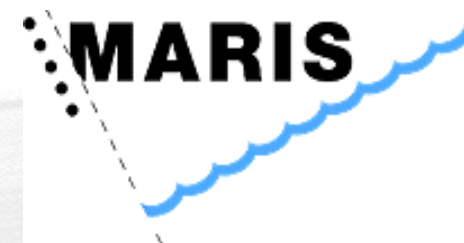


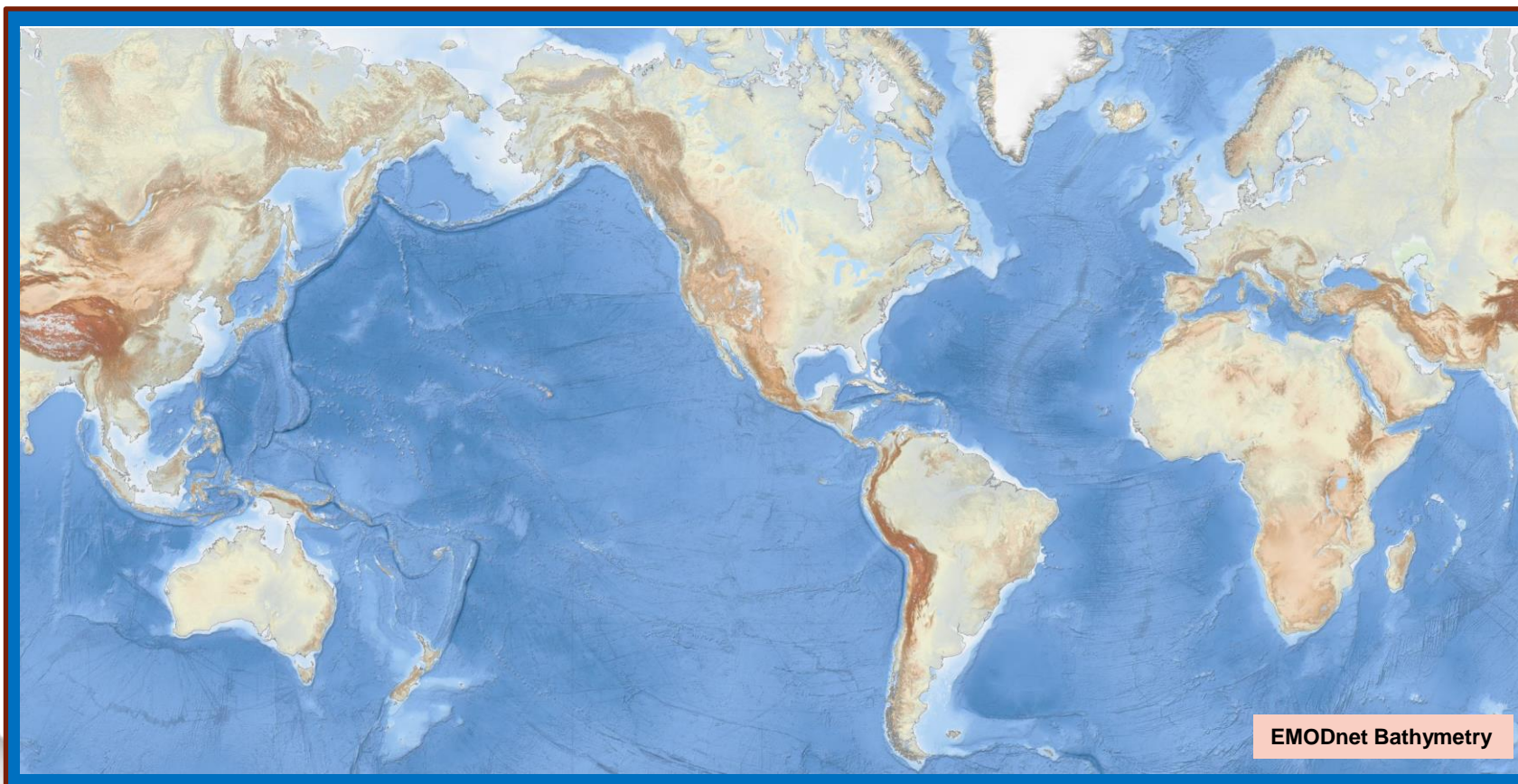
European marine and ocean data management and how to handle data from scientific cruises in Eurofleets+

Dick M.A. Schaap





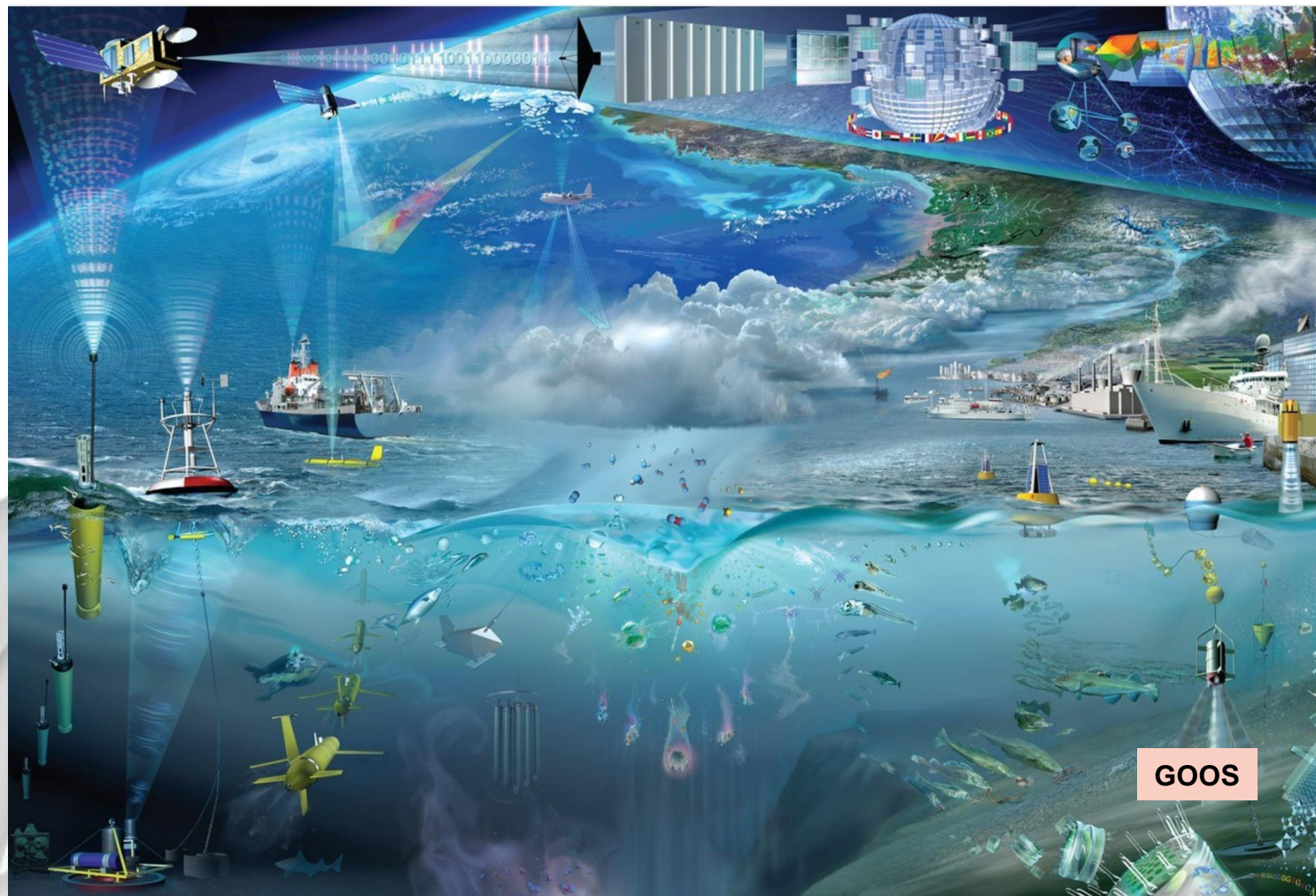
Oceans and seas are important



Climate, Energy, Food, Tourism, Trade, Health,



Acquisition of marine and ocean data

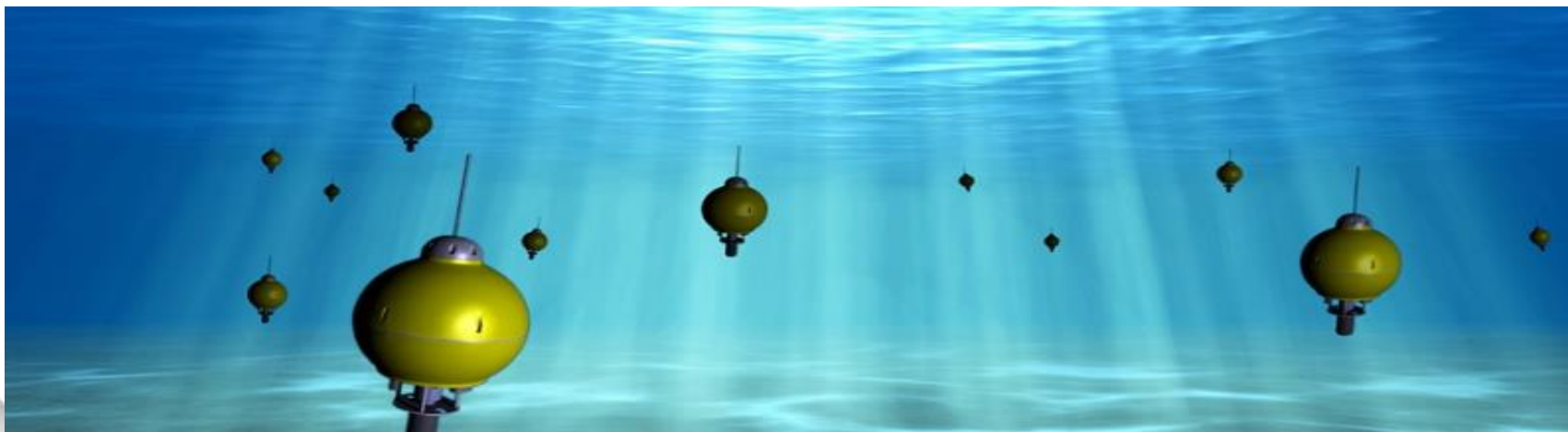


- Scientific Research to gain knowledge and insight
- Modelling (including hindcast, nowcast, forecast)
- Economic activities: shipping, offshore industry, dredging industry, fisheries, tourism, engineering ..
- Environmental Management: monitoring and assessment (water quality, climate status, stock assessment)
- Marine Conventions and Directives, in Europe: Water Framework Directive (WFD), Marine Strategy (MSFD), Marine Spatial Planning (MSP), Coastal Zone Management
- EU Strategies, such as Green Deal, Blue Environment, Blue Economy



Economy of data acquisition

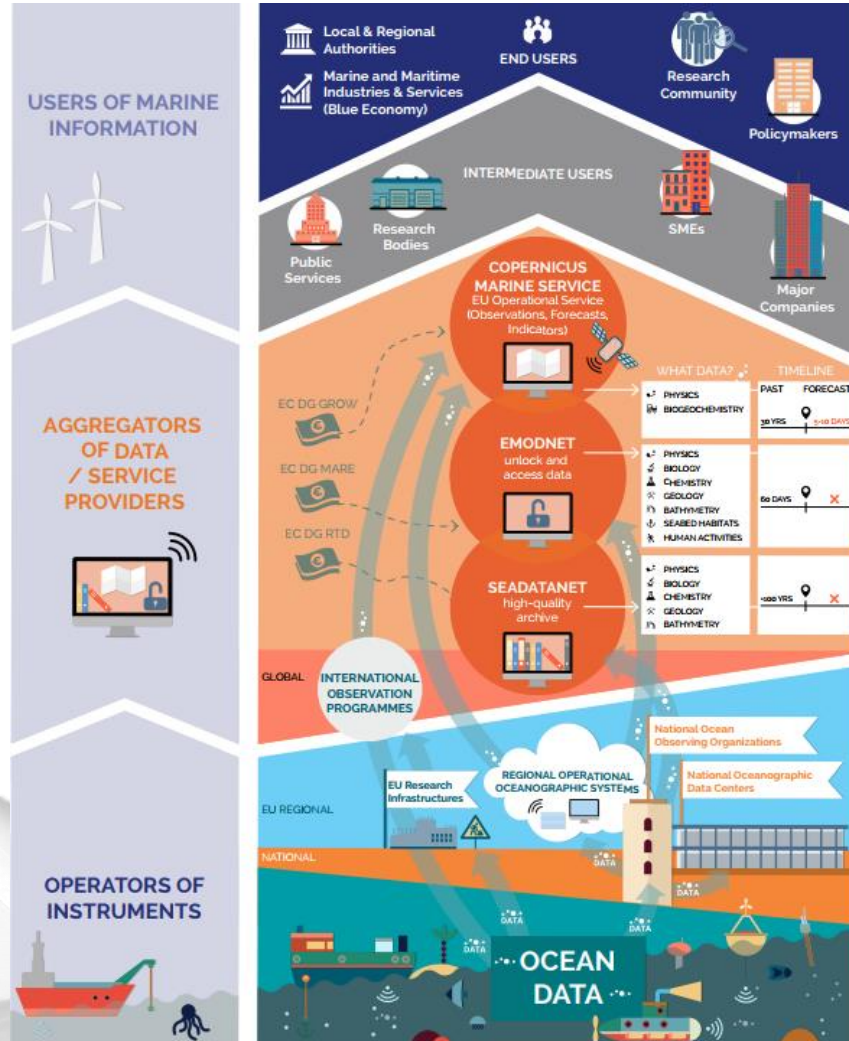
- Data are collected by governments, research institutes, and private industry: in Europe already more than several thousands of organisations)
- Data for physics, geophysics, meteorology, chemistry, biology, geology, bathymetry
- Acquisition of oceanographic and marine data is expensive; annual costs in Europe estimated at **1.4 Billion Euro** (1.0 = in-situ; 0.4 = satellites)



Professional data management is required with agreements on standardisation, quality control protocols, long term archiving, catalogues, and access



European landscape of marine data management



Data aggregators and providers of data products and services



What is SeaDataNet?



