



Blue-Cloud2026



Blue-Cloud 2026 in a nutshell

November 2023



Funded by
the European Union¹

A federated European FAIR and Open Research Ecosystem for oceans, seas, coastal and inland waters

Blue-Cloud 2026 **builds upon the pilot Blue-Cloud project** to further evolve its **pilot ecosystem into a Federated European Ecosystem to deliver FAIR & Open data, analytical services, instrumental for deepening research of oceans, EU seas, coastal & inland waters.**

It develops a **thematic marine extension to EOSC** for open web-based science, & serves needs of the EU Blue Economy, Marine Environment and Marine Knowledge agendas.

Budget: € 8 845 420,00

Funding: [HORIZON-INFRA-2022-EOSC-01 | RIA - Research and Innovation action](https://cordis.europa.eu/project/id/101094227)
<https://cordis.europa.eu/project/id/101094227>

Length: 42 months

Starting date: 1 January 2023

Consortium: 40 partners from 14 countries

Project Information

Blue-Cloud 2026

Grant agreement ID: 101094227

DOI

[10.3030/101094227](https://doi.org/10.3030/101094227)

Start date

1 January 2023

End date

30 June 2026

Funded under

Research infrastructures

Total cost

€ 8 845 420

EU contribution

€ 8 845 420



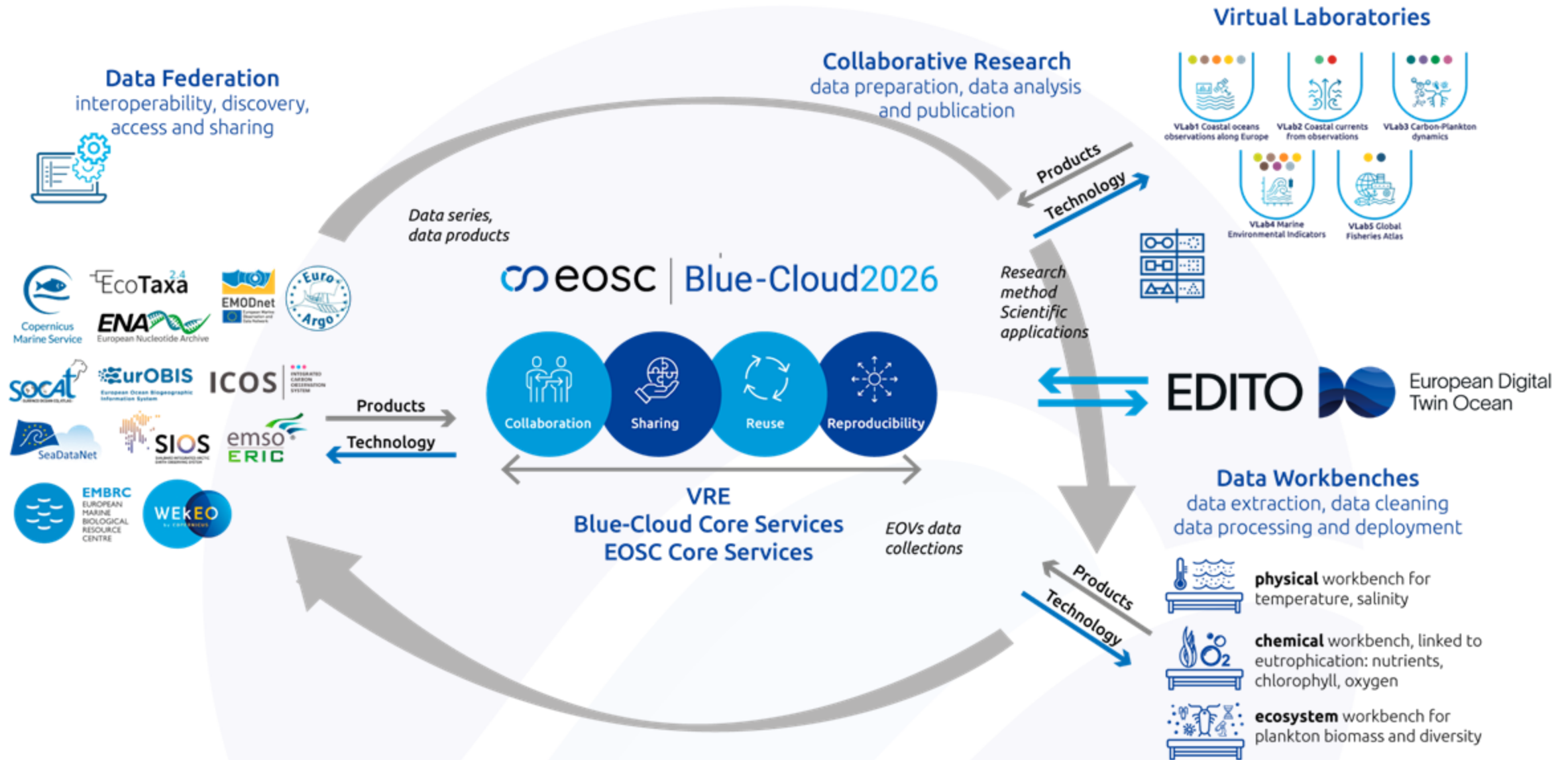
Coordinated by

CONSIGLIO NAZIONALE DELLE RICERCHE

 Italy

Develop a Federated European Ecosystem to deliver FAIR & Open data and analytical services, instrumental for deepening research of oceans, EU seas, coastal & inland waters. It also aims to develop a thematic marine extension to EOSC for open web-based science, serving the needs of the EU Blue Economy, Marine Environment and Marine Knowledge agendas.

