no longer be applied. EMODnet Physics reports on the number of available platforms (units - col C) and the overall volume of downloaded gigabytes (col D) from ERDDAP, which is hosting the in-situ data.
2. Current status and coverage of total number of data products A) Volume and coverage of available data products		Table 2A lists the products available at prod-erddap.emodnet-physics.eu, which are linked through the central portal (plus the underwaternoise products that are available on prod-geoserver). As reported previously, we are implementing the following concepts: data, data collections, and products. Indicator 2A reports on the products available at prod-erddap.emodnet-physics.eu. We have also introduced a new controlled vocabulary (NVS:P33) to better organize data collections. The system now offers several collections under this new arrangement.
B) Usage of data products since the start of the project phase	Logs	Table 2B provides an overview of the interaction with the EMODnet Physics services. Both ERDDAP and GeoServer have recorded a significant increase in interaction since the last report. As detailed in the report, these tools are responsible for serving data and product presentations on the Central Portal. When users interact with EMODnet Physics content, the system redirects them and retrieves information from these services. In addition to interactions through the central map viewer, these services also support programmatic access.
3. Internal and external organisations supplying/approached to supply data and data products since start of the project phase		There are several new sources integrated, including some older providers that have added new sources to their packages. For the sake of completeness and ease of reporting, we are listing all the providers that have added at least one platform or data collection to the previous sharing. Most of these providers are delivering on voluntary base (after a preliminary approach)

4. Online 'Web' interfaces to access or view data		EMODnet Physics organizes data collections and product access through three primary components: ERDDAP, GeoServer, and GeoNetwork. GeoNetwork serves as the catalog and directs users to datasets in ERDDAP, GeoServer, or both. ERDDAP is responsible for managing time series data and certain gridded data using ncWMS. On the other hand, GeoServer hosts vector data, maps, and trajectories. The monitoring of WMS, WFS, and other services that offer data and products to CP is now centralized and conducted every 10 minutes. The web page https://monitor.emodnet.eu/resources?lang=en&tag=Physics presents real-time status. It would be very useful to have the option to download statistics for a custom period and conduct a more in-depth analysis of the instantaneous status.
5.1. Daily number of page views of EMODnet Thematic entry page since the start of the contract		We monitor the typical working hours' usage of the portal. The system tracks the EMODnet Physics static page, which provides a general overview of the activity and is in line with the previous period. According to Matomo stats (internal monitoring) on the HTML populating the geoviewer contents, we record five times more traffic on Physics. If we look at the interaction on the ERDDAP that populates the in situ Physics layers, we recorded about ten times more interactions. The current version of the Europe Analytics report monitors the geoviewer, which is the most visited page, but it does not give details on specific themes
5.2. Total number of visitors, page views, unique page views and percentage of returning visitors, since the start of the contract		For consistency in this analysis, we have adjusted all data to a monthly figure. As a reference value, we consider the first quarter after centralization (Q1 2023), divided by three (months). For tracking progress or trends, we report the total sum of visitors during the reporting period (Q4 2023 -> Q2 2024) divided by 12. While this approach does not capture daily dynamics, it indicates that activity on the new Central Portal was very intense immediately after its launch, followed by a slight decline to a steady level in the subsequent months. It is important to note that this metric only monitors interactions with the static page, which historically has not been the most accessed one for Physics. The true value of EMODnet Physics is highlighted by the significant increase in data downloads (see product interface interactions - Indicator 2)

The monitoring numbers reported as part of the progress monitoring of EMODnet performance are collected through Matomo and/or Europa Analytics, unless reported otherwise.

10. Recommendations for follow-up actions by the EU

EMODnet is a long-term program designed to address the fragmentation of marine data sources, making it easier to discover and access data and data products for various purposes. It aims to enhance data interoperability and accessibility, fostering utilization by industry, policymakers, and scientists. Thanks to its incremental approach, the program successfully achieved the European Commission's 2020 targets for marine knowledge accessibility and interoperability. As we move into a new operational phase, this imperative extends to all thematic projects, with a particular focus on EMODnet Physics. While the overarching goals remain consistent, EMODnet Physics must pivot toward increasing the productivity of those engaged in marine-related endeavors, promoting innovation in the blue economy sector, and reducing uncertainty in our understanding of marine behavior. This involves enhancing the accessibility and interoperability of marine data, encompassing regions beyond European seas. EMODnet Physics will continue to play a pivotal role in facilitating data and information sharing in alignment with the Marine Strategy Framework Directive[24], the Maritime Spatial Planning Directive[25], Marine Water Directive, European Green Deal, UN Decade of Ocean Science for Sustainable Development 2021-2030, etc. and fit-for-purpose catalogues and data-product collections should be organized.

EMODnet Physics is hosting large and comprehensive thematic data collections (e.g., Sea Level, Surface Currents from HFR, etc.), which are highly valued by EMODnet stakeholders. In the case of River Data, EMODnet Physics serves as the primary operational data provisioning platform (ETOOFS report 2022)[26], making the system crucial for an increasing number of users. Support and collaboration with SOOS are other key elements. A clear message from the SOOS Symposium 2023 is that a complete understanding of global effects requires considering the contributions of the Southern Oceans. In this context, SOOSmap plays a crucial role in showcasing available data and their locations. Without EMODnet Physics, this tool would either not be available or not perform as efficiently. The growing interest from a wider community and the need for continuous updates, both in terms of services and products, necessitate a new contract framework. Under this framework, the team does not need to bid for continuity every other year.

EMODnet Physics acts as a catalyst, bringing communities together to address and resolve various data issues, thereby increasing the amount of shared and available data. Any potential data-sharing challenges are discussed, and active solutions are proposed. This has been the case for HFR operators, glider operators, fishermen, and now EMODnet Physics is engaging with new and important communities: citizen science projects and cryosphere researchers. More specifically, EMODnet Physics is focused on enhancing the spatial resolution of its collections. Spatial resolution here refers to increasing the number of sources, closing gaps in coastal areas, and connecting with new providers involved in operational marine data programs. Importantly, other key European infrastructures such as Copernicus Marine Service-INSTAC, the SeaDataNet network of

[24] http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm
[25] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0089&from=EN
[26] E Alvarez Fanjul et al 2022

NODCs, and European projects like H2020 SO-CHIC, HE OCEAN:ICE, HE POLARIN, HE LandSeaLot, etc., also benefit from these efforts to unlock and coordinate data.

The priority should be given to parameters and communities that are unique in physics and not easily findable and accessible elsewhere. This list includes river data (to complement runoff data with other physical and meteorological data), ice data (from smart cameras), wind data, and cryosphere data at sea. To achieve this, it's crucial to continue developing collaborations and memoranda of understanding with key community players such as the Arctic Ice Breaker consortium, SIOS, EuroFleet, IMO, and WOD. Operational data from the BIOARGO program (including parameters like Alkalinity, pH, Dissolved Oxygen, and Chlorophyll) have started being included in Physics collections and this should continue.

In parallel, it's important to develop and make available network platform products based on community requests. Other potential products could include monthly maps of surface currents, monthly maps displaying anomalies in Temperature, Salinity, and Sea Level, as well as 24-hour predictions for sea level/tide, wind, wave, and runoff data from in-situ platforms. Marine Forecasting Centers welcome this new data, as it helps improve thermohaline circulation models in coastal areas by providing better classification of land-marine boundary conditions, particularly focusing on salinity fields. It is recommended that the EU continues to support these activities and makes new, fit-for-purpose products available for coastal applications by integrating both in-situ and remote sensing data with model output products.