A pan-European infrastructure, initiated and set up by the NODCs and marine data focal points of 34 countries bordering the European seas

90s	Metadata directories Medar/MedAtlas
1998-2001	EuroNODIM (FP3)
2002-2005	Sea-Search (FP5)
2006-2011	SeaDataNet (FP6)
2011-2015	SeaDataNet II (FP7)
2016-2021	SeaDataCloud (H2020)



SeaDataNet AISBL since 2019

- Developing and maintaining of standards and associated tools, services, and guidance for metadata and data formats, and controlled vocabularies for handling many data types and disciplines, deploying FAIR and INSPIRE principles
- Providing training and support to data centres for uptake of standards, tools, and services in their operation
- Developing technological skills for uptake of emerging technologies and principles
- Developing and publishing integrated data products such as T&S climatologies
- Being a major player in the European ocean and marine data management landscape supporting EU initiatives like EMODnet, CMEMS, and EOSC and working together with several Research Infrastructures (RIs), also in the Blue-Cloud



8



SeaDataNet standards

“Making Data and Services:

- ***Findable***
- ***Accessible***
- ***Interoperable***
- ***Re-usable***

for machines and people.”



- **Common standards for the marine domain**, adapting ISO and OGC standards and achieving INSPIRE compliance:
 - **Metadata formats for data sets, research cruises, monitoring networks, organisations, and research projects**
 - **Standard data exchange formats : ODV ASCII and NetCDF (CF)**, fully supported by controlled vocabularies
 - **Controlled Vocabularies** for the marine domain (>90.000 terms in 110+ lists), with international governance and web services
- **Maintenance and dissemination of standard QA-QC procedures**, together with IOC/IODE and ICES



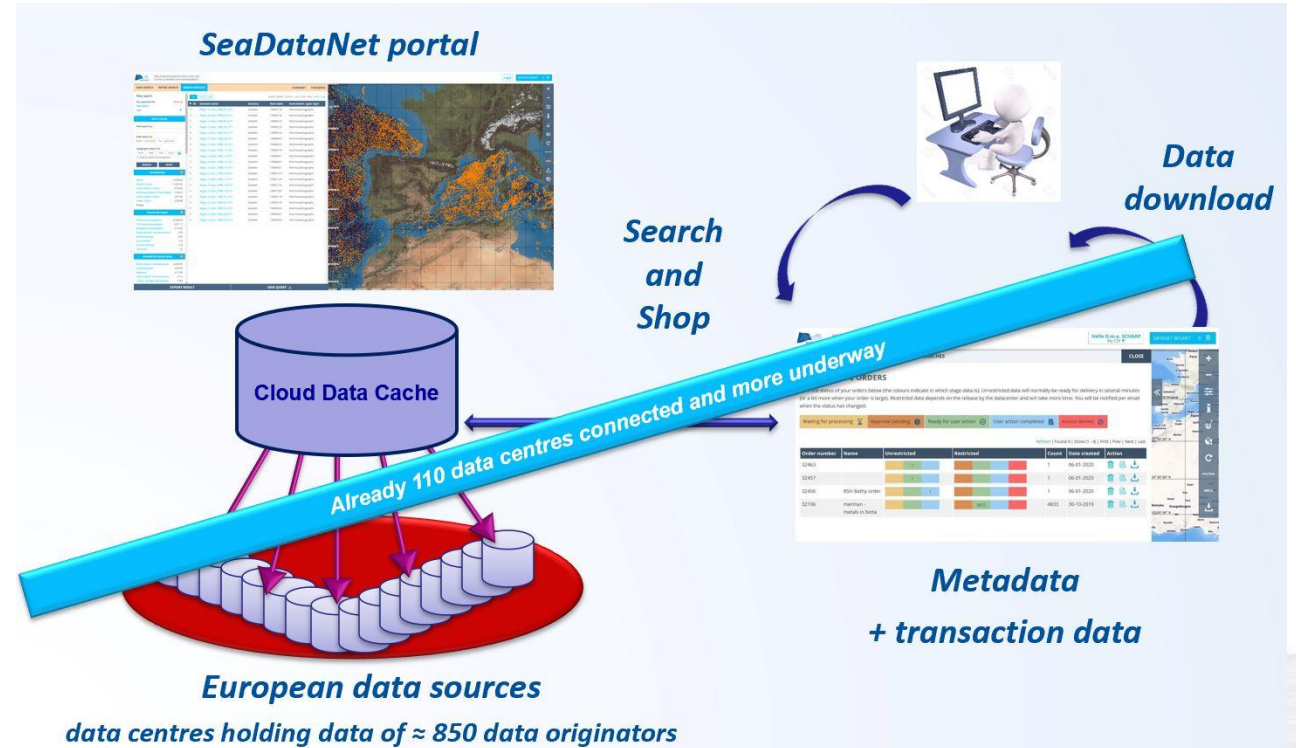


CDI Data Discovery & Access Service

*Cooperation with
EUDAT, European e-
infrastructure of
academic computing
centres*



As part of:

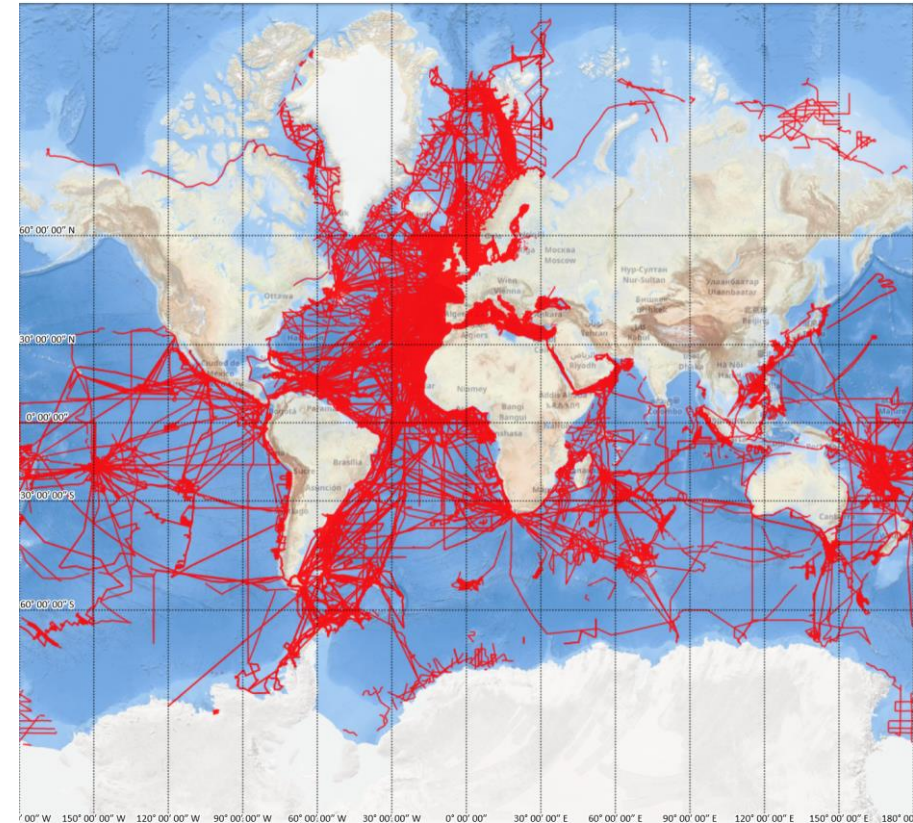
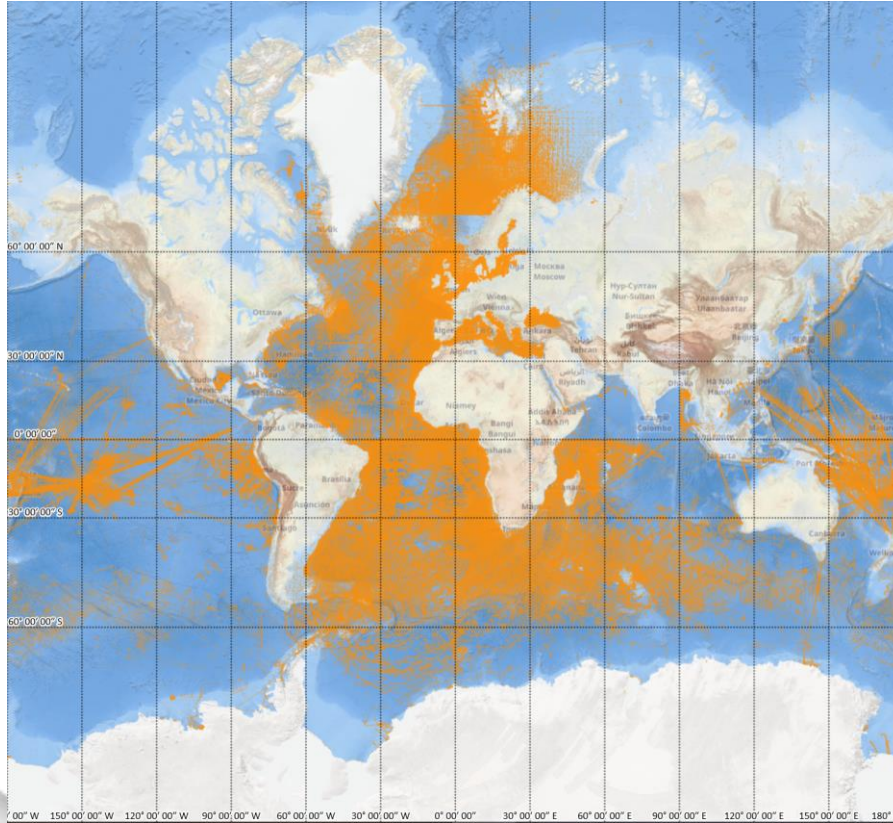


<https://cdi.seadatanet.org/search>

Providing harmonized discovery and access to marine and ocean data sets for physics, chemistry, geology, bathymetry, biology, and geophysics



CDI Data Discovery & Access Service



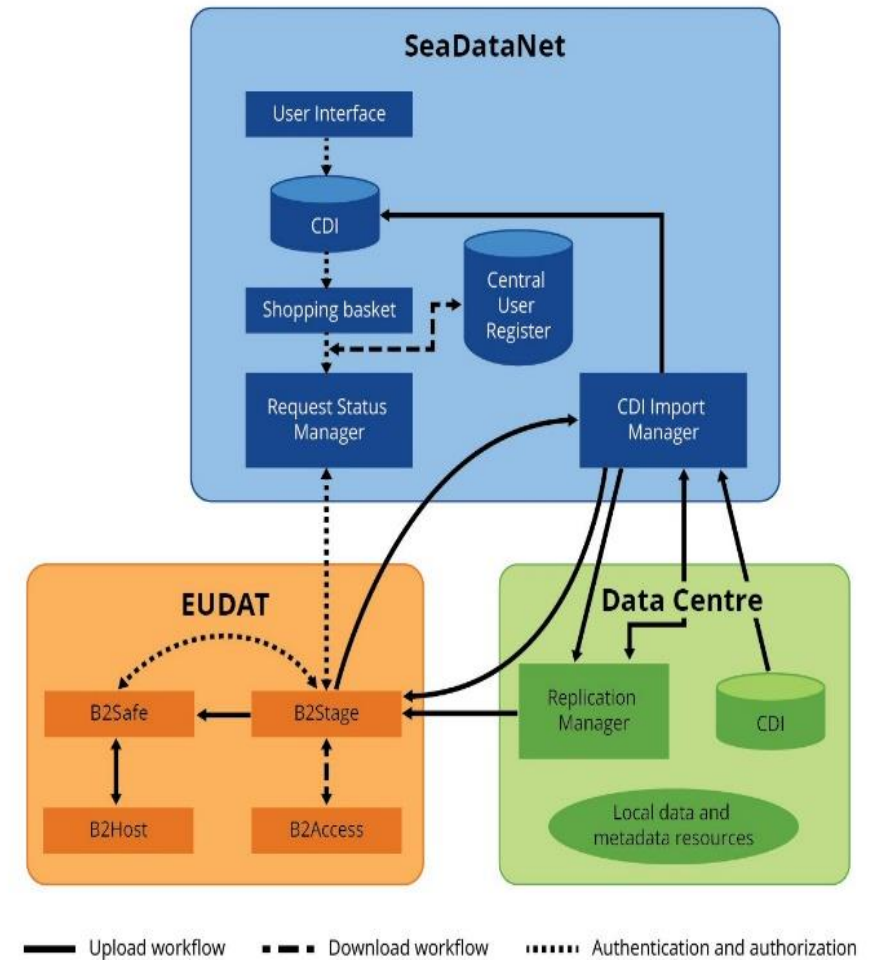
Nov 2022: more than 2.8 million CDI entries for physics, chemistry, biology, geology, bathymetry, and geophysics, from 117 data centres, located around the European seas, and 907 data originators.