All in all, Blue-Cloud 2026 will expand the federated approach of the previous Blue-Cloud, involving more aquatic data stakeholders, and interacting with EOSC developments, in support of the EU Green Deal, UN SDG, EU Destination Earth, and the EU Mission Starfish on healthy oceans, seas, coastal and inland waters, ultimately to provide a core data service for the Digital Twin of the Ocean.



MISSION: To develop further the European federation of marine and inland water data management infrastructures & high quality services



A1. DD&AS

A FAIR compliant Data Discovery & Access Services > access to 10+ million open data sets & products by 13 major BDIs



A2. VRE

An Open Science Virtual Research Environment (VRE) federating multiple e-infrastructures > supporting Analytical Big Data Workbenches & VLabs



A3. EOVs

3 EOJ Workbenches for highly qualified data collections

3.000 DATA ANALYTICS SESSIONS PER MONTH - 5,000 HTC DATA ANALYTICS JOBS PER MONTH

A4. VLABS - FIVE DOMAIN-BASED VIRTUAL LABS



Coastal Ocean observations along Europe



Coastal currents from observations



Carbon-Plankton Dynamics



Marine Environmental Indicators



Global Fisheries Atlas



A7. COMMUNITY

- All EU countries engaged
- 3k+ engaged Blue-Cloud community users
- 5k+ followers across all the platforms
- 10+ External Stakeholders



OUTREACH

- 1 Blue-Cloud Hackathon
- 1 Blue-Cloud TV
- 18 Newsletter issues
- 11 Webinars on Blue-Cloud VRE, DDAS & EOJ Workbenches
- 3 Blue-Cloud Annual Impact Events
- 3 Ocean Literacy Webinars
- Videos & Interviews



A6. TRAINING ACADEMY & CATALOGUE

- 3 Online training course on Best Practices for FAIR data principles
- 3 Info session & course on the EOJ Workbenches
- 2 online webinars dedicated to the BlueCloud VRE
- 2 dedicated to the DDAS and the innovations introduced
- A series of training sessions on how to use the VLabs



POLICY

- Scientific papers & articles
- Restoring healthy oceans, seas, coastal & inland waters in Europe
- Strategic Roadmap 2030 **A5. ROADMAP**
- Cross-domain expansion factsheets
- Sustainability Business model



DTO Task Force



Scientific and Administrative Coordinator



Project Coordinator



Technical Coordinator



Blue-Cloud 2026 core services

VRE & Data Discovery & Access Services - status today





Facilitates users:

Federated search for discovering interesting data sets (currently more than 10 million) in a two step approach

Federated retrieval of identified data sets using a shopping basket mechanism

Download of data sets or push to Blue-Cloud VRE

Facilitates managers of Blue Data Infrastructures:

Wider outreach to potential users

Stay informed about data requests and users for their repository

Periodic reporting of downloads from their repository



Expanding and Optimising the Blue-Cloud Data Discovery & Access service (DD&AS) and its FAIRness by:

- harmonising and expanding functionality of web services as operated by each BDI for discovery and access of managed data resources, and as used in DD&AS, following FAIRness review
- developing and deploying semantic brokering as part of DD&AS interface
- federating additional BDIs into the DD&AS (**EMSO, SIOS, EMODnet Physics, MGnify**)
- reviewing, and if missing, developing and deploying data sub-setting and extracting services, operated by each BDI, for feeding Blue-Cloud 'raw data' Data Lakes,
- developing and deploying Blue-Cloud Data Lakes for storing and maintaining 1) 'raw data' extracted from BDIs and 2) harmonised and validated data collections for selected data types, as resulting from the WP3 EOVS Work Benches



Support researchers and scientists in doing science

Without

- forcing specific approaches and technologies
- asking to focus on matters other than their science

By

- enriching their activities with the information that enables sharing and reuse of their scientific workflows
- making their research objects ready for publication

Virtual Laboratories

Data sharing

- Workspace
- Dataspace
- Repositories

Data analytics

- High Throughput Computing
- Notebook
- RStudio

Social networking

- Messages
- Posts and replies
- User profiling

Research Object Publishing

- Catalogue
- Thredds
- GeoNetwork

It is implemented as a System of Systems promoting Open Science



Blue-Cloud 2026 WorkBenches





physical workbench for temperature, salinity



chemical workbench, linked to eutrophication: nutrients, chlorophyll, oxygen



ecosystem workbench for plankton biomass and diversity

The objective is to obtain **highly qualified datasets** for some chosen Essential Ocean Variables (EOVs) combining different and various sources as inputs.

→ The results will be 1 highly qualified dataset per EOV

Workbenches or pipelines will be built to obtain the highly qualified datasets that can use other data sources or be adjusted depending on expert needs