EMODnet Physics should continue to facilitate community data-sharing discussions and make additional sources of in-situ data available to EMODnet stakeholders and the Copernicus program. It is also recommended that EMODnet, in collaboration with Copernicus, work on data provenance and legacy information, providing details about the principal investigator, applied QC/QF procedures, links to other data sources for the same data, and more.

EMODnet Physics should also continue expanding its reach to new communities such as marinas, port associations, offshore wind energy associations, and emerging data sources like citizen science data.

According to statistics and user feedback, EMODnet Physics effectively meets the needs of users interested in both near-real-time data and long-term historical time series data. It is recommended to start working on incorporating in-situ forecast information to enhance the user experience. This is particularly relevant for certain parameters within the EMODnet Physics domain, such as sea level, wave data, currents, and wind data.

As mentioned earlier, it is advisable to focus on making more wind data available, including coastal marine data from citizen science initiatives, ocean literacy data (digitizing early data collections from research papers and reports), underwater noise data, in-situ ice data, HF Radar-derived wave height and direction data, and beach camera data. Another user request is for density maps of observations (e.g., days of recording per grid cell). Additionally, it's recommended to establish pipelines for more frequent releases of temperature and salinity climatology data, along with monthly maps of anomalies (beginning with temperature and salinity).

EMODnet Physics is also recommended to continue its efforts in improving and harmonizing metadata. EMODnet is built upon international standards, such as SDN vocabularies, which are evolving entities. Therefore, some emphasis should be placed on developing simplified data models, including metadata schemas and minimum required metadata, as these are crucial for achieving EMODnet's objectives. Key references for metadata standards include ISO 19115 and 19139, the use of OceanSites netcdf data format and conventions, the new EMODnet Physics P33 and SDN for parameters (P01-P02). Furthermore, encouraging a broader adoption of the Creative Commons framework, particularly CC-BY for data policy, is advisable. Additionally, promoting the use of unique identifiers like DOIs and ORCIDs to properly identify and acknowledge sources and provenance is important.

Developing a structured framework for training materials and a help desk, similar to Copernicus Marine, is highly beneficial.

Given the increasing interest from a broader community in unique products such as river data, sea level information, wind data, etc., along with the need for continuous updates in terms of services and products, a new contract framework that eliminates the need for bidding every other year is crucial.

From a management perspective, the coordination team would benefit from more concise documentation and indicators template for activity reports.

11. Annex: Other documentation attached

List of Attached documents

- D1.21 - Guideline on data Ingestion procedure for nrt v.2024
- D2.01- Data sources gap analysis v.2024
- D2.03 - EMODnet Physics data management including metadata and metadata governance v.2024
- D2.05 - List of products v.2024
- D3.01 - Tools and methods to implement interoperability

Data Sources (key federated integrators)

- CMEMS INSTAC (in situ measurement from EuroGOOS and ROOSs institutes)
- European Oceanographic Data Centres
- GDAC (Coriolis)
- Global Sea Level Observing System (GLOSS)
- IOC Sea Level Station Monitoring (SLS)
- Permanent service for mean sea level (PSMSL)
- University of Hawaii Sea Level Centre (UHSLC) - GLOSS Fast-Delivery Centre
- Système d'Observation du Niveau des Eaux Littorales (SONEL)
- Deep Ocean Multi-Disciplinary Ocean Reference Stations (OceanSITES)
- ARGO profiling float data (including EuroARGO and BioARGO)
- Southern Oceans Observing System (SOOS)
- Global HF Radar Network
- Everyone's Gliding Observatories (EGO) and OceanGlider Network
- Voluntary Observing Ship (VOS), Ship of Opportunity Program (SOOP)
- Data Buoy Cooperation Panel (DBCP), Arctic Buoy Data (IAPB),
- Tropical Moored buoys: Pacific Ocean (TAO, TRITON), Atlantic Ocean (PIRATA), Indian Ocean (RAMA)
- European Multidisciplinary Seafloor and water column Observatory (EMSO)
- Global Ocean Surface Underway Data Pilot Project (GOSUD)
- US National Data Buoy Centre (NDBC), Integrated Ocean Observing System (IOOS), National Oceanic and Atmospheric Administration (NOAA)
- Australian Integrated Marine Observing System (IMOS)
- Global Ocean Ship-Based Hydrographic Investigations Program (GO-SHIP)
- Berring Data Collective – Fishing vessels data
- JRC Tzunami Array Device
- NMDIS monthly sea level data

- International Council for the Exploration of the Sea (ICES)
- Marine Mammals Exploring the Oceans Pole to Pole (MEOP)
- PANGAEA - Data Publisher for Earth & Environmental Science
- Global Ocean Data Analysis Project (GLODAP)
- Surface Ocean CO_2 Atlas (SOCAT)
- Circular Arctic Expedition (ACE)
- Global Runoff Data Center (GRDC)
- SeaDataNet (Temperature Climatology and Salinity Climatology products)

The list does not include single marine data institutes.

Data Sources and provided platforms (since 01/08/2023)

Table 22. List of Sources

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
AGENCIA CATALANA DE L'AIGUA	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7
AGENCY FOR MARITIME SERVICES AND COAST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
AGENCY FOR MARITIME SERVICES AND COAST, DEPARTMENT COAST	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	6
AGENCY OF MARINE PROTECTED AREAS	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
ALFRED WEGENER INSTITUTE HELMHOLTZ CENTRE FOR POLAR AND MARINE RESEARCH	77	0	0	59	0	0	2	0	0	0	34	0	0	63	0	0	0	0	0	2	0	0	237
ALL-RUSSIA RESEARCH INSTITUTE OF HYDROMETEOROLOGICAL INFORMATION, WORLD DATA CENTRE, NATIONAL OCEANOGRAPHIC DATA CENTRE (NODC)	0	28	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	52
ALSEAMAR	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
ANTARCTIC METEOROLOGICAL RESEARCH CENTER (AMRC)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	132	0	0	132
ANTIGUA & BARBUDA METEOROLOGICAL SERVICES	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	14