<https://cdi.seadatanet.org/search>




CDI service architecture

- **Local software tools** at data centres to prepare CDI metadata and data ingestions
- **Replication Manager** (RM) at data centres for transfer entries from data centres to central CDI catalogue and EUDAT data cloud
- **EUDAT cloud** with adapted EUDAT services to store unrestricted data sets
- **CDI User Interface** with central CDI metadata catalogue and facilities for ordering and downloading data sets







CDI service user interface




PAN-EUROPEAN INFRASTRUCTURE FOR
OCEAN & MARINE DATA MANAGEMENT

 FEEDBACK

 SURVEY

Login

DATASET BASKET 0 

NEW SEARCHREFINE SEARCHSEARCH RESULTS

SUMMARYTIMESERIES


Filter search

You searched for:


Instrument Type:


CTD

EXPORT RESULT


SAVE QUERY 


INPUT FIELDS

Free search 

Date search 

From To


Geographic search 

North West East South 

☐ Search within bounding box

SEARCH

RESET

SEA REGIONS 

Atlantic Ocean (295552)

North Atlantic Ocean (284862)


Northeast Atlantic Ocean (40... (271726)

Baltic Sea (210188)

Mediterranean Region (156882)

Mediterranean Sea (121244)

+ More

DISCIPLINE (P08) 


Physical oceanography (751057)

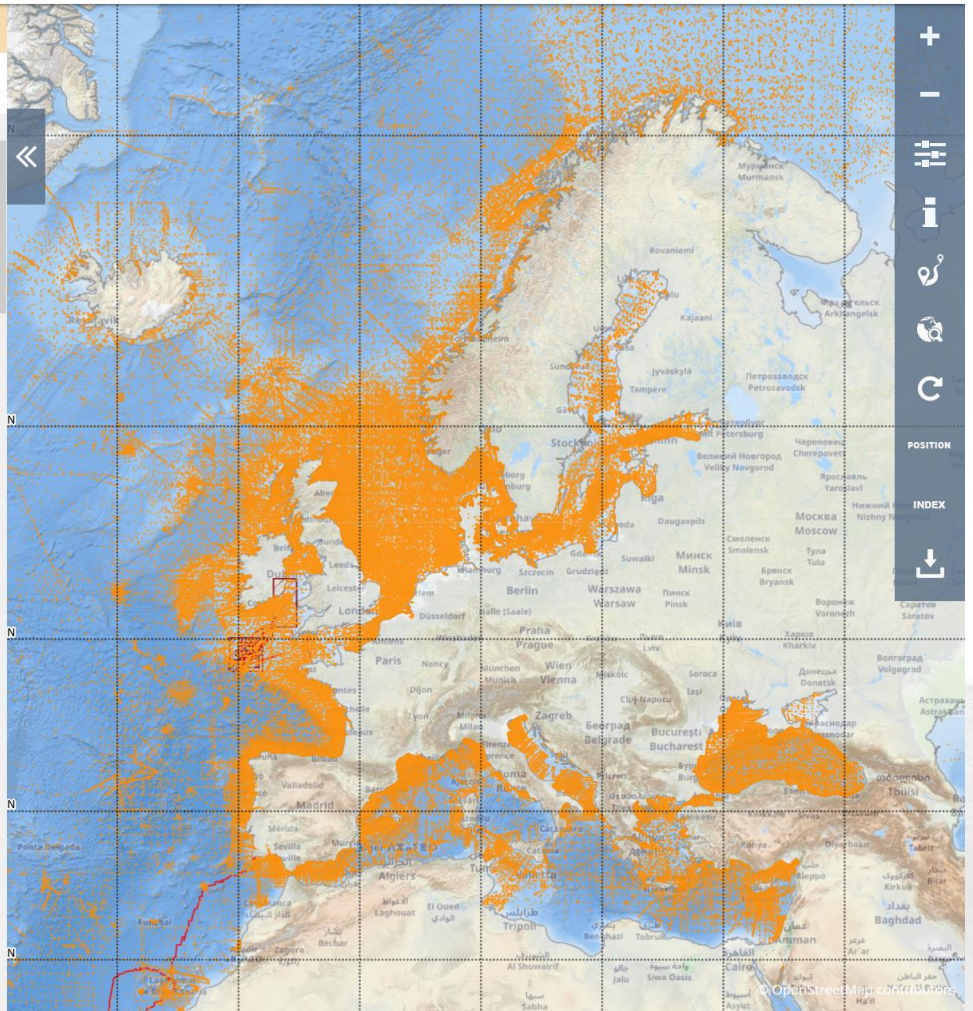
Administration and dimensi... (320780)


Chemical oceanography (315854)

100100010000

Found 763627 | Show (1 - 100) | First | Prev | Next | Last


	Dataset name	Country originator	Start date	Instrument / gear type
<input type="checkbox"/>	08V1_LT1B_CTD	Lithuania	20080212	CTD
<input type="checkbox"/>	08V1_LT1_CTD	Lithuania	20080211	CTD
<input type="checkbox"/>	08V1_LT2C_CTD	Lithuania	20080212	CTD
<input type="checkbox"/>	08V1_LT2_CTD	Lithuania	20080211	CTD
<input type="checkbox"/>	08V1_LT3_CTD	Lithuania	20080211	CTD
<input type="checkbox"/>	08V1_LT46_CTD	Lithuania	20080212	CTD
<input type="checkbox"/>	08V1_LT4C_CTD	Lithuania	20080212	CTD
<input type="checkbox"/>	08V1_LT4_CTD	Lithuania	20080212	CTD
<input type="checkbox"/>	08V1_LT5_CTD	Lithuania	20080213	CTD
<input type="checkbox"/>	08V1_LT64A_CTD	Lithuania	20080212	CTD
<input type="checkbox"/>	08V1_LT64_CTD	Lithuania	20080212	CTD
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<input type="checkbox"/>	08V1_LT6_CTD	Lithuania	20080213	CTD
<input type="checkbox"/>	08V1_LT7_CTD	Lithuania	20080213	CTD
<input type="checkbox"/>	08V1_LTB-1_CTD	Lithuania	20080211	CTD
<input type="checkbox"/>	08V1_LTB-4_CTD	Lithuania	20080212	CTD
<input type="checkbox"/>	08V1_LTN-6_CTD	Lithuania	20080213	CTD
<input type="checkbox"/>	08V2_LT1_CTD	Lithuania	20080507	CTD






+

-



POSITION

INDEX



CDI search example for CTD measurements



CDI Data Discovery & Access Service



PAN-EUROPEAN INFRASTRUCTURE FOR
OCEAN & MARINE DATA MANAGEMENT

FEEDBACK

SURVEY

Login

DATASET BASKET 0

NEW SEARCH

REFINE SEARCH

SEARCH RESULTS

SUMMARY

TIMESERIES

Filter search

You searched for: Reset all

Free search: tara oceans

EXPORT RESULT SAVE QUERY

INPUT FIELDS

Free search ?

Date search ?

From yyyymmdd To yyyymmdd

Geographic search ?

North West East South ?

☐ Search within bounding box

SEARCH RESET

SEA REGIONS ?

Mediterranean Region (2491)

Mediterranean Sea (2218)

Mediterranean Sea, Eastern ... (2173)

Atlantic Ocean (677)

Pacific Ocean (558)

North Atlantic Ocean (508)

+ More

DISCIPLINE (P08) ?

Physical oceanography (4296)

Chemical oceanography (2613)

Found 4386 | Show (2701 - 2800) | First | Prev | Next | Last

SELECT ☐

DATASET NAME Environmental parameters measured on discrete water samples during the Tara Oceans expedition 2009-2013.

COUNTRY ORIGINATOR France

START DATE 20101009

INSTRUMENT / GEAR TYPE discrete water samplers

SELECT ☐

DATASET NAME Environmental parameters measured from physical and optical sensors during Tara Oceans expedition 2009-2013.

COUNTRY ORIGINATOR France

START DATE 20101009

INSTRUMENT / GEAR TYPE CTD

SELECT ☐

DATASET NAME Environmental parameters measured on discrete water samples during the Tara Oceans expedition 2009-2013.

COUNTRY ORIGINATOR France

START DATE 20101009

INSTRUMENT / GEAR TYPE discrete water samplers

SELECT ☐

DATASET NAME Environmental parameters measured from physical and optical sensors during Tara Oceans expedition 2009-2013.

COUNTRY ORIGINATOR France

START DATE 20101012

INSTRUMENT / GEAR TYPE CTD

SELECT ☐

DATASET NAME Environmental parameters measured on discrete water samples during the Tara Oceans expedition 2009-2013.

COUNTRY ORIGINATOR France

85° 00' 00" N

60° 00' 00" N

30° 00' 00" N

0° 00' 00" N

30° 00' 00" S

60° 00' 00" S

150° 00' 00" W 120° 00' 00" W 90° 00' 00" W 60° 00' 00" W 30° 00' 00" W 0° 00' 00" 30° 00' 00" E 60° 00' 00" E 90° 00' 00" E 120° 00' 00" E 150° 00' 00" E

© OpenStreetMap contributors

CDI search example for Tara-Oceans cruises

<https://cdi.seadatanet.org/search>



Fit for handling many data types

- **SeaDataNet metadata and data formats for:**
 - **Physical** data sets, developed with NODCs
 - **Chemistry** datasets, developed with EMODnet Chemistry
 - **Biological** data sets, developed with EurOBIS
 - **Geological and geophysical** data sets, developed with EuroGeoSurveys
 - **Bathymetry** data sets, developed with EMODnet Bathymetry
 - **HF-Radar** data sets, developed with EuroGOOS and EMODnet Physics
 - **Glider** data sets, developed with Ocean Glider network
 - **Flow Cytometry** data together with CNRS and JERICO
 - **Marine Litter** data (beach, seafloor, and micro litter), developed with EMODnet Chemistry and TG ML
- **SeaDataNet Controlled Vocabularies** expanded with new lists and new terms:
 - Currently, 115 lists with > 91000 terms
 - Available as Web Services, SparQL endpoint, User Interfaces, and with P01 Vocabulary builder and decomposer



Tools & services provided

- Software tools for generating XML entries (MIKADO), format conversions and format checking (NEMO and OCTOPUS)
- Software tools for analyses (ODV) and interpolations (DIVA)
- Online versions of ODV (WebODV) and DIVA (DIVAnd) as part of SeaDataNet Virtual Research Environment (VRE)
- Sensor Web Enablement (SWE) toolkit for operational data streams
- SEANOE data publishing and DOI minting service
- Vocabulary and Directories web services
- Brokerage service for discovery and access of several international repositories (NCEI-USA, WOD-USA, AODN-Australia)



SeaDataNet cooperation

- **Many research projects:** ENVRI-FAIR, MARINET2, PHIDIAS, E-Shape, EOSC-EGI-ACE, EOSC-Future, AtlantOS,, adopting and adapting SeaDataNet standards and services, and use cases
- **Large ocean monitoring systems:** EuroGOOS, JERICO-S3, EuroFleets+, Euro-Argo, Gliders, ... adopting standards and services for validation + long-term archiving
- **Blue-Cloud project in G7 Future of the Oceans framework:** pillar under Blue-Cloud Data Discovery & Access service, federating SeaDataNet, EMODnet, ELIXIR-ENA, EurOBIS, EcoTaxa, ICOS, SOCAT, and Euro-Argo
- **GEOSS - EuroGEOSS:** populating the GEOSS portal with SeaDataNet in-situ data collections for global sharing
- **UNESCO IOC – IODE network and Ocean Data Portal:** global data exchange and interoperability solutions
- **Copernicus Marine Services (CMS):** providing standards, and cooperation in T&S climatologies

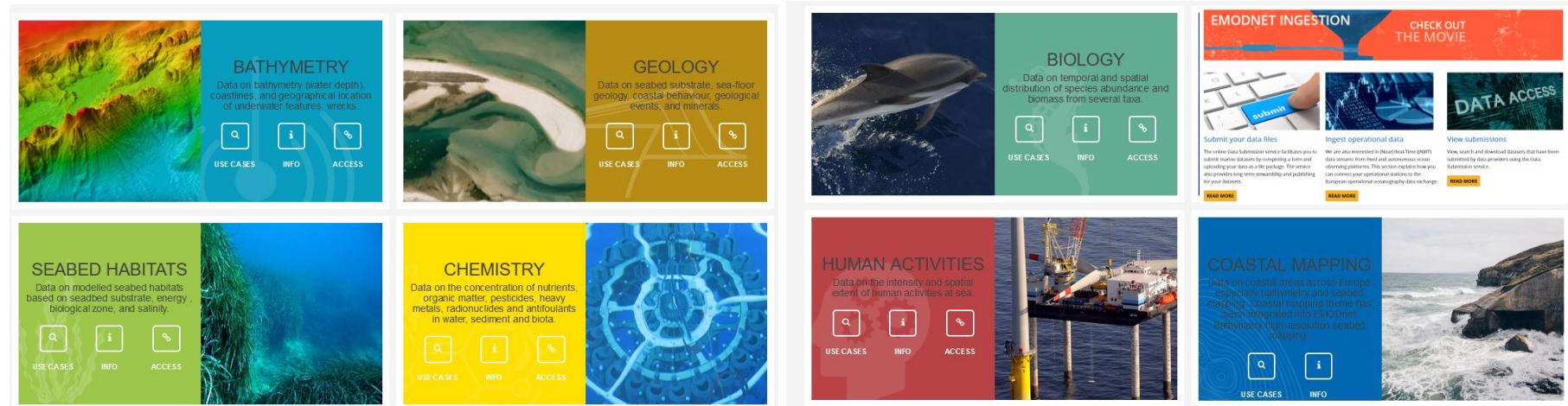
SeaDataNet is the essential data management link between marine and ocean data collectors (research cruises, operational monitoring, fixed network, autonomous floats, ..) and the overarching infrastructures such as EMODnet, CMS, Blue-Cloud, and EOSC