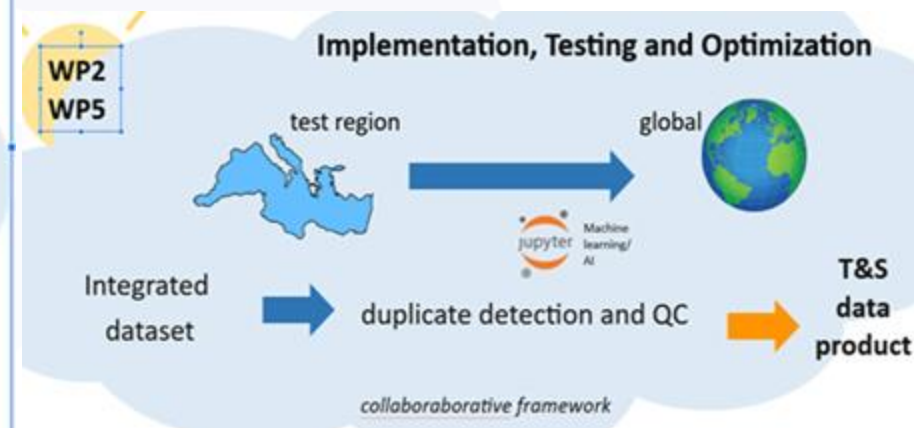
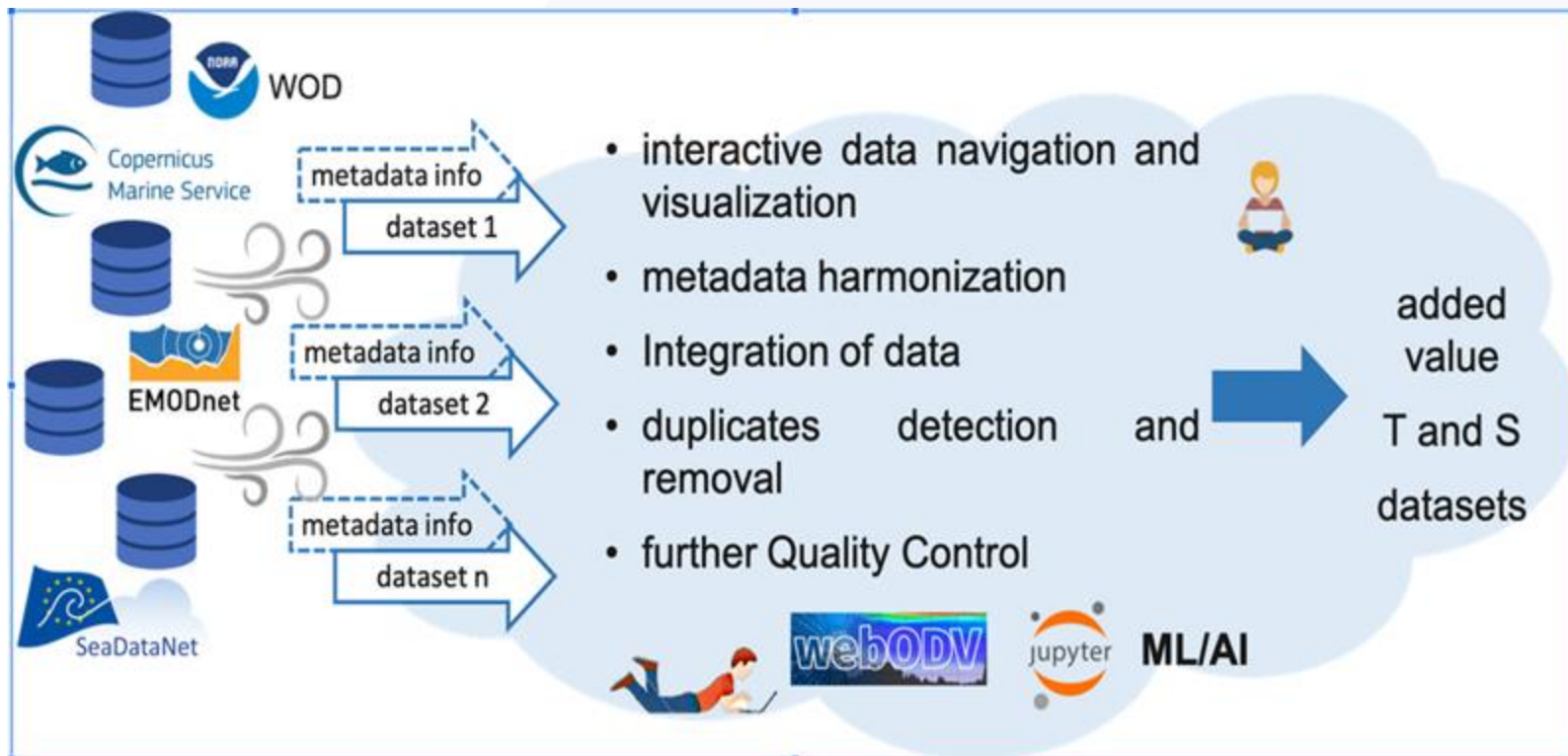
The challenge is to deal with large in situ datasets, i.e. to both access the relevant data and make developments on it. Blue Cloud 2026 will allow this thanks to the high level performance D4science VRE based on cloud computing associated with big data technology, a large datasets repository (datalake) and an expert data management.

Example for the physical workbench:



physical workbench for temperature, salinity

Speed up the process of * interactive data navigation/visualisation, * metadata harmonisation, * integration of data, * duplicate detection and * further QC thanks to IT technological advancement (cloud computing, VRE, big data)



Example for the chemical workbench:



chemical workbench,
linked to eutrophication:
nutrients, chlorophyll,
oxygen

- **workflow that will merge multi-source datasets to obtain an integrated and most complete dataset for the North East Atlantic to the global ocean; provide a set of QC procedures and handling of potential duplicate observations**



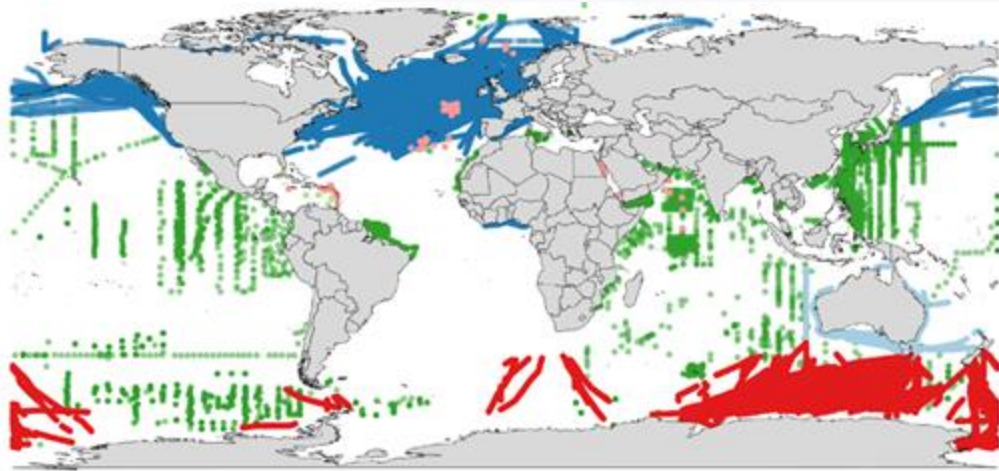
**Blue Cloud
Eutrophication
data
products**