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
AQUATIC SCIENCES, SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	9
AQUITAINE OBSERVATORY OF SCIENCES OF THE UNIVERSE, UNIVERSITY OF BORDEAUX	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
ARCTIC AND ANTARCTIC RESEARCH INSTITUTE, ROSHYDROMET (SAINT-PETERSBURG)	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
ARCTIC SUBMARINE LABORATORY	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
ARPA EMILIA-ROMAGNA, SERVIZIO METEOROLOGICO REGIONALE	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
ARPA FRIULI-VENEZIA GIULIA, ALTO ADRIATICO OBSERVATORY	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4
ARPA LIGURIA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
ARPA SARDEGNA	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
ARPA VENETO, OSSERVATORIO REGIONALE ACQUE	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7
ATLANTIC OCEANOGRAPHIC & METEOROLOGICAL LABORATORY	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY , NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	85	1	0	6188	0	0	12	0	0	0	6	0	0	0	0	56	0	0	0	0	0	9	6357
ATOMIC ENERGY AND ALTERNATIVE ENERGY COMMISSION (HEADQUARTER)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
AUGAS DE GALICIA, XUNTA DE GALICIA	0	0	0	0	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0	0	0	0	44
AUSTRALIAN ANTARCTIC DATA CENTRE, AUSTRALIAN ANTARCTIC DIVISION, DEPARTMENT OF THE ENVIRONMENT, AUSTRALIAN GOVERNMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
AUSTRALIAN ANTARCTIC DIVISION, DEPARTMENT OF THE ENVIRONMENT, AUSTRALIAN GOVERNMENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	0	1	60
AUSTRALIAN INSTITUTE OF MARINE SCIENCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
AUSTRALIAN OCEAN DATA NETWORK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
AZTI, HEADQUARTERS PASAIA(GIPUZKOA)	0	0	0	0	0	1	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	8
BALEARIC ISLANDS COASTAL OBSERVING AND FORECASTING SYSTEM	0	0	0	9	0	0	15	4	1	0	6	0	0	0	0	0	0	3	0	0	0	0	38
BALEARIC ISLANDS UNIVERSITY, SCIENCES FACULTY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4
BARBADOS METEOROLOGICAL SERVICES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4
BASQUE METEREOLOGICAL AGENCY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
BEDFORD INSTITUTE OF OCEANOGRAPHY	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
BERMUDA INSTITUTE OF OCEAN SCIENCES	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
BERRING DATA COLLECTIVE	0	0	0	0	0	4	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	25
BIZKAIKO FORU ALDUNDIA - DIPUTACION FORAL DE BIZKAIA	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5
BP EXPLORATION & PRODUCTION	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	7
BRAZILIAN NAVY DIRECTORATE OF HYDROGRAPHY AND NAVIGATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	4
BRITISH ANTARCTIC SURVEY	2	0	0	0	0	0	3	0	0	0	0	0	0	6	0	0	0	0	0	17	0	0	28
BRITISH OCEANOGRAPHIC DATA CENTRE	3	2	0	0	0	0	1	0	0	0	0	0	0	244	0	0	0	0	0	0	0	0	250
BUREAU OF ENQUIRY AND ANALYSIS FOR CIVIL AVIATION SAFETY	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
BUREAU OF METEOROLOGY, MELBOURNE	0	0	0	58	0	0	0	0	0	0	1	0	0	0	0	0	28	0	0	0	0	7	94
CANADIAN COAST GUARD	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
CENTRAL FISHERIES RESEARCH INSTITUTE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
CENTRAL WEATHER ADMINISTRATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0	0	0	0	46
CENTRAL WEATHER BUREAU, TAIWAN	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	14
CENTRE FOR BIOLOGICAL STUDIES OF CHIZE	0	0	0	0	0	0	0	0	0	0	0	0	0	538	0	0	0	0	0	0	0	0	538
CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE, LOWESTOFT LABORATORY	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	17
CENTRE FOR MARITIME RESEARCH AND EXPERIMENTATION	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
CENTRE FOR SCIENTIFIC RESEARCH AND HIGHER EDUCATION OF ENSENADA	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
CENTRE FOR STUDIES ON RISKS, ENVIRONMENT, MOBILITY AND URBAN PLANNING - TECHNICAL	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	30

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
DIRECTORATE RISKS, WATERS AND SEA (PLOUZANE)																							
CENTRO FUNZIONALE DELLA REGIONE TOSCANA	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7
CHICAGO PARK DISTRICT	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5
CHINARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	9
CNR, INSTITUTE FOR THE STUDY OF ANTHROPIC IMPACTS AND SUSTAINABILITY IN THE MARINE ENVIRONMENT, GENOVA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
CNR, INSTITUTE OF MARINE SCIENCES S.S. OF LERICI (SP)	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6
CNR, NATIONAL RESEARCH COUNCIL, INSTITUTE OF MARINE SCIENCE	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
CNR, NATIONAL RESEARCH COUNCIL, INSTITUTE OF MARINE SCIENCE (TRIESTE)	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	1	0	0	0	0	10

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
CNRS, COM, PHYSICAL AND BIOGEOCHEMICAL OCEANOGRAPHY LABORATORY (TOULON)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
CNRS, INSU TECHNICAL DIVISION, LA SEYNE-SUR-MER	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
CNRS, LABORATORY OF STUDIES ON SPATIAL GEOPHYSICS AND OCEANOGRAPHY	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
CNRS, NATIONAL INSTITUTE OF SCIENCES OF THE UNIVERSE	0	1	0	0	0	0	10	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	12
CNRS, PALEOENVIRONMENT AND PALEOBIOSPHERE	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	5
COLD REGIONS RESEARCH AND ENGINEERING LABORATORY	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION	347	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	347

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
CONFEDERACION HIDROGRAFICA DEL CANTABRICO	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	14
CONFEDERACION HIDROGRAFICA DEL EBRO	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
CONFEDERACION HIDROGRAFICA DEL GUADALQUIVIR	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
CONFEDERACION HIDROGRAFICA DEL JUCAR	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	6
CONFEDERACION HIDROGRAFICA DEL MINO-SIL	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
CONFEDERACION HIDROGRAFICA DEL SEGURA	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
CONSORTIUM FOR OCEAN LEADERSHIP	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
CORIOLIS	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
CSIRO OCEANS & ATMOSPHERE	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	6
CYPRUS OCEANOGRAPHY CENTER	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
CoLAB +ATLANTIC	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
DALHOUSIE UNIVERSITY, DEPARTMENT OF OCEANOGRAPHY	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
DANISH COASTAL AUTHORITY MINISTRY OF TRANSPORT AND ENERGY	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
DANISH METEOROLOGICAL INSTITUTE, OCEANOGRAPHIC SECTION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
DANMARKS TEKNISKE UNIVERSITETET	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
DEAKIN UNIVERSITY	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
DEEP-OCEAN ASSESSMENT AND REPORTING OF TSUNAMI (DART)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
DEFENCE CENTRE FOR OPERATIONAL OCEANOGRAPHY	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
DEMOCRITUS UNIVERSITY OF THRACE, DEPARTMENT OF	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
ENVIRONMENTAL ENGINEERING, SPECIAL ACCOUNT FOR RESEARCH FUNDS																							
DEPARTMENT FOR ENVIRONMENT FOOD & RURAL AFFAIRS	0	0	0	0	0	0	0	0	0	0	0	70	0	0	0	0	0	0	0	0	0	0	70
DEPARTMENT OF ENVIRONMENT AND SCIENCE, QUEENSLAND GOVERNMENT	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
DEPARTMENT OF ENVIRONMENT FISHERIES AND FOREST	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
DEPARTMENT OF MARINE RESEARCH OF THE ENVIRONMENTAL PROTECTION AGENCY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
DEPARTMENT OF MARINE SYSTEMS AT TALLINN UNIVERSITY OF TECHNOLOGY	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	3	0	0	0	0	6
DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIAN GOVERNMENT	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	27