Cooperation with



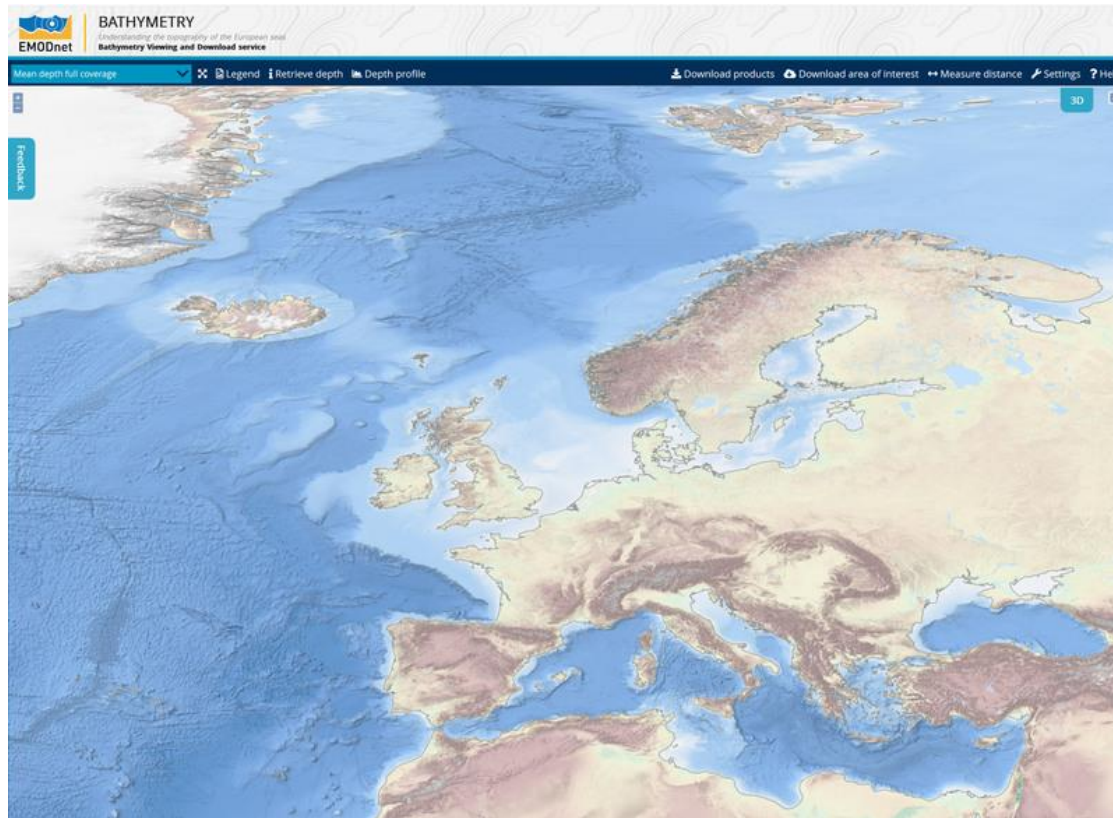
- The overarching **European Marine Observation and Data Network (EMODnet)** was initiated in 2008 by EU DG MARE



- SeaDataNet qualified as a leading infrastructure for the EMODnet data management component and is driving several thematic portals from the start
- This synergy has resulted in many more data centres adopting SeaDataNet standards and connecting to the CDI Data Discovery and Access service, while it gave a flying start to EMODnet
- EMODnet has a focus on **European data products and services** in support of Blue Economy, Blue Environment and Marine Knowledge 2020 agendas
- The data sets as gathered, harmonised and delivered by SeaDataNet provide essential input for generating and regularly updating EMODnet data products

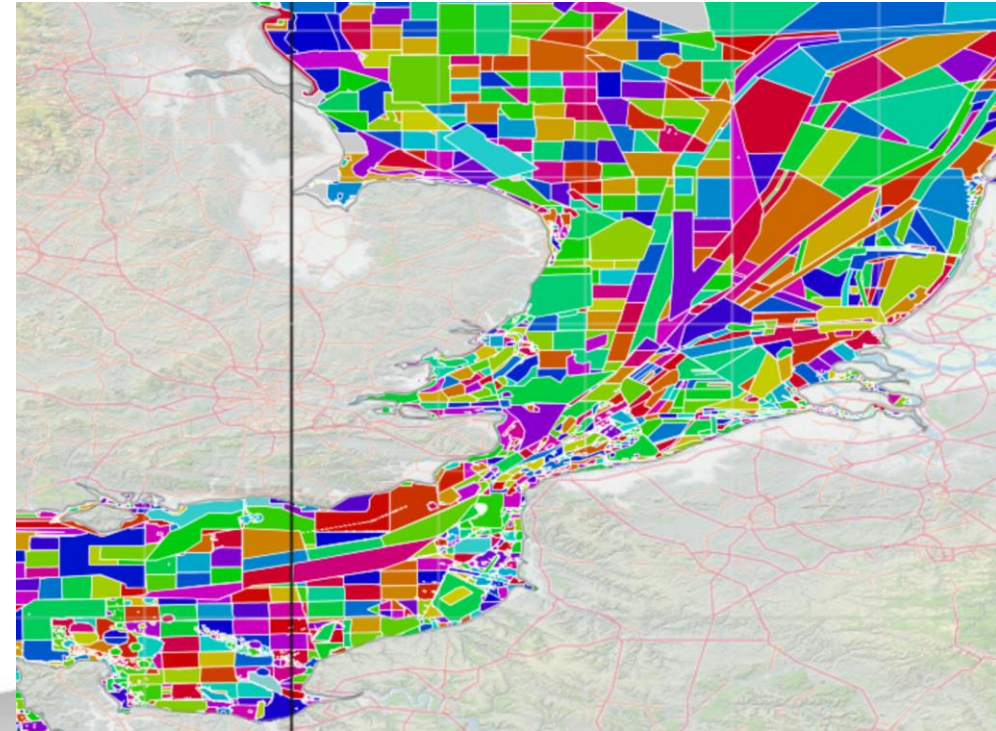


Example: EMODnet Bathymetry



The best Digital Terrain Model for European seas:


- * Resolution 115 * 115 meters
- * Based upon > 16.000 survey and SDB data sets




Source reference layer with direct links to CDI service for metadata about used data




Example: EMODnet Bathymetry




BATHYMETRY
Understanding the topography of the European seas
CDI Data Discovery and Access Service

 **FEEDBACK**

 **SURVEY**

Login

DATASET BASKET 0 

NEW SEARCHREFINE SEARCHSEARCH RESULTS

SUMMARYTIMESERIES

Filter search

EXPORT RESULT

SAVE QUERY 

INPUT FIELDS

Free search 

Date search 
From To

Geographic search 

NorthWestEastSouth

☐ Search within bounding box

SEARCH

RESET

SEA REGIONS 

Atlantic Ocean (18189)

North Atlantic Ocean (18115)

Northeast Atlantic Ocean (40... (17324)

Baltic Sea (10525)

North Sea (6788)

Central Baltic Sea (4782)

+ More

MEASURING AREA TYPE 

surface (38988)

curve (2326)

INSTRUMENT TYPE 

100100010000

Found 41314 | Show (1 - 100) | First | Prev | Next | Last

<input type="checkbox"/>	Dataset name	Country originator	Start date	Instrument / gear type
<input type="checkbox"/>	Celtic Explorer Bathymetry CE0701 Kerry 14m Globe dtm	Ireland	20070417	multi-beam echosounders Differential Global Positioning System receivers
<input type="checkbox"/>	Celtic Explorer Bathymetry CE0702 Kerry 14m Globe Dtm	Ireland	20070516	multi-beam echosounders Differential Global Positioning System receivers
<input type="checkbox"/>	Celtic Voyager Bathymetry CV0901 Shannon 14m Globe Dtm	Ireland	20090318	multi-beam echosounders Differential Global Positioning System receivers
<input type="checkbox"/>	Celtic Voyager Bathymetry CV0902 Dingle 5m NetCDF	Ireland	20090515	multi-beam echosounders Differential Global Positioning System receivers
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<input type="checkbox"/>	Celtic Voyager Bathymetry CV0902 Tralee 14m Globe Dtm	Ireland	20090515	multi-beam echosounders Differential Global Positioning System receivers
<input type="checkbox"/>	Celtic Voyager Bathymetry CV0903 Wexford 14m Globe Dtm	Ireland	20090729	multi-beam echosounders Differential Global Positioning System receivers
<input type="checkbox"/>	Celtic Voyager Bathymetry CV0905 UCC Dublin 5m NetCDF	Ireland	20091126	multi-beam echosounders Differential



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-











POSITION

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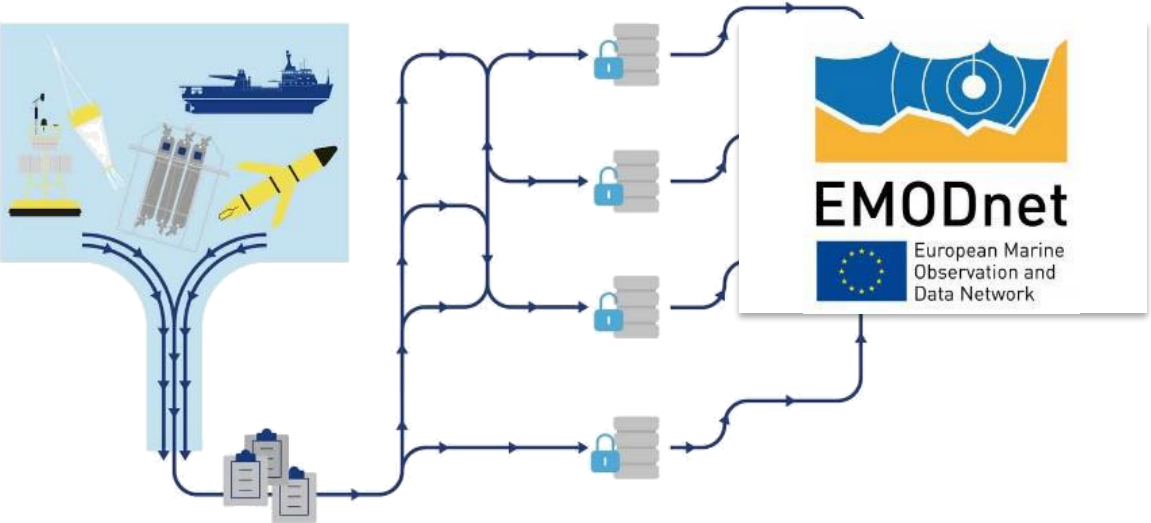


Example: EMODnet Bathymetry





Example: EMODnet Chemistry



Collection, **A**ggregation, Standardization, **Q**uality check of EU marine water quality data relevant to the EU Marine Directives and to global climate change

Group of Parameters		Parameters
Marine Litter	Beach macrolitter, Seafloor macrolitter, Floating microlitter	Composition, Abundance, etc.
Ocean acidification	Acidity	pH, PCO ₂ , etc.
Contaminants	Antifoulants, Hydrocarbons, Heavy metals, Pesticides, Polychlorobiphenyls (PCBs), Radionuclides	Anthracene, Fluoranthene, Me, Cd, Pb, TBT, DDTs, etc.
Eutrophication	Nutrients, dissolved gases, etc.	N, P, Si, Chl-a, O ₂ , C, etc.

Eutrophication
5.

Concentrations of contaminants
8.

Contaminants in fish/seafood for human consumption
9.

Marine litter
10.

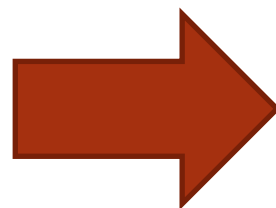


Example: EMODnet Chemistry

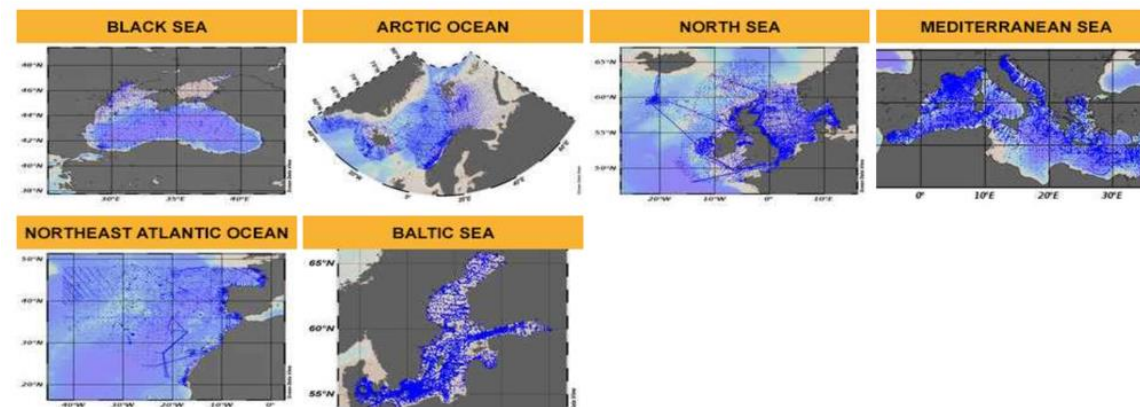
Eutrophication (nutrients, chlorophyll and oxygen) and Ocean Acidification (alkalinity and pH) in seawater



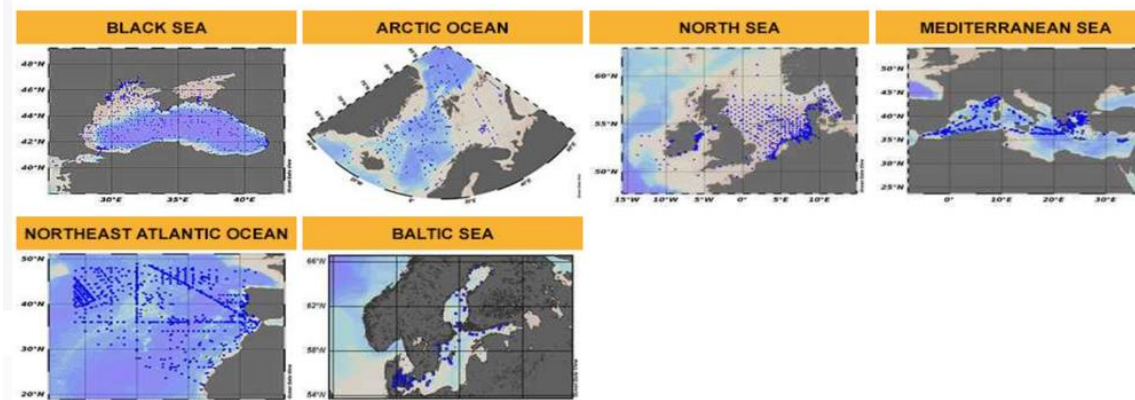
Free and open access to **over 1 million chemistry data sets** in all EU sea basins



QA-QC & Harmonisation by Regional experts



Contaminants in seawater, biota and sediment



Data collections

Data are harmonized, standardized, validated and made available as regional and global data collections.