Example for the ecosystem workbench:

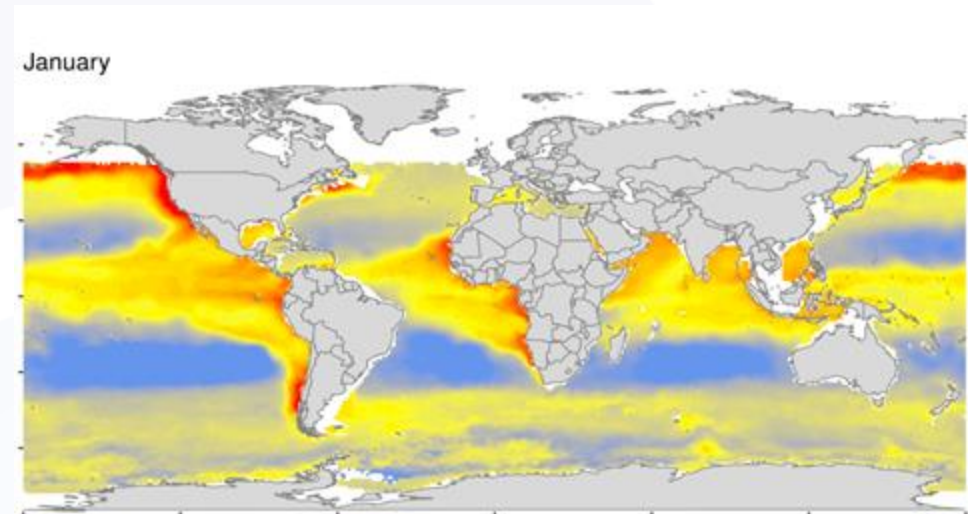


ecosystem workbench
for plankton biomass
and diversity

A rigorously quality-controlled, automatized modelling (machine learning) pipeline that integrates data from multiple European data repositories to produce **phyto- and zooplankton biomass and biodiversity products for the past, present and future ocean**



Data
(raw foraminifera biomass observations, multiple sources)



Knowledge
(integrated, quality- and bias-corrected biomass fields)