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
DIRECCION GENERAL DE INFRAESTRUCTURAS DEL AGUA, JUNTA DE ANDALUCIA	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10
DIRECCION GENERAL MARITIMA	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	1	0	0	0	0	5
DIRECTORATE GENERAL OF METEOROLOGY AND AIR NAVIGATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
EAUFRANCE	0	0	0	0	0	0	0	0	0	0	0	113	0	0	0	0	0	0	0	0	0	0	113
ECOOCEAN	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
ECUADORIAN NAVY OCEANOGRAPHIC INSTITUTE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3
EIG EUMETNET	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50
ELECTRICITY SUPPLY BOARD	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4
EMERCIT	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0	0	0	0	6
ENEA CENTRO RICERCHE AMBIENTE MARINO (LA SPEZIA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3341	0	3341
ENSTA BRETAGNE	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
ENVEN ENERGY CORPORATION	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
ENVIRONMENT AGENCY HEAD OFFICE	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
ENVIRONMENT AND CLIMATE CHANGE CANADA, CLIMATE RESEARCH DIVISION	0	0	0	44	0	0	0	0	0	0	149	106	0	0	0	0	10	0	0	0	0	1	310
ENVIRONMENTAL AGENCY OF THE REPUBLIC OF SLOVENIA	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
ERIC EURO-ARGO	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	110
ESTONIAN ENVIRONMENT AGENCY	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10
EURO-MEDITERRANEAN CENTRE ON CLIMATE CHANGE (CMCC FOUNDATION)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
EUROPEAN ORGANIZATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES	0	0	0	145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	145
EXECUTIVE AGENCY FOR EXPLORATION AND MAINTENANCE OF THE DANUBE RIVER (EAEMDR)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
FACULTY OF FISHERIES, KAGOSHIMA UNIV.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
FAR EASTERN REGIONAL HYDROMETEOROLOGICAL RESEARCH INSTITUTE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
FEDERAL MARITIME AND HYDROGRAPHIC AGENCY	162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	162
FEDERAL MARITIME AND HYDROGRAPHIC AGENCY, DEPT. OCEANOGRAPHY	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	11
FEDERAL SERVICE FOR HYDROMETEOROLOGY AND ENVIRONMENTAL MONITORING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
FEDERAL UNIVERSITY OF RIO GRANDE INSTITUTE OF OCEANOGRAPHY	1	0	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	29
FINNISH ENVIRONMENT INSTITUTE	0	143	0	0	1	0	0	0	0	0	0	42	0	0	0	0	0	0	0	0	0	0	186
FINNISH METEOROLOGICAL INSTITUTE	21	1	0	0	0	0	1	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	47
FIRST INSTITUTE OF OCEANOGRAPHY,	97	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	101

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
MINISTRY OF NATURAL RESOURCES																							
FISHERIES AND OCEANS CANADA	128	0	0	59	0	0	1	0	0	0	194	0	0	143	0	0	0	0	0	0	0	0	525
FISHERIES AND OCEANS CANADA, MARINE ENVIRONMENTAL DATA SECTION	6	0	0	7	0	0	3	0	0	0	8	0	0	0	0	0	0	0	0	0	0	9	33
FLANDERS HYDRAULICS RESEARCH	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	12
FLANDERS MARINE INSTITUTE	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
FRANCE ELECTRICITY COMPANY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
FRENCH POLAR INSTITUTE PAUL-EMILE VICTOR	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	4
GEOGRAPHICAL NATIONAL INSTITUTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
GEOMETOC	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
GERMAN FEDERAL WATERWAYS AND SHIPPING ADMINISTRATION	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
GERMAN OCEANOGRAPHIC DATACENTRE	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
GERMAN WEATHER SERVICE, MARITIME WEATHER OFFICE HAMBURG	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	80	0	0	0	0	5	87
GIPUZKOAKO FORU ALDUNDIA - DIPUTACION FORAL DE GIPUZKOA	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	6
GLOSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	11
GULF OF MAINE LOBSTER FOUNDATION, NOAA FISHERIES	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
HARBOURS AUTHORITY	0	0	0	0	0	0	0	20	2	0	21	0	0	0	0	0	0	0	0	0	0	0	43
HELLENIC CENTER FOR MARINE RESEARCH (HCMR)	0	1	0	0	0	0	1	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	10
HELLENIC CENTRE FOR MARINE RESEARCH, HELLENIC NATIONAL OCEANOGRAPHIC DATA CENTRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
HELLENIC CENTRE FOR MARINE RESEARCH,	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
INSTITUTE OF MARINE BIOLOGICAL RESOURCES AND INLAND WATERS																							
HELLENIC CENTRE FOR MARINE RESEARCH, INSTITUTE OF OCEANOGRAPHY	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
HELLENIC CENTRE FOR MARINE RESEARCH, INSTITUTE OF OCEANOGRAPHY, PHYSICAL OCEANOGRAPHIC DEPARTMENT	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
HELMHOLTZ CENTRE FOR OCEAN RESEARCH KIEL	9	0	0	0	0	0	12	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	24
HELMHOLTZ-ZENTRUM GEESTHACHT, CENTRE FOR MATERIALS AND COASTAL RESEARCH	0	0	0	0	0	0	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
HELMHOLTZ-ZENTRUM HEREON GMBH	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
HYDROGRAPHIC AND OCEANOGRAPHIC SERVICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
HYDROGRAPHIC AND OCEANOGRAPHIC SERVICE OF THE FRENCH NAVY	53	27	0	478	0	0	0	0	0	0	1	0	0	1	0	0	1	22	0	0	0	51	634
HYDROGRAPHIC INSTITUTE	0	1	0	0	0	0	0	12	2	0	1	0	0	0	0	0	0	0	0	0	0	0	16
ICELANDIC ROAD AND COASTAL ADMINISTRATION	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
IEO-CSIC, SANTANDER OCEANOGRAPHIC CENTRE	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
IEO-CSIC, SPANISH OCEANOGRAPHIC INSTITUTE	31	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43
IFREMER HEAD OFFICE	3	6	0	220	0	0	10	1	0	238	28	0	0	0	0	2	1	0	0	0	0	6	515
IFREMER, DEEP ENVIRONMENT LABORATORY	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	7
IFREMER, DEPARTMENT OF SPATIAL AND PHYSICAL OCEANOGRAPHY	124	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	127
IFREMER, GENAVIR (LA SEYNE SUR MER)	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
IFREMER, INFORMATION VALUATION SERVICE FOR INTEGRATED MANAGEMENT AND MONITORING	0	445	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	445
IFREMER, RESEARCH INFRASTRUCTURES AND INFORMATION SYSTEMS	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
IFREMER, SCIENTIFIC INFORMATION SYSTEMS FOR THE SEA	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3
INDIAN NATIONAL CENTRE FOR OCEAN INFORMATION SERVICES	139	0	0	44	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	184
INMET - INSTITUTO NACIONAL DE METEOROLOGIA	0	0	0	0	0	0	0	0	0	0	0	765	0	0	0	0	0	0	0	282	0	0	1047
INSTITUTE FOR ENVIRONMENTAL PROTECTION AND RESEARCH	0	538	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	555
INSTITUTE FOR MARINE BIOLOGICAL RESOURCES AND BIOTECHNOLOGY, ANCONA	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
INSTITUTE OF GEOLOGICAL AND NUCLEAR SCIENCES LTD.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4
INSTITUTE OF HYDROENGINEERING, POLISH ACADEMY OF SCIENCES	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
INSTITUTE OF MARINE RESEARCH	29	8	0	1	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	46
INSTITUTE OF MARINE SCIENCES, MIDDLE EAST TECHNICAL UNIVERSITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
INSTITUTE OF METEOROLOGY AND WATER MANAGEMENT NATIONAL RESEARCH INSTITUTE, POLAND	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	16
INSTITUTE OF OCEANOLOGY, BULGARIAN ACADEMY OF SCIENCES	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
INSTITUTE OF OCEANOLOGY, BULGARIAN ACADEMY OF SCIENCES	4	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	0	0	0	0	15