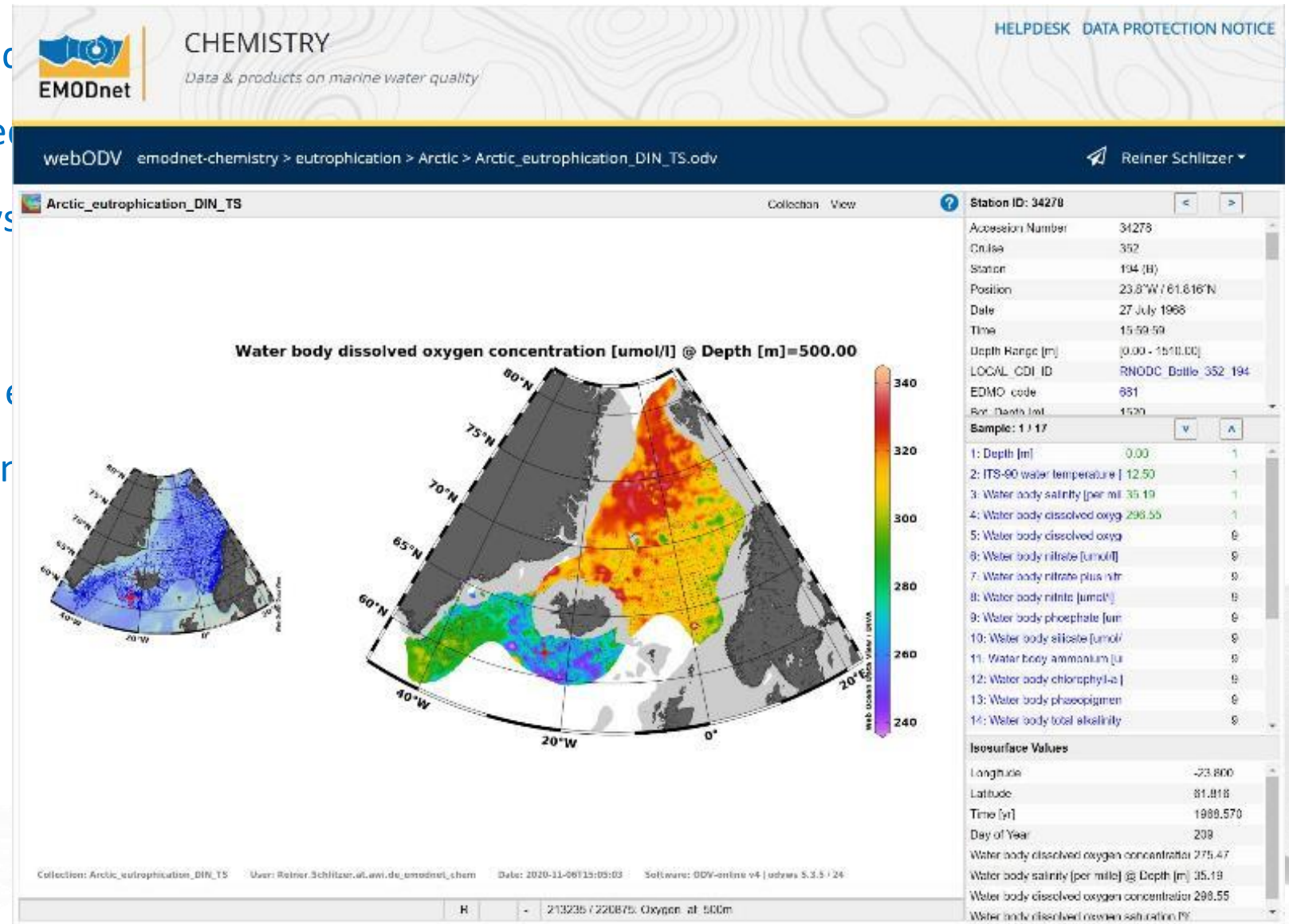
Example: EMODnet Chemistry

- The validated Data Collections can be downloaded and also can be analysed, visualised and extracted using the WebODV explorer and extractor service, enabling:
 - to browse, sub-set, and export data sets into several formats.
 - perform in-depth scientific analyses,
 - prepare extracts and all kinds of visualisations for scientific papers and analytical documents and presentations.



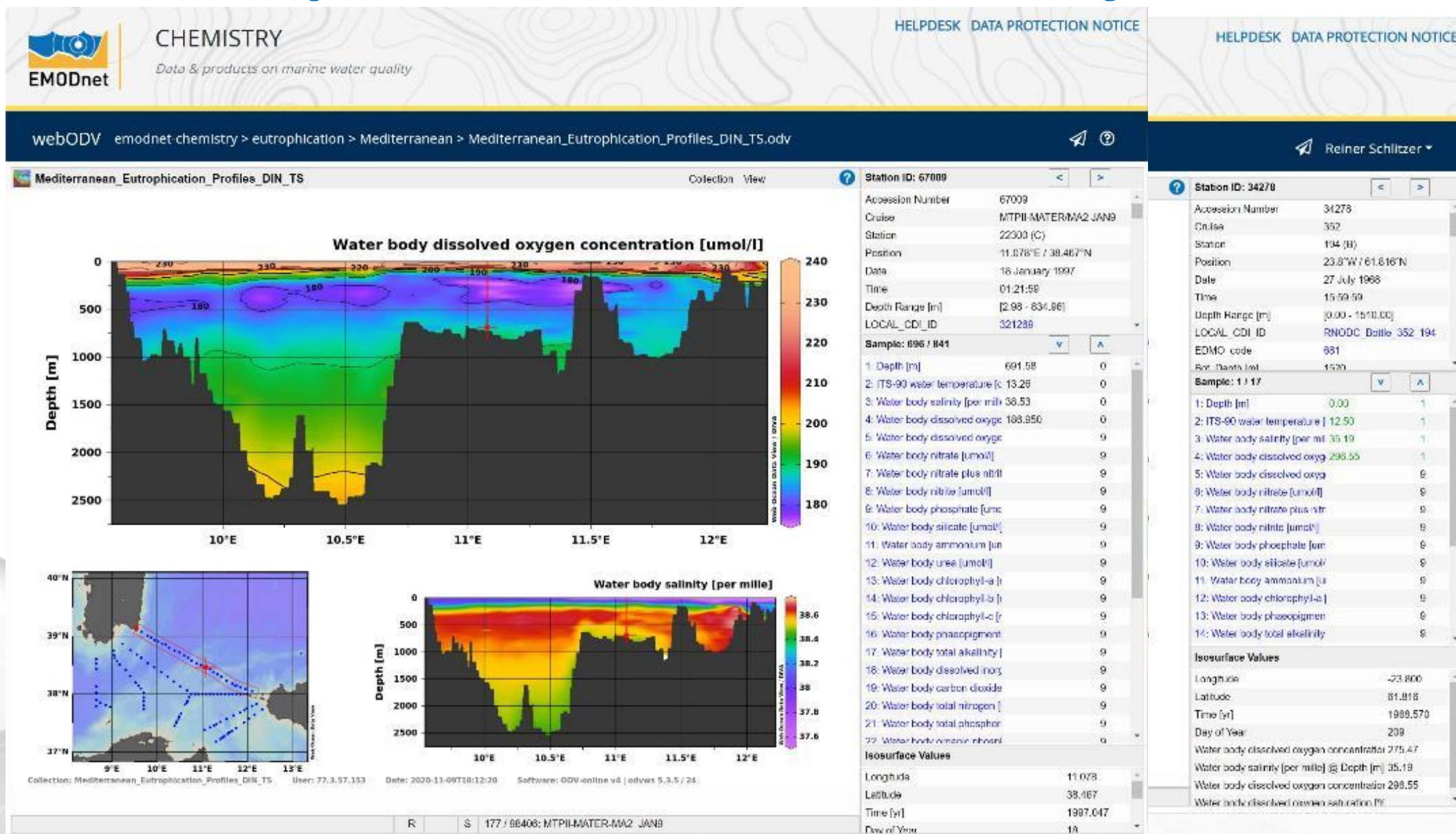
Example: EMODnet Chemistry

- The validated and extracted data
- to browse
- perform
- prepare a document





Example: EMODnet Chemistry





Blue-Cloud initiative

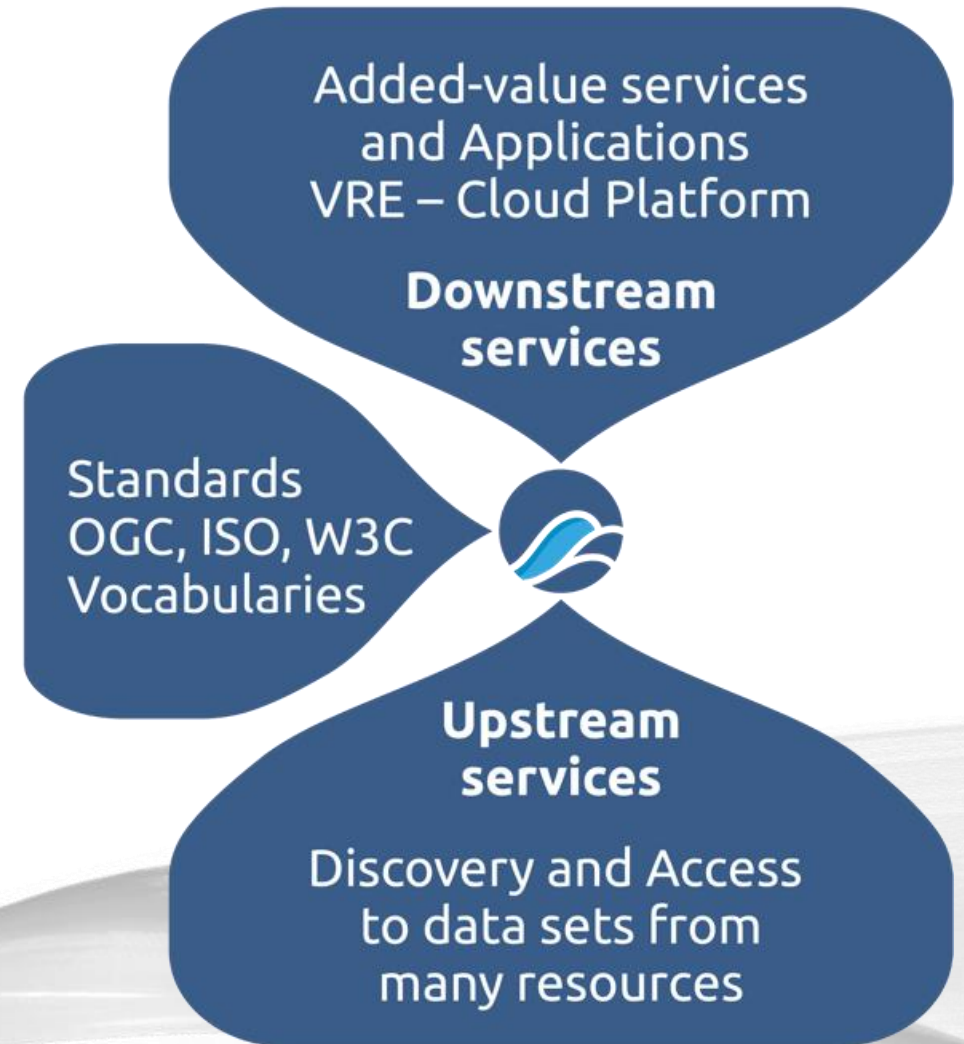
- To explore and demonstrate the potential of **cloud based open science** supporting research for ocean sustainability, and UN Decade of the Oceans and G7 Future of the Oceans
- To deploy a **cyber platform with smart federation** of multidisciplinary data repositories, analytical tools, and computing facilities
- To develop a **marine thematic European Open Science Cloud (EOSC)** serving the blue economy, marine environment & marine knowledge agendas





Blue-Cloud overarching concept

- Developing and deploying Virtual Research Environment (VRE) with an array of services for configuring and running Virtual Labs for specific analytical workflows, use cases, and demonstrators
- Applying common standards and interoperability solutions for providing harmonized metadata and data
- Developing and deploying harmonized discovery and access to established European marine data management and processing infrastructures