Blue-Cloud 2026 Virtual Labs



Blue Data Infrastructures

Blue Cloud VRE



Coastal Ocean observations along Europe



new!
Coastal currents from observations



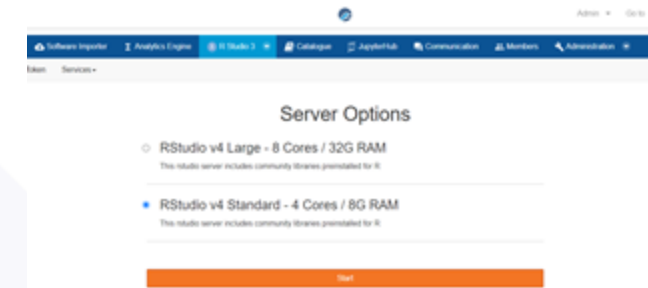
Carbon-Plankton Dynamics



Marine Environmental Indicators



Global Fisheries Atlas

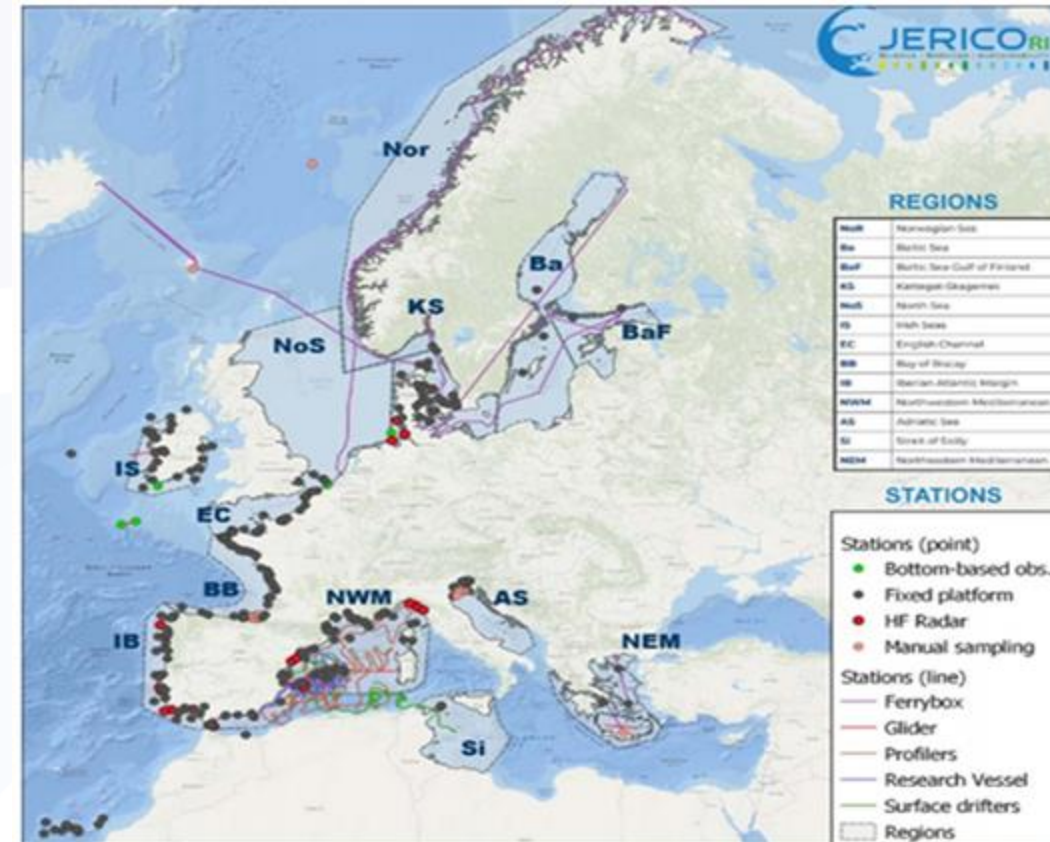




Integration of European coastal observations in 3 thematic services: **Transboundary Processes and Connectivity**, Extreme Events & Ocean Glider



- HF Radar Currents
- Current Profile in MP Buoys
- T in Wave Buoys
- T,S in MP Buoys
- T,S Glider profiles
- SSH at coastal tide gauges
- SST fields
- NEMO 3D T,S, SSH, Current
- ERA5 Surface Meteo Params
- Physics, BGC, Biology
- Physics, Chemistry, Biology, Bathymetry
- Bathymetry

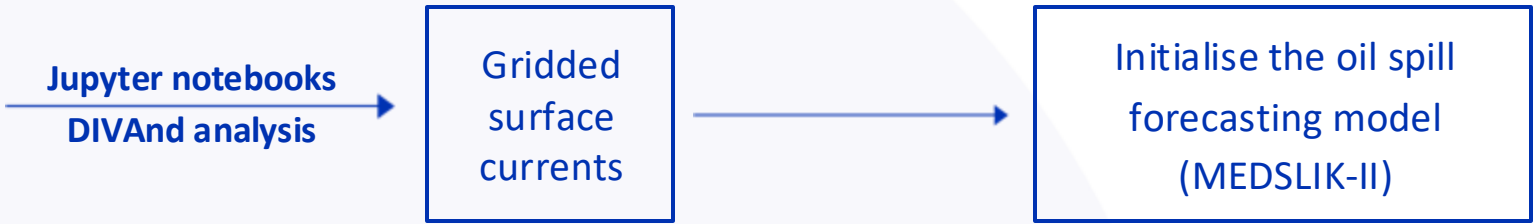




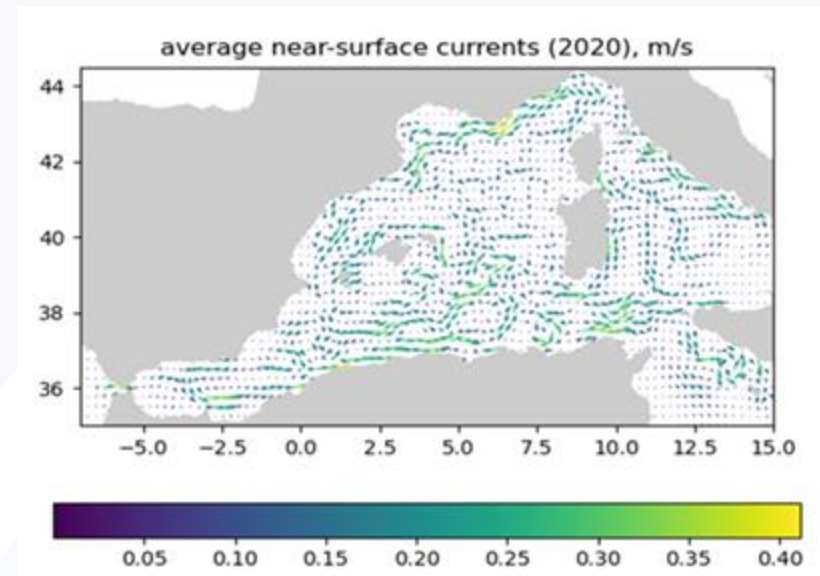
Integration of direct and indirect currents data from different sources, and application to run an oil spill model



In Situ - Global Ocean-Delayed Mode Observations of surface (drifters, HFR) and satellite altimetry