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
INSTITUTE OF OCEANOLOGY, POLISH ACADEMY OF SCIENCES	9	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	10
INSTITUTE PERTANIAN BOGOR UNIVERSITY	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATISTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6
INSTITUTO NACIONAL DE SISMOLOGIA, VULCANOLOGIA, METEOROLOGIA E HIDROLOGIA (INSIVUMEH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
INSTITUTO NACIONAL DEL AGUA (INA)	0	0	0	0	0	0	0	0	0	0	0	455	0	0	0	0	0	0	0	14	0	0	469
INTEGRATED MARINE OBSERVING SYSTEM	0	0	0	0	0	0	3	0	0	0	0	0	0	612	0	0	0	0	0	0	0	0	615
INTELLICHECK MOBILISA	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
INTERNATIONAL ARCTIC BUOY PROGRAM	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65
INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
IRD SIEGE	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
IRD, CENTRE DE NOUMEA	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4	10
IRD, CENTRE DE BRETAGNE	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	4	23
IRD, CENTRE OF HANN	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
ISRAEL ELECTRIC COMPANY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
ISRAEL OCEANOGRAPHIC AND LIMNOLOGICAL RESEARCH	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA, GEOMAGNETISM, AERONOMY AND ENVIRONMENTAL GEOPHYSICS DEPARTMENT	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	6
ITALIAN HYDROGRAPHIC INSTITUTE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY	179	2	0	1	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	1	199
JAPAN FISHERIES AGENCY	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
JAPAN METEOROLOGICAL AGENCY	88	7	0	5	0	0	0	0	0	0	0	0	0	0	0	0	147	0	0	0	0	3	250
JCOMM IN-SITU OBSERVATIONS PROGRAMME SUPPORT CENTRE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	4
JRC, INSTITUTE FOR ENVIRONMENT AND SUSTAINABILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	9
JRC-CNRST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
KING ABDULAZIZ UNIVERSITY	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
KOREA INSTITUTE OF OCEAN SCIENCE & TECHNOLOGY	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
KYOTO UNIVERSITY	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
LABORATORY FOR OCEAN PHYSICS AND SATELLITE REMOTE	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41
LABORATORY OF OCEANOGRAPHY AND CLIMATE, EXPERIMENTS	0	1	0	17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
AND NUMERICAL APPROACHES																							
LABORATORY OF OCEANOGRAPHY OF VILLEFRANCHE	61	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	63
LABORATORY OF PHYSICAL OCEANOGRAPHY, UNIVERSITE DE BRETAGNE OCCIDENTALE (UBO)	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
LAMMA CONSORTIUM	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
LAMONT-DOHERTY EARTH OBSERVATORY, COLUMBIA UNIVERSITY	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
LYSE AS	0	0	0	0	0	0	0	0	0	0	73	0	0	0	0	0	0	0	0	0	0	0	73
MALDIVES METEOROLOGICAL SERVICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
MANLY HYDRAULICS LABORATORY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
MARINE AND FRESHWATER RESEARCH INSTITUTE	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
MARINE HYDROPHYSICAL INSTITUTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
MARINE INSTITUTE	7	0	0	0	0	0	2	0	0	0	4	0	0	0	0	0	0	5	0	0	0	0	18
MARINE MAMMAL RESEARCH UNIT	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	9
MARINE SOUND	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
MARITIME INSTITUTE IN GDANSK, DEPARTMENT OF OPERATIONAL OCEANOGRAPHY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
MARITIME SAFETY AGENCY, JAPAN OCEANOGRAPHIC DATA CENTRE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
MEDITERRANEAN INSTITUTE OF OCEANOGRAPHY (MARSEILLE)	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3
MEDITERRANEAN INSTITUTE OF OCEANOGRAPHY, LA SEYNE SUR MER	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	2
MEMORIAL UNIVERSITY OF NEWFOUNDLAND,	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
OCEAN SCIENCES CENTRE																							
MET OFFICE, EXETER	185	1	0	89	0	0	0	0	0	0	3	9	0	0	0	0	78	0	0	0	0	1	366
METEO FRANCE	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	19	0	0	0	0	0	20
METEO FRANCE, CENTRE DE METEOROLOGIE MARINE	0	0	0	320	0	0	0	0	0	0	7	0	0	0	0	22	0	0	0	0	0	2	351
METEO FRANCE, SCHAPI	0	0	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0	0	0	0	0	0	120
METEOROLOGICAL RESEARCH INSTITUTE, KOREA METEOROLOGICAL ADMINISTRATION	145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	145
METEOROLOGICAL SERVICE OF JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
METEOROLOGICAL SERVICE OF NEW ZEALAND LTD	0	0	0	9	0	5206	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	5219
MINISTERE DE L'ENVIRONNEMENT, DE LA LUTTE CONTRE LES CHANGEMENTS CLIMATIQUES, DE LA FAUNE ET DES PARCS(MELCCFP)	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	27

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
MONTEREY BAY AQUARIUM RESEARCH INSTITUTE	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	4
MOTE MARINE LABORATORY & AQUARIUM	0	0	0	0	0	0	2	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	12
NATIONAL ANTARCTIC SCIENTIFIC CENTRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM - CENTRALIZED DATA MANAGEMENT OFFICE (NERRS CDMO)	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	26
NATIONAL ICE CENTER	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
NATIONAL INSTITUTE FOR EARTH PHYSICS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
NATIONAL INSTITUTE FOR MARINE RESEARCH AND DEVELOPMENT "GRIGORE ANTIPA"	0	10	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	55	0	0	0	66
NATIONAL INSTITUTE OF BIOLOGY, MARINE BIOLOGY STATION	0	69	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71
NATIONAL INSTITUTE OF FISHERIES RESEARCH	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
NATIONAL INSTITUTE OF MARINE GEOLOGY AND GEOECOLOGY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
NATIONAL INSTITUTE OF METEOROLOGY AND HYDROLOGY, BULGARIAN ACADEMY OF SCIENCES	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
NATIONAL INSTITUTE OF OCEAN TECHNOLOGY	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	1	0	0	0	0	0	0	9
NATIONAL INSTITUTE OF OCEANOGRAPHY	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
NATIONAL INSTITUTE OF OCEANOGRAPHY AND APPLIED GEOPHYSICS - OGS, DIVISION OF OCEANOGRAPHY	99	3	0	90	0	0	4	2	1	0	7	0	0	0	0	0	0	0	0	0	0	5	211
NATIONAL INSTITUTE OF OCEANOGRAPHY AND FISHERIES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
NATIONAL INSTITUTE OF WATER AND ATMOSPHERIC RESEARCH	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
NATIONAL INSTITUTE OF WATER AND	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
ATMOSPHERIC RESEARCH (DUPLICATE)																							
NATIONAL MARINE FISHERIES SERVICE, MISSISSIPPI LABORATORIES, PASCAGOULA FACILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
NATIONAL OBSERVATORY OF ATHENS, INSTITUTE OF GEODYNAMICS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	0	1	0	0	0	0	7	0	0	0	3	0	0	160	0	0	1	6	0	0	0	6	184
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL DATA BUOY CENTER	0	0	0	349	0	0	0	0	0	0	1468	0	0	0	0	9	0	0	0	0	0	0	1826
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL DATA BUOY CENTER (NOAA NDBC)	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	15
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION,	325	0	0	0	0	0	1	0	0	0	36	0	0	0	0	1	0	0	0	0	0	0	363