Blue-Cloud federation of major infrastructures



D4SCIENCE
INFRASTRUCTURE

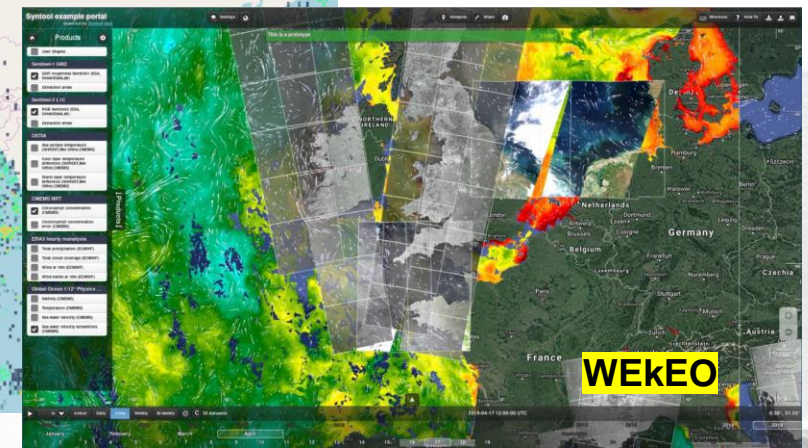
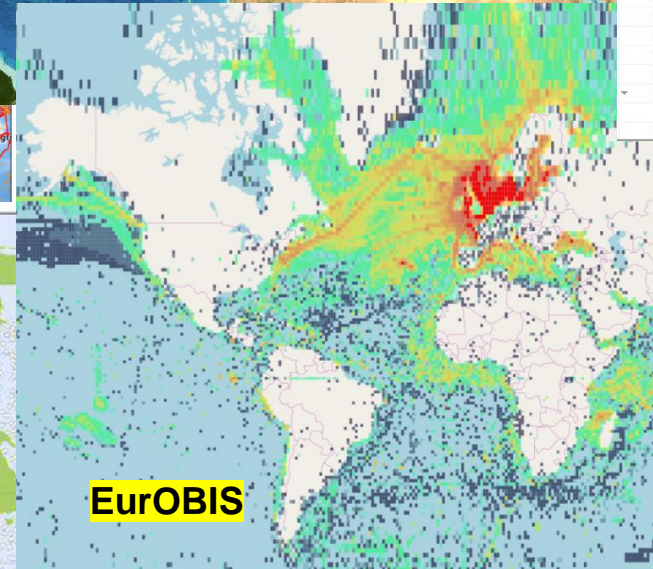
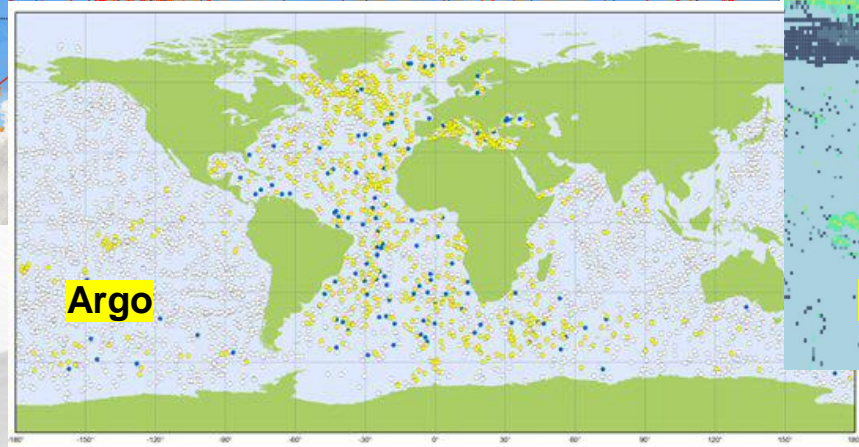
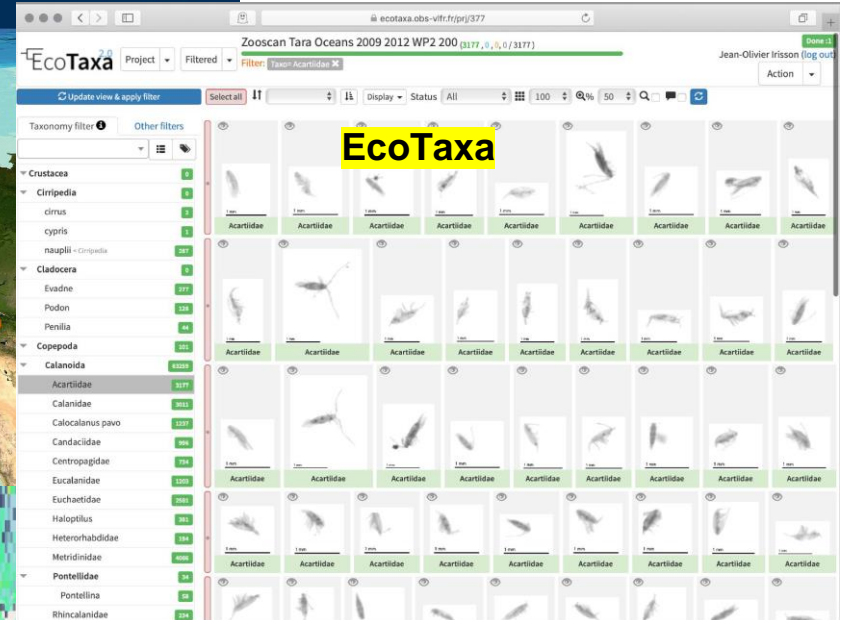
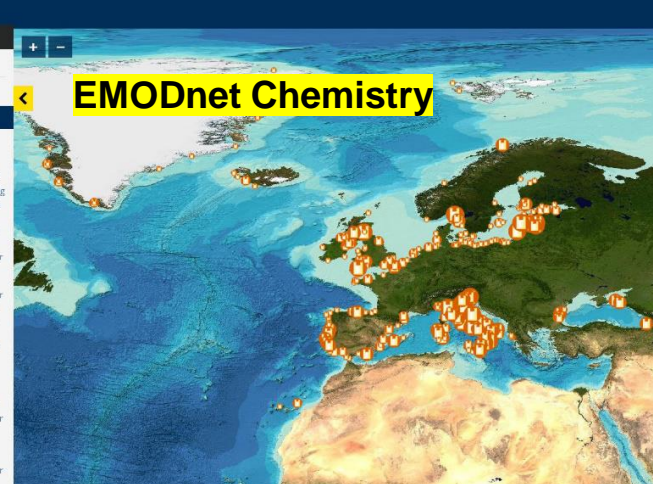
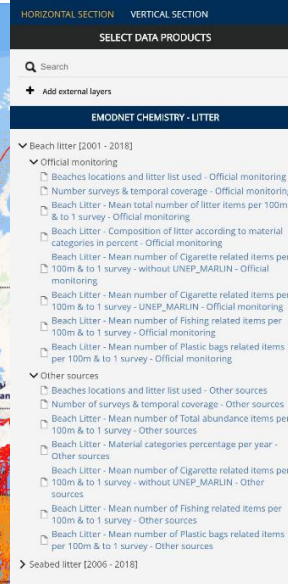
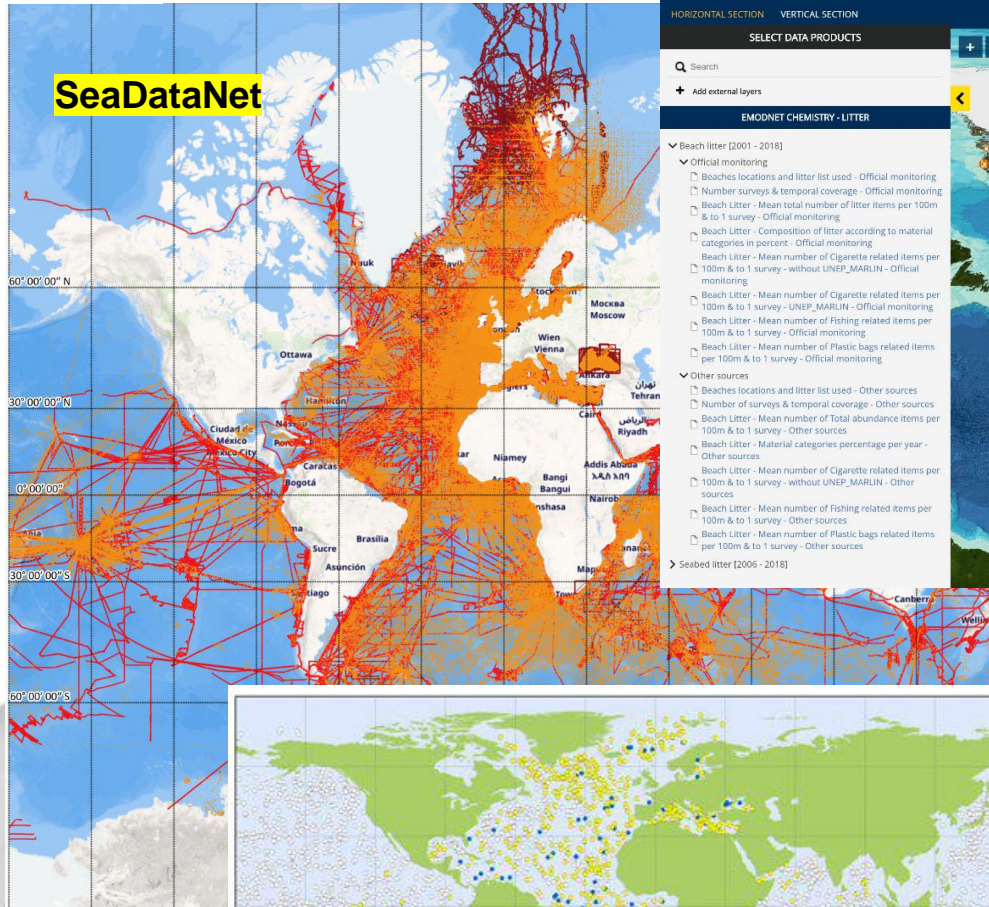


Blue Data infrastructures

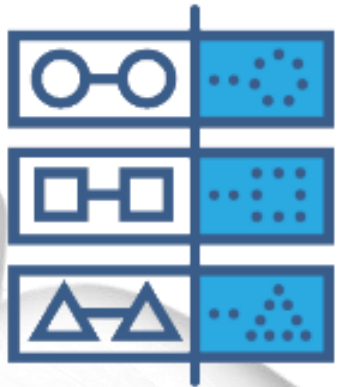
E-infrastructures



Illustrations of data coverage



Key products and services



- **Blue-Cloud Data Discovery & Access service**, federating key European data management infrastructures, to facilitate users in finding and retrieving multi-disciplinary datasets from multiple repositories
- **Blue-Cloud Virtual Research Environment infrastructure** to provide a range of services and to facilitate orchestration of computing and analytical services for constructing, hosting and operating Virtual Labs for specific applications
- **Blue-Cloud Virtual Labs**, configured with specific analytical workflows to serve as **Demonstrators**, which can be adopted and adapted for other inputs and analyses

www.blue-cloud.org



Biodiversity
Zoo and Phytoplankton EO
products



Genomics
Plankton Genomics



Environment
Marine Environmental
Indicators




Fisheries
Global Record of Stocks and
Fisheries



Aquaculture
Aquaculture Monitor



DATA DISCOVERY & ACCESS SERVICE



Pioneering innovative services for Marine Research & the Blue Economy

DATA DISCOVERY & ACCESS SERVICE

[?](#) [FEEDBACK](#) [WELCOME DICK M.A. SCHAAP](#) [DATASET BASKET 0](#)

Filter search










Free search

Date search

From

To

Geographic search

Blue Data infrastructures	Level 2 Search	Level 1 Results (25848)	Level 1 Total	Last update
 EcoTaxa	Level 2 Search	10	10	2022-06-19
 ELIXIR-ENA	Level 2 Search	32	32	2022-06-19
 EMODnet Chemistry	Level 2 Search	210	210	2022-06-19
 EuroArgo - Argo	Level 2 Search	16998	16998	2022-05-01
 EurOBIS - EMODnet Biology	Level 2 Search	1024	1024	2022-06-19
 ICOS data portal	Level 2 Search	195	195	2022-05-08
 SeaDataNet	Level 2 Search	859	859	2022-05-29
 SeaDataNet-products	Level 2 Search	49	49	2022-06-19
 Socat	Level 2 Search	6471	6471	2022-05-29

<https://data.blue-cloud.org>



DATA DISCOVERY & ACCESS SERVICE

Blue-Cloud
Pioneering innovative services for Marine Research & the Blue Economy

DATA DISCOVERY & ACCESS SERVICE

WELCOME DICK M.A. SCHAAP

DATASET BASKET 0

Filter search

Free search

Date search

From

To

Geographic search

North

West

South

SEARCH

Reset all

You searched for: EuroArgo - Argo

Free search

Date search

From

To

Geographic search

North

West

East

South

SEARCH

RESET

Back to search

Results found: 16998

(1 - 100)

100 500 1000

VIEW MAP

ID	Title	Start date	End date	Level2
78501	6461 - 5905972 - Argo UW-SOCCOM	20180830	20190928	Level 2 details
78843	APEX Profiling Float - 4901132 - Argo Canada	20090715	20140109	Level 2 details
78347	0587 - 1902334 - Argo JAMSTEC	20191225	20220423	Level 2 details
78625	SOLO Profiling Float - 4900333 - Argo SIO	20030331	20060628	Level 2 details
78728	SOLO Profiling Float SBE - 1901435 - Argo SIO	20100117	20160426	Level 2 details
79669	APEX Profiling Float SBE 5389 - 2901303 - Argo INDIA	20110212	20200425	Level 2 details
78812	NAVIS-A-SBE - 2902536 - Argo JAMSTEC	20150601	20200914	Level 2 details
78723	APEX Profiling Float IR_SBE_5374 - 5903740 - Argo UW	20120305	20171125	Level 2 details
78889	PROVOR Profiling Float - 6901881 - Argo GREECE	20131101	20140901	Level 2 details
79762	SOLO Profiling Float SBE - 5903757 - Argo SIO	20110821	20160320	Level 2 details
78817	APEX Profiling Float - 3900500 - Argo UW	20051217	20200603	Level 2 details

<https://data.blue-cloud.org>



DATA DISCOVERY & ACCESS SERVICE

The screenshot displays the Blue-Cloud Data Discovery & Access Service interface. The top navigation bar includes the Blue-Cloud logo, the service name, a feedback button, a welcome message for 'DICK M.A. SCHAAAP', and a dataset basket icon. The main content area features a search bar with the text 'EuroArgo - Argo' and a 'Filter search' button. Below the search bar, there are filters for 'Free search', 'Date search', and 'Geographic search'. The 'Geographic search' filter is expanded, showing options for 'North', 'South', 'West', and 'East'. A 'SEARCH' button is visible. The main map area shows a world map with numerous red bounding boxes indicating search results. A sidebar on the left contains additional search filters and a 'SEARCH' button. The bottom of the interface shows a 'VIEW RESULTS' button and a 'DATASET BASKET' icon.

<https://data.blue-cloud.org>



DATA DISCOVERY & ACCESS SERVICE

The screenshot displays the Blue-Cloud Data Discovery & Access Service interface. The header includes the Blue-Cloud logo, the service name, a feedback button, a welcome message for 'DICK M.A. SCHAAAP', and a dataset basket icon. The main content area is divided into a left sidebar for filters and a right section for search results.