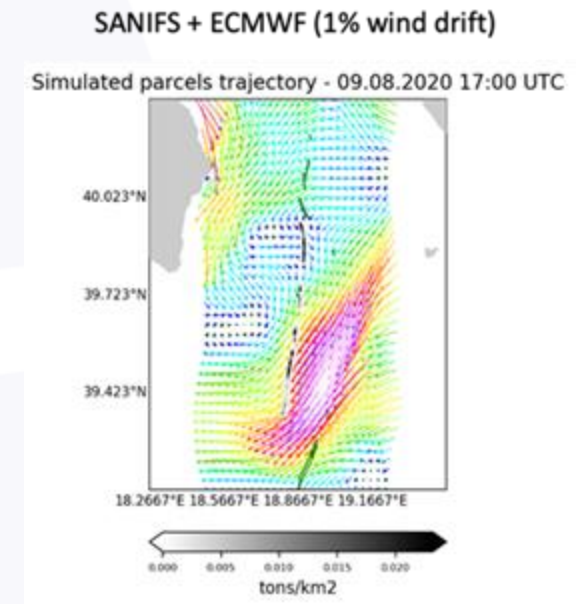
Bathymetry



Coastline



Wind speed



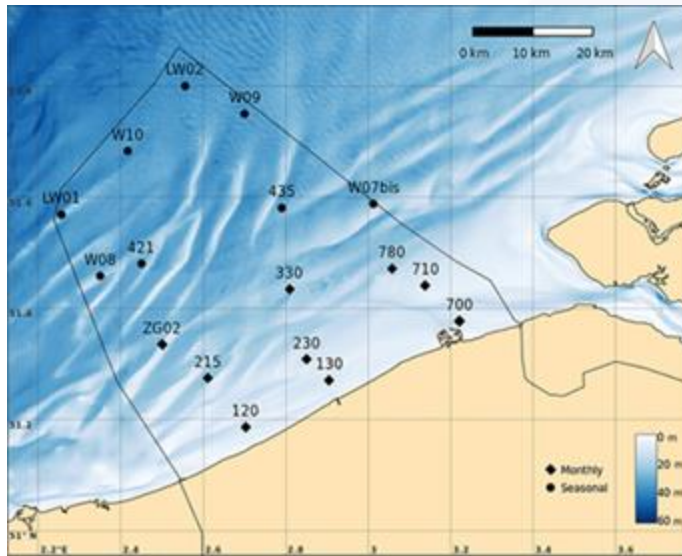


Nutrient-Phytoplankton-Zooplankton-Detritus (NPZD) Model, i.e. a mechanistic model, to identify the contribution of the drivers in phytoplankton dynamics and carbon dynamics.

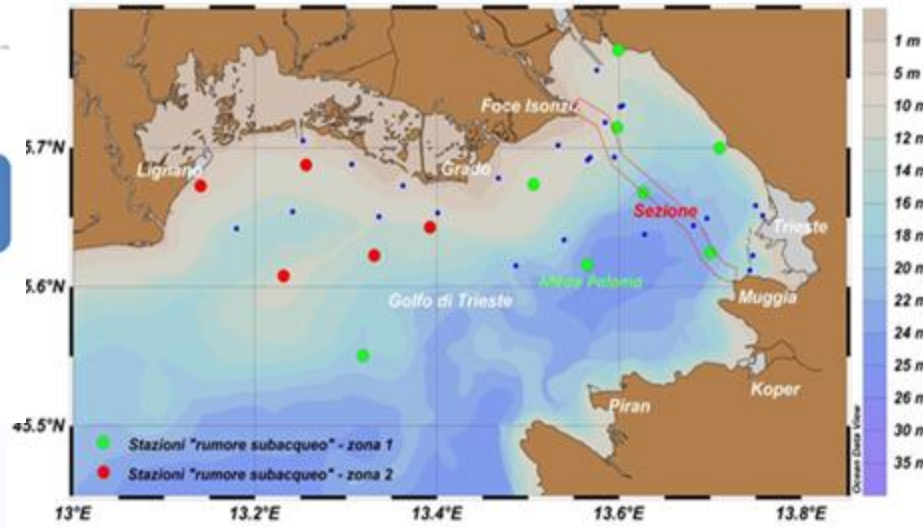
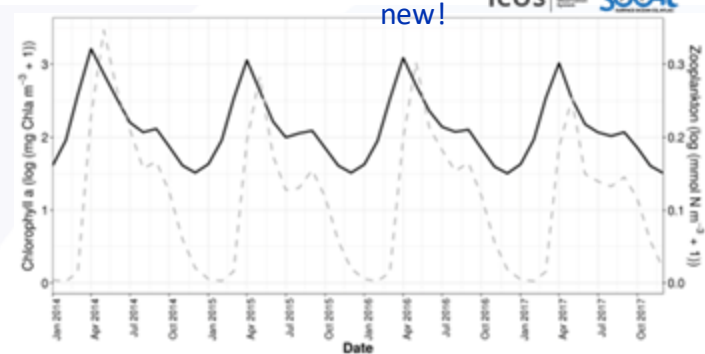
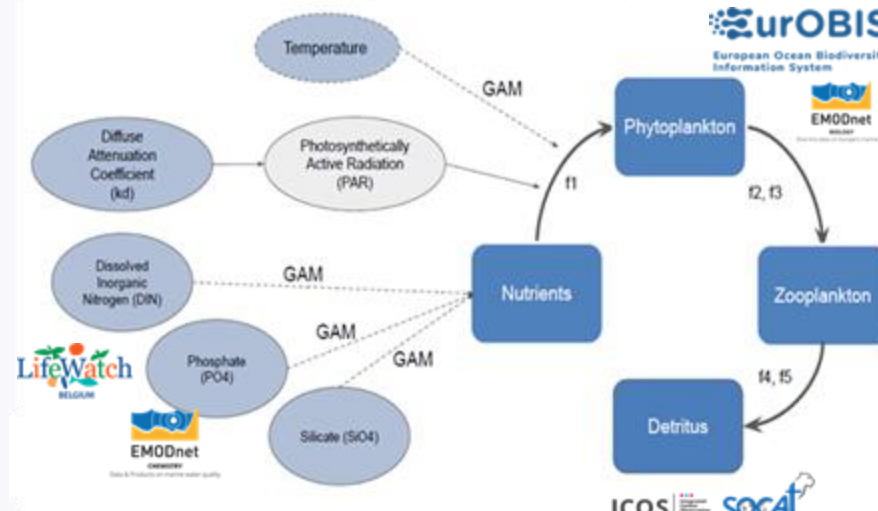


Seasonal and monthly records from 2011-2022

Train and validate the NPZD model for the Adriatic

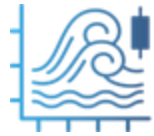


Mortelmans et al. (2019)



ogs.it





Marine Environmental Indicators

Web app for cloud computation of new added-value data to monitor the environmental status of marine areas.



SERVICES

new!