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
PACIFIC MARINE ENVIRONMENTAL LABORATORY																							
NATIONAL OCEANOGRAPHY CENTRE (UK)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
NATIONAL OCEANOGRAPHY CENTRE (LIVERPOOL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5
NATIONAL OCEANOGRAPHY CENTRE (SOUTHAMPTON)	8	0	0	0	1	0	27	0	0	0	4	0	0	0	0	0	0	1	0	0	0	0	41
NATIONAL RENEWABLE ENERGY CENTRE	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
NATIONAL RESEARCH COUNCIL	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
NATIONAL RESEARCH INSTITUTE OF FAR SEAS FISHERIES	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
NATIONAL RESEARCH PROGRAM IN ANTARCTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	35
NATIONAL SCIENCE FOUNDATION	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
NATIONAL TIDAL UNIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
NATIONAL WATER AGENCY OF BRAZIL	0	0	0	0	0	0	0	0	0	0	0	2815	0	0	0	0	0	0	0	19	0	0	2834
NATIONAL WEATHER SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	519	0	0	0	0	8	527
NAVAL HYDROGRAPHIC SERVICE	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	12	18
NAVAL OCEANOGRAPHIC OFFICE	35	0	0	45	0	0	52	0	0	0	0	0	0	0	0	41	0	0	0	0	0	0	173
NAVY HYDROGRAPHIC AND OCEANOGRAPHIC SERVICE, MILITARY OCEANOGRAPHY CENTRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	32
NEW ZEALAND DEFENCE TECHNOLOGY AGENCY	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
NOAA OFFICE OF MARINE AND AVIATION OPERATIONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
NOAA SOUTHEAST FISHERIES SCIENCE CENTER, BEAUFORT LABORATORY	0	0	0	0	0	0	0	0	0	490	0	0	0	0	0	0	1	0	0	0	0	0	491

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
NOAA SOUTHWEST FISHERIES SCIENCE CENTER	0	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4
NOAA, GREAT LAKES ENVIRONMENTAL RESEARCH LABORATORY	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
NOAA, NATIONAL MARINE FISHERIES SERVICE	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	3
NOAA, OFFICE OF OCEAN EXPLORATION AND RESEARCH	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
NOAA, WDC FOR OCEANOGRAPHY	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	7
NORTH CAROLINA STATE UNIVERSITY	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
NORTHWEST REGIONAL COASTAL MONITORING	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
NORWEGIAN HYDROGRAPHIC SERVICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4
NORWEGIAN INSTITUTE OF WATER RESEARCH	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
NORWEGIAN METEOROLOGICAL INSTITUTE	0	0	0	0	0	0	0	12	3	0	0	8	0	0	0	0	0	0	0	0	0	0	23
NORWEGIAN POLAR INSTITUTE	0	1	0	0	0	0	0	0	0	0	0	0	0	122	0	0	0	0	0	0	0	0	123

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
NORWEGIAN WATER RESOURCES AND ENERGY DIRECTORATE	0	0	0	0	0	0	0	0	0	0	0	96	0	0	0	0	0	0	0	0	0	0	96
OCEANIC AND CONTINENTAL ENVIRONMENTS AND PALEOENVIRONMENTS, TALENCE	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
OCEANIC PLATFORM OF THE CANARY ISLANDS	0	0	0	0	0	0	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	9
OCEANOGRAPHY MALTA RESEARCH GROUP, DEPARTMENT OF GEOSCIENCES, UNIVERSITY OF MALTA	0	2	0	0	0	0	0	8	1	0	6	0	0	0	0	0	0	0	0	0	0	0	17
OIL & GAS UK	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	2
OPW HYDROMETRIC SECTION	0	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	31
OREGON HEALTH & SCIENCE UNIVERSITY	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
OREGON STATE UNIVERSITY	0	0	0	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
OREGON STATE UNIVERSITY, COLLEGE OF EARTH, OCEAN, AND ATMOSPHERIC SCIENCES	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
P.P.SHIRSHOV INSTITUTE OF OCEANOLOGY, RAS	0	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	7
PANGAEA, DATA PUBLISHER FOR EARTH & ENVIRONMENTAL SCIENCE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
PETROBRAS	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
PILOT (QINGDAO) NATIONAL LABORATORY FOR MARINE SCIENCE AND TECHNOLOGY (QNLM)	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
PLYMOUTH MARINE LABORATORY	16	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	18
POLAR EARTH OSERVING NETWORK (POLENET)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	0	58
POLAR SCIENCE CENTER	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
PORTUGUESE ENVIRONMENT AGENCY	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	16
PUERTO RICO SEISMIC NETWORK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
R&D CENTRE KIEL UNIVERSITY OF APPLIED SCIENCES	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
RAYTHEON COMPANY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
REMOCEAN	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47
RESEARCH MEDITERRANEAN OBSERVATORY ON ENVIRONMENT, OSU	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
RIJKSWATERSTAAT WATER, TRAFFIC AND ENVIRONMENT	0	0	0	0	0	0	0	1	0	0	36	10	0	0	0	0	0	4	0	0	0	0	51
ROSCOFF MARINE STATION, SORBONNE UNIVERSITE AND CNRS	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE , UNIVERSITY OF MIAMI	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
ROYAL NETHERLANDS INSTITUTE FOR SEA RESEARCH	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
ROYAL NETHERLANDS METEOROLOGICAL INSTITUTE	13	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY, INSTITUTE OF MARINE AND COASTAL SCIENCES	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
SABM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
SAILDRONE	0	0	0	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	34
SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY, UNIVERSITY OF HAWAI'I AT MANOA	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	6
SCOTTISH ASSOCIATION FOR MARINE SCIENCE	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
SCOTTISH ENVIRONMENT PROTECTION AGENCY	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	50
SCRIPPS INSTITUTION OF OCEANOGRAPHY	308	0	0	1315	0	0	24	232	5	0	45	0	0	0	0	3	1	0	0	0	0	5	1938
SCSC	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	6
SEA MAMMAL RESEARCH UNIT	0	0	0	0	0	0	0	0	0	0	0	0	0	137	0	0	0	0	0	0	0	0	137
SECOND INSTITUTE OF OCEANOGRAPHY, MINISTRY OF NATURAL RESOURCES	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80
SERVICIO HIDROGRAFICO Y OCEANOGRAFICO DE LA ARMADA (CHILE)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
SGAS	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
SHELL INTERNATIONAL EXPLORATION & PRODUCTION BV	0	0	0	0	0	0	1	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	12
SKIDAWAY INSTITUTE OF OCEANOGRAPHY	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
SONEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	91
SOUTH AFRICAN NATIONAL ANTARCTIC PROGRAMME	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	14
SOUTH AFRICAN WEATHER SERVICE	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
SOUTHERN OCEAN CARBON & CLIMATE OBSERVATORY	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
SOWR	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	6
STANFORD UNIVERSITY HOPKINS MARINE STATION	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
STATE AGENCY FOR COASTAL PROTECTION, NATIONAL PARK AND MARINE PROTECTION SCHLESWIG-HOLSTEIN LKN.SH	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
STOCKHOLM UNIVERSITY, INSTITUTE OF APPLIED ENVIRONMENTAL RESEARCH	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3
STONY BROOK UNIVERSITY, SCHOOL OF MARINE AND ATMOSPHERIC SCIENCES	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
SUNY PLATTSBURGH	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
SWEDISH MARITIME ADMINISTRATION	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
SWEDISH METEOROLOGICAL AND HYDROLOGICAL INSTITUTE	0	3	0	0	6	0	0	0	0	0	62	62	0	0	0	0	0	14	0	0	0	0	147
TAKUVIK JOINT LABORATORY	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
TALLINN UNIVERSITY OF TECHNOLOGY	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
TECHNICAL UNIVERSITY OF DENMARK, NATIONAL SPACE INSTITUTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
TECHNOLOGICAL INSTITUTE FOR THE	0	0	0	0	0	0	0	4	1	0	3	0	0	0	0	0	0	0	0	0	0	0	8