Filter search sidebar:

- Free search:** You searched for: EuroArgo - Argo
- Date search:** From: To: (Date range selection)
- Geographic search:** North, West, South, East (Geographic area selection)
- SEARCH** button

Search results section:

Results found: 296 in 0.07 Seconds (1 - 100) 100 296 VIEW MAP

Platform	Platform Code	Transmission System	Cycle	Cycle Start Date
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	255	2021-08-13T07:27:14.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	194	2020-05-04T02:05:25.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	133	2018-09-20T00:49:50.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	135	2018-10-10T02:49:11.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	241	2021-04-24T12:26:02.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	119	2018-05-02T12:38:06.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	93	2017-08-14T14:20:14.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	33	2015-12-22T18:00:27.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	289	2022-04-24T07:07:58.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	229	2021-01-23T05:32:11.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	211	2020-09-12T15:23:41.000Z
<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	73	2017-01-26T12:34:37.000Z

Variables section:

Variable	Count
SUBSURFACE PRESSURE	296
SUBSURFACE SALINITY	296
SUBSURFACE TEMPERATURE	296

<https://data.blue-cloud.org>



<https://data.blue-cloud.org>



BLUE-CLOUD VIRTUAL RESEARCH ENVIRONMENT



Collaboration



Sharing



Reuse



Reproducibility

Blue Cloud VRE promotes Open Science



Conclusions

- It is very important that ocean and marine data as collected by science, government, industry, and citizens are shared and become available for wider use in many applications and derived data products
- Europe over time has established an extensive landscape for marine data management, featuring several research data infrastructures for specific data types, complemented with EU initiatives such as EMODnet, Copernicus Marine Service, and European Open Science Cloud.
- There is an ongoing move to more integration between the infrastructures, making data and services more FAIR, and developing more cloud based analytical and visualisation capabilities, supported by powerful computing and storage resources. This is explored as part of ENVRI-FAIR, Blue-Cloud and EOSC-FUTURE projects.
- SeaDataNet is a major network of NODCs and it handles the data management for many data collectors, including data from most cruises of the European marine research vessel fleet.

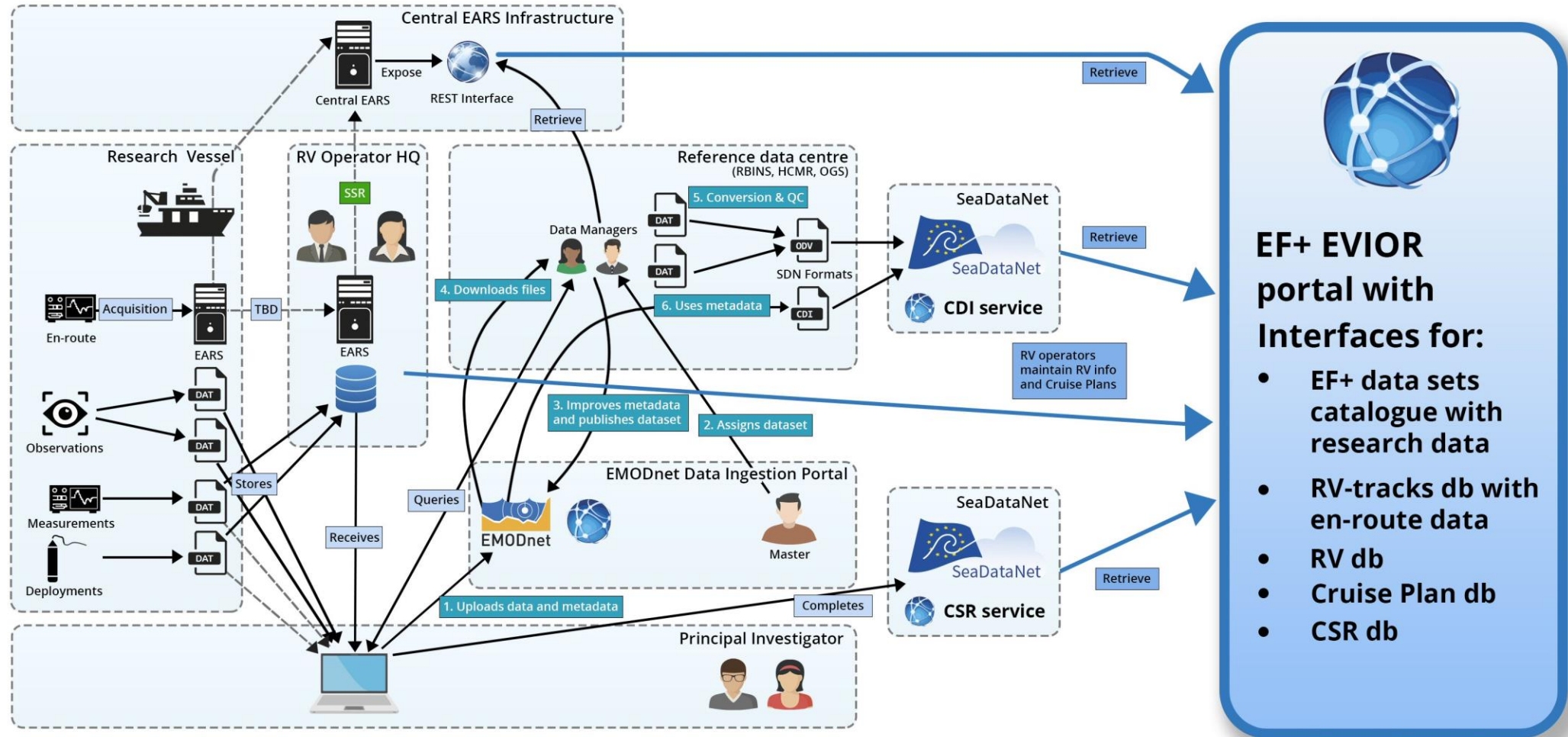


Eurofleets+ open data management strategy

- To ensure that the research data collected during the funded TA cruises, and the en-route data collected by the research vessels are made widely available in line with FAIR and Open Research Data principles
- To make use of existing European standards and services of SeaDataNet for managing and publishing collected cruise data sets, which ensures also distribution towards EMODnet and the wider community of potential users
- To establish and populate also the EVIOR ((European Virtual Infrastructure in Ocean Research) platform, embedded in Eurofleets website, with all information relevant for following the Eurofleets+ cruises and outcomes



Eurofleets+ data management workflow



Capturing and publishing metadata and data from cruise plan to underway to post cruise



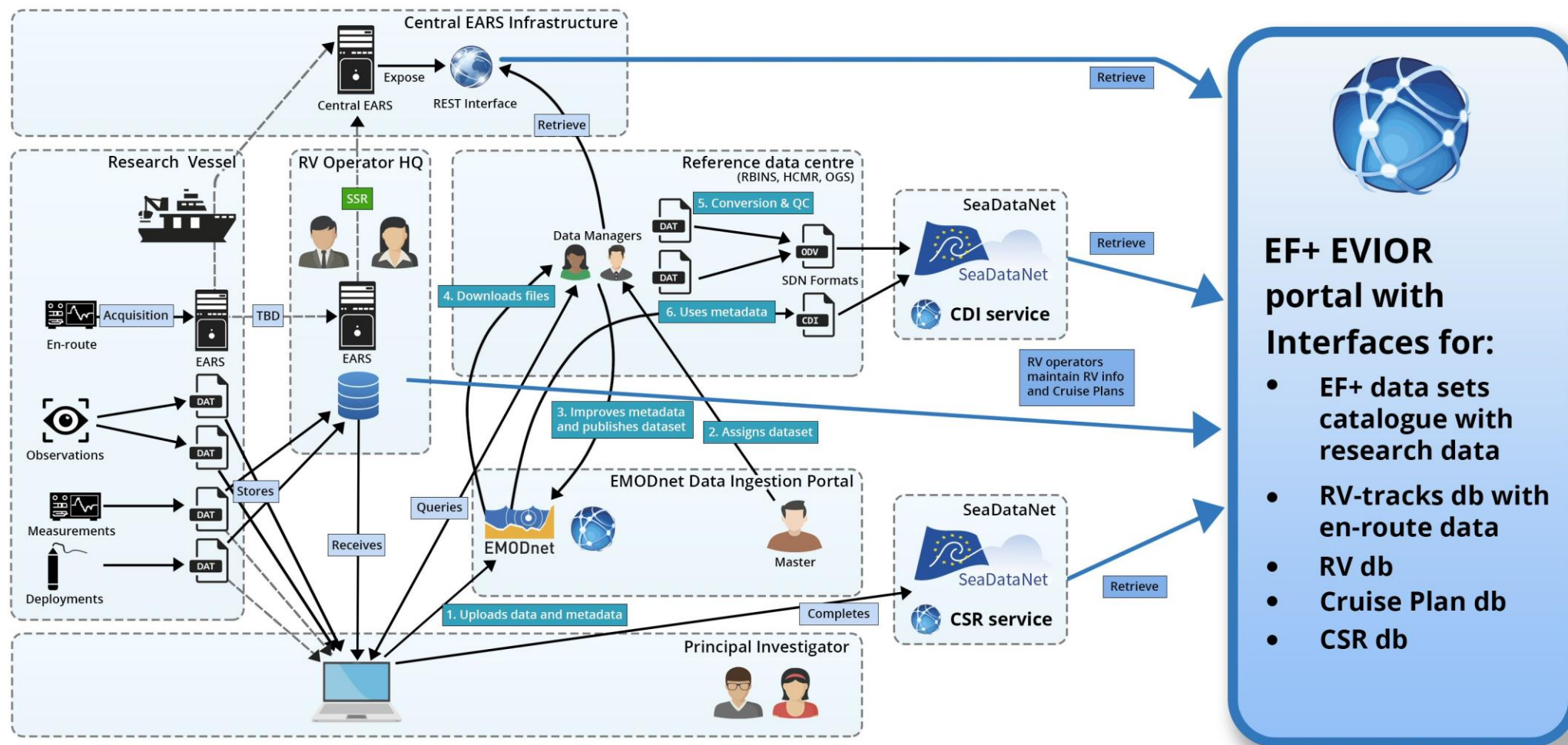
EVIOR (European Virtual Infrastructure in Ocean Research) platform

Dick M.A. Schaap





Data Management Workflow



Capturing and publishing metadata and data from cruise plan to underway to post cruise



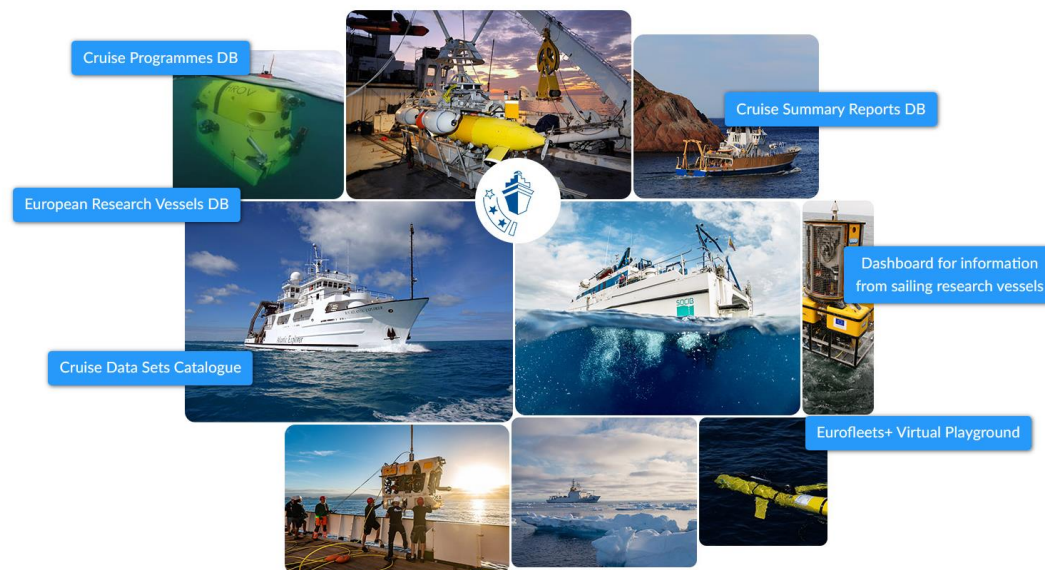
EVIOR platform



An alliance of European marine research infrastructure
to meet the evolving needs of the research and industrial communities

[Go to Eurofleets home](#) >

European Virtual Infrastructure in Ocean Research (EVIOR)



Sharing information on planned, current and completed cruises and on details of European research vessels and specialized equipment. Giving e-access to underway events information, sailing tracks and current position of European research vessels



EVIOR platform

Cruise Programmes

[RETURN TO EVIOR HOME](#)

Geographical box

Research Vessel

Hans Brattstroem (110)

Kristine Bonnevie (52)

G.M. Dannevig (36)

Belgica (33)

Ramon Margalef (30)

... [More](#)

Country operator

Norway (309)

France (133)

Spain (111)

Germany (91)

Italy (53)

... [More](#)

Status

Completed (849)

Scheduled (26)

Current (26)

Discipline

Physical oceanography (115)

Biological oceanography (80)

Start » Date from: 20210101 to: 20221231 x

Zoom in to selected

☒ 20 ☐ 50 ☐ 100 records

Go

Found 907 | Show (1-20) | Previous | Next 20

Cruise name	Vessel name	Country operator	Departure	Arrival	Berths	Status	Show
RADIAL VIGO 1222	Mytilus	Spain	2022-12-19	2022-12-19	Unknown		→
RCAN	Ramon Margalef	Spain	2022-12-15	2022-12-17	Unknown		→
SCOPES	Thalassa	France	2022-12-14	2023-01-10	Unknown		→



Structure in Ocean Research (EVIOR)



Sharing information on planned, current and completed cruises and on details of European research vessels and specialized equipment. Giving e-access to underway events information, sailing tracks and current position of European research vessels



EVIOR platform

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Towards an Alliance of European Research Fleets



Eurofleets European Vessel Database



This directory is a searchable database of European research vessels. Operators/managers can enter/update their research vessels [online](#) or by contacting the [helpdesk](#).

[Cruise Programmes database](#)

[Cruise Summary Reports database](#)

[Large Exchangeable Instruments database](#)

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Operating RVs

Prepare your query with a combination of the following criteria:

<input type="text" value="[Vessel Name]"/>	<input type="text" value="[Vessel Category]"/>
<input type="text" value="[Country]"/>	<input type="text" value="[Length]"/>
<input type="text" value="[Main Activity]"/>	<input type="text" value="[Available for charter]"/>
<input type="text" value="Operating RVs"/>	<input type="button" value="reset"/> <input type="button" value="search"/>

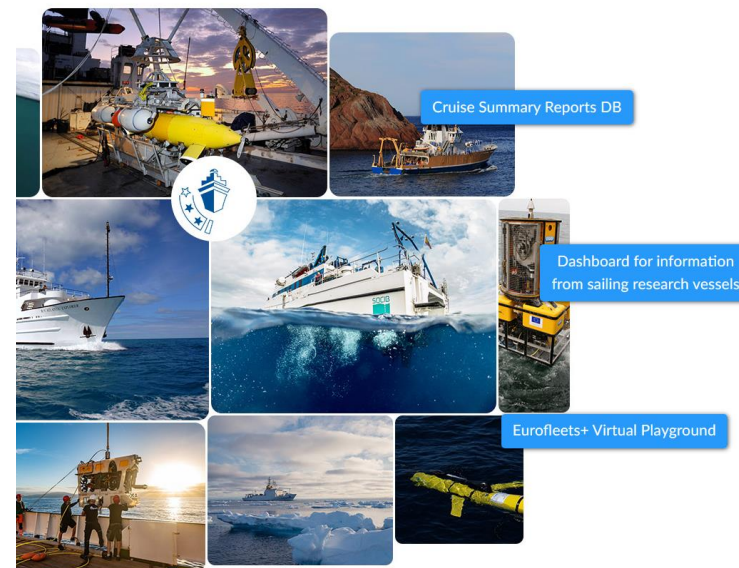
Search results Your search has returned 309 vessels.