- Marine Environmental indicator (MEI) generator
- Ocean patterns and ocean regimes indicators
- Storm severity index
- Easy access to carbon data
- Ocean heat content
- Enhance Storm Severity Index (SSI v2)
- Trophic Index (TRIX)
- Marine heat wave
- Temperature and salinity Historical Data
- Mediterranean Sea Physics Reanalysis
- Global Ocean Physics Reanalysis
- Wind speed
- Wind (ERA5) reanalysis
- Global in-situ observation
- Other environmental variables



Cloud Computing Platform (CCP)



Method	Creation time	End time	Data source	Output Type	Area [lon,lat]	Depth [m]	Time range
Ocean Climate	2022-05-19T08:57:05Z	2022-05-19T09:00:18Z	MEIOSEA_MULTYEAR_PHY_D06_D04_BC	annual climatology map - Sea Water Salinity	[2,34]-[20,42]	[0.5, 1000]	1982/1990

sea water salinity (PSU), annual climatology map
1987 - 1990, lon: 2, 34, 36, 38, 40, 42, lat: 0.5, 1000 m

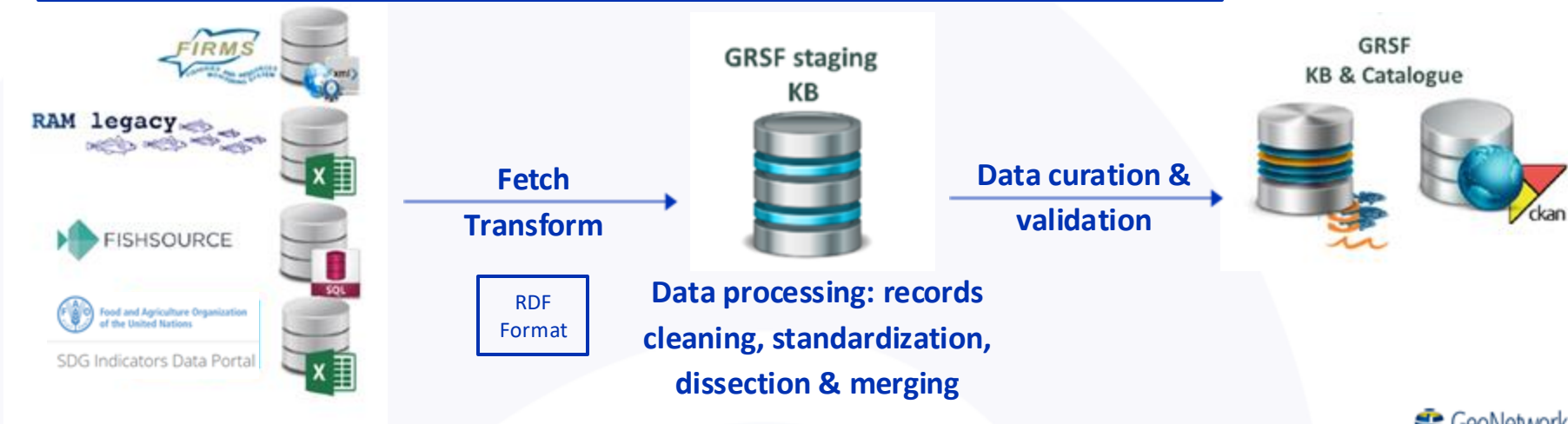
Download range | Download Data | Download (Jupyter Log) | Download Log



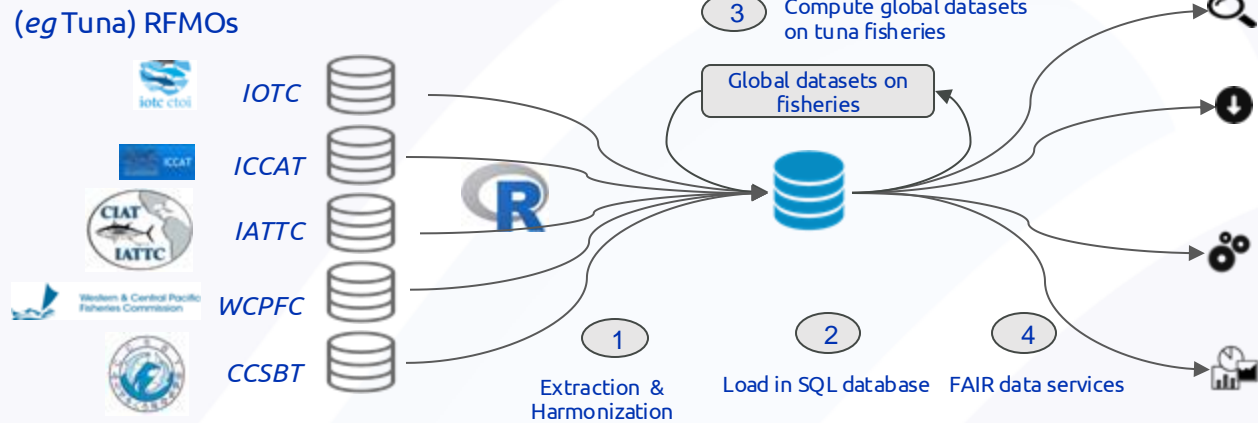
Discovery & Access of Global Record of Stocks and Fisheries, and Fisheries Atlas datasets



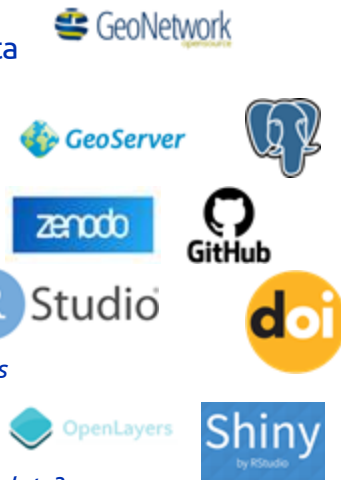
GRSF Catalog
(Knowledge level)



new! Workflows merging
Fisheries Atlas
(data level)



- Discover** available data
What datasets exist? How they were built?
- Access** the data and code
Different protocols and formats?
- Process** the data
How to customize a fisheries atlas?
- Visualize** the data
How to easily create maps, plots?