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
CONTROL OF THE MARINE ENVIRONMENT OF GALICIA																							
TEXAS A&M UNIVERSITY	0	0	0	0	0	0	5	0	0	0	1	0	0	0	0	4	0	0	0	0	0	0	10
THE AGENCY FOR METEOROGY, CLIMATOLOGY AND GEOPHYSICS	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
THE DANISH ENVIRONMENTAL PROTECTION AGENCY	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	9
THE FRENCH NAVY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
THE MINISTRY OF NATIONAL DEFENSE, GENERAL COMMAND OF MAPPING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
THE OCEAN RACE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
THE SHIP OF OPPORTUNITY PROGRAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
THE UNIVERSITY CENTRE IN SVALBARD	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5
TOKYO UNIVERSITY OF MARINE SCIENCE AND TECHNOLOGY	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
TURKISH STATE METEOROLOGICAL SERVICE	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	22
U.S. ARMY CORPS OF ENGINEERS	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
U.S. GEOLOGICAL SURVEY	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	21
U.S. INTEGRATED OCEAN OBSERVING SYSTEM	0	0	0	0	0	0	1653	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1653
UG-MESA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
UKRAINIAN SCIENTIFIC CENTER OF ECOLOGY OF SEA	0	217	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	217
UNION OF BULGARIAN BLACK SEA LOCAL AUTHORITIES	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
UNITED KINGDOM HYDROGRAPHIC OFFICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
UNITED STATES COAST GUAR	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UNITED STATES NAVY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
UNIVERSIDAD DE CONCEPCION, CONCEPTION UNIVERSITY	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITE DE PARIS VI, UPMC, HYDROBIOLOGY LABORATORY	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UNIVERSITY OF ALASKA FAIRBANKS	0	0	0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	6
UNIVERSITY OF AZORES, DEPARTMENT OF OCEANOGRAPHY AND FISHERIES (IMAR NETWORK)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
UNIVERSITY OF BERGEN, GEOPHYSICAL INSTITUTE	0	1	0	0	0	0	6	0	0	0	59	0	0	0	0	0	0	0	0	0	0	0	66
UNIVERSITY OF BRITTANY, MARINE OBSERVATORY OF THE EUROPEAN UNIVERSITY INSTITUTE OF THE SEA, OSU	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
UNIVERSITY OF CAEN, MARINE STATION OF LUC/MER, RESEARCH CENTER OF COASTAL ENVIRONMENT	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
UNIVERSITY OF CALIFORNIA, SANTA CRUZ	0	0	0	0	0	0	2	0	0	0	0	0	0	90	0	0	0	0	0	0	0	0	92
UNIVERSITY OF CONNECTICUT	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITY OF CONNECTICUT, MARINE SCIENCES	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
UNIVERSITY OF DELAWARE	0	0	0	0	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	5
UNIVERSITY OF DELAWARE COLLEGE OF EARTH, OCEAN, AND ENVIRONMENT	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITY OF EAST ANGLIA, SCHOOL OF ENVIRONMENTAL SCIENCES	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
UNIVERSITY OF GENOVA, DISTAV DIPARTIMENTO DI SCIENZE DELLA TERRA, DELL'AMBIENTE E DELLA VITA - DISTAV	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5
UNIVERSITY OF GOTHENBURG	2	0	0	0	0	0	1	0	0	0	0	0	0	66	0	0	0	0	0	0	0	0	69

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
UNIVERSITY OF HAMBURG, INSTITUTE OF OCEANOGRAPHY	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITY OF HAWAII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
UNIVERSITY OF HAWAII SEA LEVEL CENTER (USA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
UNIVERSITY OF MAINE	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITY OF MARYLAND	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UNIVERSITY OF MASSACHUSETTS, DARTMOUTH	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UNIVERSITY OF MICHIGAN	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	4
UNIVERSITY OF MINNESOTA DULUTH	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL, DEPARTMENT OF MARINE SCIENCES	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UNIVERSITY OF NORTH CAROLINA WILMINGTON	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITY OF PERPIGNAN, CEFREM	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
UNIVERSITY OF PRETORIA DEPARTMENT OF ZOOLOGY AND ENTOMOLOGY	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
UNIVERSITY OF RHODE ISLAND, GRADUATE SCHOOL OF OCEANOGRAPHY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
UNIVERSITY OF SOUTH FLORIDA	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
UNIVERSITY OF SOUTHERN MISSISSIPPI	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITY OF SOUTHERN MISSISSIPPI DEPARTMENT OF MARINE SCIENCE	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UNIVERSITY OF TOKYO, OCEAN RESEARCH INSTITUTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
UNIVERSITY OF TROMSO	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UNIVERSITY OF WASHINGTON	502	1	0	22	0	0	1	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	531
UNIVERSITY OF WASHINGTON, APPLIED PHYSICS LABORATORY	0	0	0	4	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	9

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
UNIVERSITY OF WASHINGTON, SCHOOL OF OCEANOGRAPHY	0	0	0	37	0	0	24	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	64
UNIVERSITY OF WESTERN AUSTRALIA	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
UNIVERSITY OF WESTERN BRITTANY	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	11
UNIVERSITY OF WINDSOR, GREAT LAKES INSTITUTE FOR ENVIRONMENTAL RESEARCH	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
UNIVERSITY OF WISCONSIN-MADISON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103	0	0	103
UNIVERSITY OF YORK, ENVIRONMENT DEPARTMENT	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
UPPSALA UNIVERSITY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
URAREN EUSKAL AGENTZIA - AGENCIA VASCA DEL AGUA (URA)	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7
US INTERNATIONAL ARCTIC BUOY PROGRAM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
UTRECHT UNIVERSITY, FACULTY OF SCIENCE, PHYSICS AND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	15

data_owner	Argo/Profiler	Botte Samples	Bottle data	Drifting Buoys	Ferrybox/Ship	Fishing Vessels	Gliders	HF Radar Radial	HF Radar Total	Mini Loggers	Mooring	River Station	Saildrone	Sea Mammals	Thermistor Chain Data	Thermistor chain data	Thermosalinographers	Tide Gauge	Vessel Mounted ADCP	Weather Station	XBT or XCTD profiles	XBT, XCTD or MBT profiles	total
ASTRONOMY, INSTITUTE FOR MARINE AND ATMOSPHERIC RESEARCH UTRECHT																							
VIRGINIA DEPARTMENT OF MINES MINERALS AND ENERGY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
VIRGINIA INSTITUTE OF MARINE SCIENCE	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3
VOICE OF THE OCEAN FOUNDATION	0	0	0	0	0	0	222	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222
WATERWAYS AND SHIPPING OFFICE MEPPEN	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
WOODS HOLE OCEANOGRAPHIC INSTITUTION	285	0	0	5	0	0	32	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	326
XYLEM WATER SOLUTIONS & WATER TECHNOLOGY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1