[Print PDF](#)

Vessel Name	Country	Category	Length
Aade	Germany	Local/Coastal	12.50 m
Actinia	United Kingdom	Local/Coastal	10.85 m
Aegaeo	Greece	Oceanic	61.50 m
Águas Vivas	Portugal	Local/Coastal	11.00 m
Akademik	Bulgaria	Oceanic	55.50 m
Akademik A. Karpinsky	Russia	Global	104.50 m
Akademik Ioffe	Russia	Global	117.10 m
Akademik Lazarev	Russia	Global	81.80 m
Akademik Mstislav Keldysh	Russia	Global	122.20 m



Structure in Ocean Research (EVIOR)



uses and on details of European research vessels and specialized equipment. Giving e-access to underway events in research vessels



EVIOR platform

[< Back to Eurofleets homepage](#)

Towards an Alliance of European Research Fleets



PAN-EUROPEAN INFRASTRUCTURE FOR
OCEAN & MARINE DATA MANAGEMENT

CRUISE SUMMARY REPORT INVENTORY (CSR)



> **CARBO-ACID**

CSR REF-NO : 21026663 [Download XML](#)



[+ ADD TO BASKET](#)

[EXPORT](#)

GENERAL INFORMATION

ID
21026663

Platform/Ship
[Ramon Margalef](#)

Cruise begin
02.08.2022

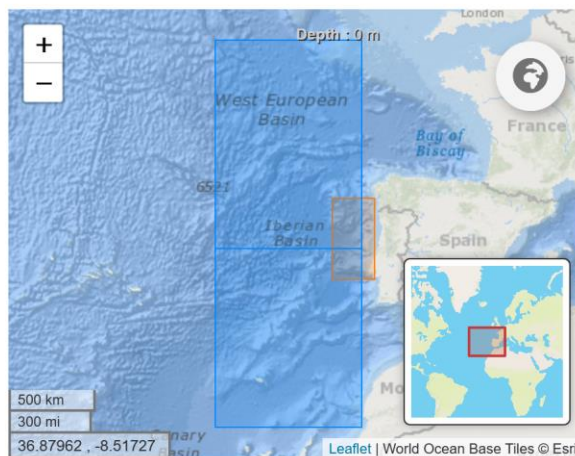
Cruise end
11.08.2022

Port of Departure
Vigo, Spain

Port of Return
Lisbon, Portugal

Chief Scientist(s)
Vitor Magalhaes - [Portuguese Institute for Sea and Atmosphere](#)
Emilia Salguero - [Portuguese Institute for Sea and Atmosphere](#)

Responsible(s) Laboratory
[Portuguese Institute for Sea and Atmosphere](#)
[IEO, Spanish Oceanographic Institute](#)



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[Contact](#)

Akademik Lazarev	Russia	Global	81.80 m
Akademik Mstislav Keldysh	Russia	Global	122.20 m

uses and on details of European research vessels and specialized equipment. Giving e-access to underway events in research vessels

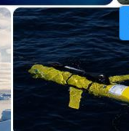
in Ocean Research (EVIOR)



[Cruise Summary Reports DB](#)



[Dashboard for information from sailing research vessels](#)



[Eurofleets+ Virtual Playground](#)



Russia

Global

122.20 m

A photograph showing a bright yellow submarine being hoisted by a large crane on the deck of a ship. The scene is set against a dramatic sunset sky with orange and purple hues. A circular logo with a blue and white design is overlaid in the bottom left corner of the image.

Cruise Summary Reports DB

Dashboard for information from sailing research vessels

Eurofleets+ Virtual Playground

European research vessels and specialized equipment. Giving e-access to underway events



EVIOR platform

Eurofleets+ Virtual Playground



Try out the Virtual Playground

Collaborative Toolkit for Scientific Project development

The Eurofleets+ Virtual Playground (VP) is a web-based tool that fosters a new vision of collaborative science, facilitating to bridge the gaps between different scientific domains and ways of thinking. The VP provides a space of data, information and knowledge in which collaborative research can take place in the easiest way.

The VP offers the possibility to create projects where PIs are enabled to load an ontology as a concept map that will act as the boundary object of the collaborative work. The VP offers prototype tools to work together interacting with the data (viewing, analysing, annotating) and communicating and discussing (messaging, forums, posting) with other members of teams and communities.

The system has been developed by OGS with opensource software and is an extension of the COLLA framework that was earlier developed by OGS. The VP provides a Virtual Research Environment where researchers have the possibility to process data and share not only results but also methods. This is achieved by sharing scripts themselves. This way it is possible to enlarge the possible methods to pack, transmit, decode and use knowledge.

Using the COLLA framework, a knowledge space can be built on top of an ontology that can guide researchers' activities. The ontology can be built using software such as for example Protégé and uploaded in COLLA to be visualized using Ontodia, a web-based ontology visualizer.

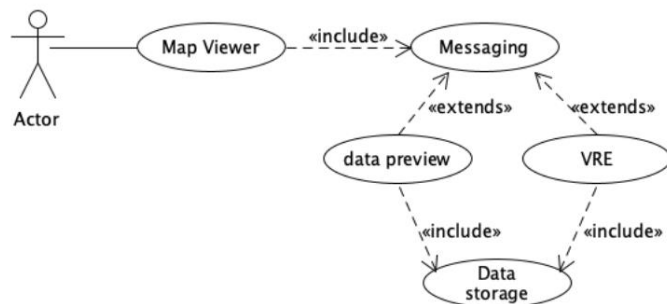
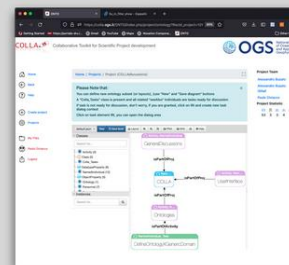
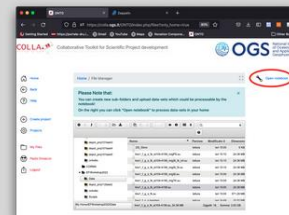
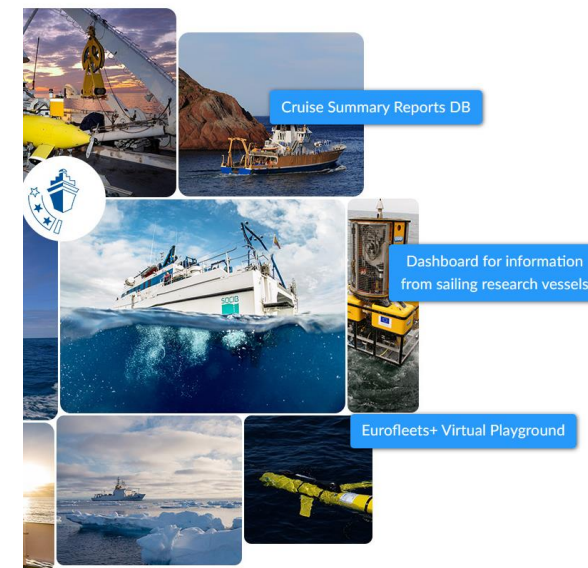


Figure: Virtual Playground system structure

[RETURN TO EVIOR HOME](#)



1 Ocean Research (EVIOR)



European research vessels and specialized equipment. Giving e-access to underway events



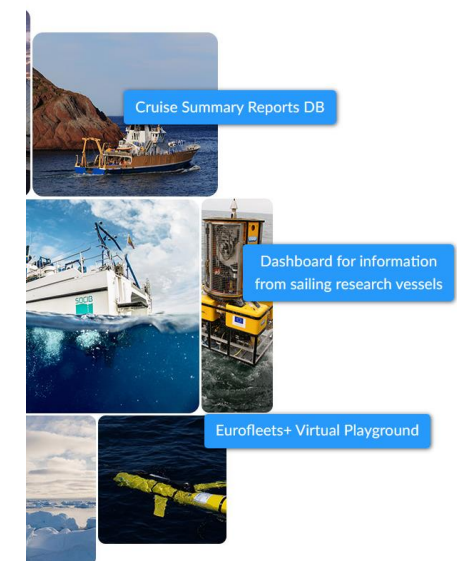
EVIOR platform

Eurofleets+ Cruise Data Sets Catalogue

[RETURN TO EVIOR HOME](#)

Cruise ID	Research Vessel	Date Start	Date End	More Details
iMAR	Pelagia	2021-05-18	2021-06-02	✓
Benchmark	G.O. Sars	2021-08-01	2021-08-10	✓
FOCUS-AUV	Tangaroa	2020-09-30	2020-10-28	✓
GRASSMAP	SOCIB	2021-09-14	2021-09-20	✓
GSHARK	Dana	2021-07-21	2021-08-12	✓
MYRTOON	Aegaeo	2021-09-30	2021-10-09	✓
PHYCOB	TUBITAK Marmara	2021-09-11	2021-09-17	✓
PORO-CLIM	Celtic Explorer	2021-05-05	2021-05-30	✓
CALYPSO	Pelagia	2022-02-20	2022-03-12	✓
CABLE	Aranda	2022-04-04	2022-04-09	✓
SEAQUAKE/GRACE	Belgica	2022-04-28	2022-05-11	✓

Research (EVIOR)



els and specialized equipment. Giving e-access to underway events



EVIOR platform

Eurofleets+ Cruise Data Sets Catalogue

[RETURN TO EVIOR HOME](#) | [BACK](#)

[Next](#)

Record No.	1
Cruise ID	iMAR
Cruise Information	Cruise Narrative
Research Vessel	Pelagia
Date start	2021-05-18
Date end	2021-06-02
Cruise Plan	
Cruise Summary Report	Cruise Summary Report
En-route Data	En-route Data
Original Research data in EMODnet Ingestion	1 2 3 4 5
Original Research data in SeaDataNet SEANOE	1 2 3 4 5
Elaborated Research data in SeaDataNet CDI service	1 2 3
Elaborated Research data in EMODnet service	1 2

h (EVIOR)

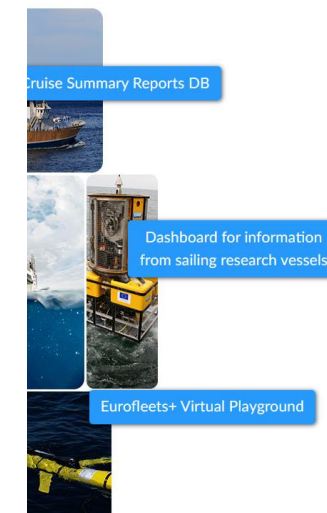


Figure: Virtual Playground system structure





NODCs for Data Management support


- TA cruise teams make an EF+ Data Management Plan (DMP)
- DMPs are reviewed by 3 NODCs in EF+: HCMR, OGS, RBINS
- One NODC is assigned per TA Cruise
- Guidance and support by NODC to PI and scientific teams:
 - Keeping index of data and sample acquisition during cruise, preferably using the EF+ EARS system on board
 - Preparing a Cruise Summary Report (CSR) after cruise
 - Ensuring transfer of data sets after scientific embargo with sufficient documentation for uptake by NODCs in SeaDataNet, also for wider distribution to EMODnet, CMEMS, and EF+ EVIOR portal




Progress – Example Data Access

**CHEMISTRY**
Data & products on marine water quality
CDI Data Discovery and Access Service - Extended search



 **FEEDBACK**

 **SURVEY**

Login

DATASET BASKET 0

NEW SEARCH

REFINE SEARCH

SEARCH RESULTS

SUMMARY

TIMESERIES

Filter search

You searched for: **synergy** [Reset all](#)

Free search:

EXPORT RESULT **SAVE QUERY**

INPUT FIELDS

Free search

Date search

Geographic search

SEARCH **RESET**

SEA REGIONS

MATRIX CATEGORIES

GROUPS OF VARIABLES

Found 107 | Show (1 - 100) | First | Prev | Next | Last

SELECT	<input type="checkbox"/>
DATASET NAME	EUROFLEETS+ SYNERGY cruise 2022: station 1024969
COUNTRY ORIGINATOR	United Kingdom
START DATE	20220619
INSTRUMENT / GEAR TYPE	CTD
SELECT	<input type="checkbox"/>
DATASET NAME	EUROFLEETS+ SYNERGY cruise 2022: station 1024970
COUNTRY ORIGINATOR	United Kingdom
START DATE	20220619
INSTRUMENT / GEAR TYPE	CTD
SELECT	<input type="checkbox"/>
DATASET NAME	EUROFLEETS+ SYNERGY cruise 2022: station 1024971
COUNTRY ORIGINATOR	United Kingdom
START DATE	20220619
INSTRUMENT / GEAR TYPE	CTD
SELECT	<input type="checkbox"/>
DATASET NAME	EUROFLEETS+ SYNERGY cruise 2022: station 1024972
COUNTRY ORIGINATOR	United Kingdom
START DATE	20220619
INSTRUMENT / GEAR TYPE	CTD
SELECT	<input type="checkbox"/>
DATASET NAME	EUROFLEETS+ SYNERGY cruise 2022: station 1024973
COUNTRY ORIGINATOR	United Kingdom
START DATE	20220619
INSTRUMENT / GEAR TYPE	CTD
SELECT	<input type="checkbox"/>