Blue-Cloud2026

Blue-Cloud 2026 Training Academy & Outreach



Expanding the Blue-Cloud online and offline presence. Consolidating Blue-Cloud's role in the EOSC community as an example for younger projects.

Key indicators

- **14300+** sessions on the website
- **2700+** combined followers on social media (target 3000 by December 2023)
- **900+** newsletter contacts - Newsletter client moved to EU-based Mailjet
- **28** events where Blue-Cloud was involved
- **8** new video interviews and **1** promotional video published in 2023

Key actions

- Launched **new website** in July 2023
- Taking part in **monthly meetings** on communications with EOSC Focus and other EOSC HE projects
- Active member of the official **EOSC Forum** online platform to promote news and events
- Presented Blue-Cloud 2026 **poster** at EOSC National Tripartite Event in Italy
- Presenting a Blue-Cloud 2026 **printed brochure** at the OSFAIR 2023
- Preparing Blue-Cloud presence at events **spread worldwide**
- Communication, Dissemination & Outreach plan delivered by March 2023

Where we have been...till October 2023 (sample)

1. AquaINFRA Kick-off Conference and Open-day - **Copenhagen, Denmark**
2. Economist Impact - World Ocean Summit & Expo - **Lisbon, Portugal**
3. From data interoperability to data spaces in the aquaculture domain - **Online**
4. EGU 2023 - **Vienna, Austria**
5. European Maritime Day EMD 2023 - **Brest, France**
6. EOOSC National Tripartite Event Italy - **Rome, Italy**
7. Copernicus Marine General Assembly 2023 - **Brussels, Belgium**
8. OCEANS 2023 - **Limerick, Ireland**
9. Science – Industry workshop on Ocean Biodiversity Data - **Online**
10. EGI Conference 2023 - **Poznan, Poland**
11. The Ocean Race Grand Finale / Ocean Data Week - **Genova, Italy**
12. IQuOD 2023 Workshop - **Potsdam, Germany**
13. FNS-Cloud Final Event - **Brussels, Belgium**
14. EOOSC Symposium 2023 - **Madrid, Spain**
15. EuroSea Symposium on Ocean Observing and Forecasting - **Paris, France**
16. Open Science FAIR 2023 - **Madrid, Spain**
17. EuroGOOS Conference 2023 - **Galway, Ireland**

Presentations, Posters, Panel discussions

Reached different stakeholders across Europe (10 different countries)

Presence at Marine/Blue Economy, Open Science & Technical Events

Leveraging on partners network and established synergies

Our network is further expanding beyond Europe and the Atlantic, with an increased presence at events and via new synergies.

Key upcoming events...

- 9-12 November - DITTO Summit **China**
- 14-15 November - EU-Caribbean Workshop on Marine Scientific Cooperation **Barbados**
- 29-30 November - EMODnet Open Conference **Belgium**
- 11-15 December - AGU 2023 **USA**

Preparing presence for...

- 10-12 April 2024 - Ocean Decade Conference **Spain**
- 14-19 April 2024 - EGU 24 **Austria**
- 27-29 May 2024 - IMDIS **Norway**



The **Training Academy** offers comprehensive lessons and materials that guide users and marine researchers in utilising Blue-Cloud services. In addition, a dedicated series of webinars focuses on FAIR data management for marine science.

Also thanks to new international partners, our content is reaching specialist audiences in extra-EU countries more than in the previous project.

26 September - 16:00 CEST

Webinar 1 - FAIR Data Principles 1: Foundational components, best practices and standards

6 December – 10.00 CET

Webinar 2 - Optimising FAIRness of federated Blue Data Infrastructures webinar



Past webinars

- 17 March - Blue-Cloud VRE
 - 127 registrants
 - 160 views on YT
- 8 June - Blue-Cloud VLabs
 - 99 registrants
 - 77 views on YT

blue-cloud.org/training-academy

Potential synergies

Ongoing activities

- The identified synergies help Blue-Cloud strengthen its position in the DTO, Mission Ocean, EOSC and Ocean Observation environments.
- Focus on establish synergies with players outside Europe (e.g. JAMSTEC).
- The Blue-Cloud team is in the process of developing MoUs with the most strategic initiatives (e.g. AquaINFRA, FAIR-EASE).



Useful materials for sharing & distribution

About Blue-Cloud 2026

- [Poster](#)
- [Rollup](#)
- [Blue-Cloud Virtual Labs in support of Sustainable Development Goals](#)
- [Flyer](#)

For dissemination & social media share

- [Twitter channel](#)
- [LinkedIn page](#)
- [Youtube account](#)
- [ZENODO account](#)

Blue-Cloud Services

- [In EOSC Marketplace](#)
- [Virtual Research Environment](#)
- [Data Discovery Access](#)
- [Data Catalogue](#)
- [Training Academy](#)

Blue-Cloud Readings

- [Strategic Roadmap](#)
- [Position Paper on EOSC](#)
- [Interfacing Blue Cloud Data Discovery and Access with EOSC](#)
- [Generic publications](#)
- [Newsletters](#)

Blue-Cloud Virtual Labs

- [Plankton Genomics](#)
- [Marine Environmental Indicators](#)
- [Zoo and Phytoplankton EOJ products](#)
- [Fish, a matter of scales](#)
- [Aquaculture](#)
- [Carbon-Plankton Dynamics](#)
- [Global Fisheries Atlas](#)
- [Coastal currents from observations](#)
- [Integration of coastal ocean observations along Europe](#)

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