Full list of publications

Table 23. List of Publication from Google Scholar + Publish or Perish

Authors	Title	Year	Publisher
Authors	Title	Year	Publisher
CT Van Isacker Nathalie, ...	The European Atlas of the Seas: an ocean literacy tool powered by EMODnet for wider society	2024	researchportal.vub.be
A Novellino, V Pizziol, R Bordoni, ...	Constructing an open library containing a curated and continuously growing digital catalogue of individual sound signatures from the marine underwater ...	2024	upcommons.upc.edu
AER Hassoun, T Tanhua, I Lips, E Heslop, ...	The European Ocean Observing Community: urgent gaps and recommendations to implement during the UN Ocean Decade	2024	frontiersin.org
S Simoncelli, M Vernet, C Coatanoan	International Conference on Marine Data and Information Systems-Proceedings Volume.	2024	archimer.ifremer.fr
M Josse	Ocean's variables study	2024	training.galaxyproject.org
DMA Schaap, T Krijger, S Pittonet, P Pagano	Blue-Cloud 2026, services to deliver, access and analyse FAIR &Open marine data	2024	meetingorganizer.copernicus.org
Y Charouif, MR Lehnert	The offshore wind energy potential of Morocco: Optimal locations, cost analysis, and socioenvironmental examination	2024	Wiley Online Library
L Bosso, R Panzuto, R Balestrieri, S Smeraldo, ...	Integrating citizen science and spatial ecology to inform management and conservation of the Italian seahorses	2024	Elsevier
F Viola, A De Lorenzis, G Verri	A novel toolbox for accurate thalweg determination in riverbed profiling and Salt Wedge Intrusion length extraction	2024	ui.adsabs.harvard.edu
Z Uriondo Arrúe, JA Fernandes Salvador, KJ Reite, ...	Toward digitalization of fishing vessels to achieve higher environmental and economic sustainability	2024	ACS
A Peresan, HM Hassan	Scenario-based tsunami hazard assessment for Northeastern Adriatic coasts	2024	Springer
MM Penchah, M Bakhoday-Paskyabi, H Bui	Considering the effects of sea waves on offshore wind simulations in the Weather Research and Forecasting model	2024	techrxiv.org
DI Malliouri, C Kyriakidou, V Moraitis, ...	A new approach for the assessment of coastal flooding risk. Application in Rhodes island, Greece	2024	Elsevier
Z Uriondo, JA Fernandes-Salvador, KJ Reite, ...	Toward Digitalization of Fishing Vessels to Achieve Higher Environmental and Economic Sustainability	2024	ACS Publications
E Faraggiana, A Ghigo, M Sirigu, E Petracca, G Giorgi, ...	Floating offshore wind potential for Mediterranean countries	2024	cell.com
D Obaton, C Liétard, A Novellino, A Giorgetti	EuroSea data integration	2023	oceanrep.geomar.de
S EMODnet	European Marine Observation and Data Network (EMODnet)	2023	
G Pietropolli, L Manzoni, G Cossarini	Multivariate relationship in big data collection of ocean observing system	2023	mdpi.com
C Parcerisas, D Botteldooren, P Devos, E Debusschere	Clustering, categorizing, and mapping of shallow coastal water soundscapes	2023	vliz.be

Authors	Title	Year	Publisher
S Liubartseva, G Coppini, G Verdiani, ...	Modeling the operational oil spills from shipping in the Adriatic Sea	2023	researchgate.net
J Castro, AP Hughes, A Cid, AR Patrício, ...	First long-term study of live observations of loggerhead and leatherback turtles in southern Portugal with relevance for conservation	2023	Wiley Online Library
S Menegon, A Fadini, L Perini, A Sarretta, ...	A geoportal of data and tools for supporting Maritime Spatial Planning in the Adriatic-Ionian Region	2023	Elsevier
M Lorenz, A Arns, U Gräwe	How sea level rise may hit you through the backdoor: Changing extreme water levels in shallow coastal lagoons	2023	Wiley Online Library
B Pérez Gómez, J Lin-Ye, A Hibbert	Quality Information Document. In Situ TAC INSITU_GLO_PHY_SSH_DISCRETE_MY_013_053. And Synthetic Quality Overview document (SQO)	2023	archimer.ifremer.fr
J Ribera Altimir, G Llorach-Tó, J Sala Coromina, ...	Combining Fisheries Monitoring with Remote Sensing for Achieving Sustainability: From Data Collection to Web Visualization	2023	digital.csic.es
J Ribera-Altimir, G Llorach-Tó, J Sala-Coromina, ...	Fisheries data management systems in the NW Mediterranean: from data collection to web visualization	2023	academic.oup.com
NC Reyes Suarez, M Portier, A Giorgetti, R Schlitzer, ...	FAIR-EASE_D4. 2_Landscaping exercise_The inclusion of special use case datasets in the data lake	2023	ricerca.ogs.it
A Melet, R van de Wal, A Amores, A Arns, ...	Sea level rise in Europe: Observations and projections	2023	sp.copernicus.org
F Foglini, V Grande	A Marine Spatial Data Infrastructure to manage multidisciplinary, inhomogeneous and fragmented geodata in a FAIR perspective... the Adriatic Sea ...	2023	Elsevier
MD 'Amen, S Smeraldo, E Azzurro	Salinity, not only temperature, drives tropical fish invasions in the Mediterranean Sea, and surface-only variables explain it better	2023	Springer
L Neimane, S Michalak	Maritime spatial plans as an object of the right of access to information	2023	Elsevier
I Lips, E Heslop, E van Doorn, AER Hassoun, ...	Final Report of EOOS Implementation Plan	2023	oceanrep.geomar.de
D Eparkhina, C Keogh, T Tanhua, N Köstner, E Heslop, ...	EuroSea Legacy Report	2023	oceanrep.geomar.de
P Wintersteller, K Hartmann	The European harmonised bathymetry grid EMODnet Bathymetry-Introduction, outlook and contribution from German partners		
J Beja, C Delaney, T Collart	The EMODnet Central Portal: how federated webservices led to a centralisation success story		
A Braga-Henriques, FM Porteiro, PA Ribeiro, ...	SUPPLEMENTARY MATERIAL 1. List of references consulted to complement the species list extracted from EMODnet (see Materials and Methods section). Braga ...		digital.csic.es
R Kopte, M Becker, T Fischer, P Brandt, M Betz, ...	FAIR ADCP Data with OSADCP: A Workflow to Process Ocean Current Data from Vessel-Mounted ADCPs		frontiersin.org
BP Gómez, JL Ye, A Gallardo, F Manzano	PRODUCT USER MANUAL		

Authors	Title	Year	Publisher
L Pashova, B Ranguelov	Tsunami Research In Bulgaria-Gaps, Challenges, And Future Research Directions		
A Amores, A Arns, AA Chaigneau, I Dinu, ID Haigh, ...	Sea level rise in Europe: observations and projections		