eosc | Blue-Cloud2026

Blue-Cloud 2026 in a nutshell

September 2023

Funded by the European Union

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
Length: 42 months
Starting date: 1 January 2023
Consortium: 40 partners from 14 countries

Blue-Cloud 2026 in a nutshell - The Goal

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.

Blue-Cloud 2026 in a nutshell - The Consortium

Consiglio Nazionale delle Ricerche

Scientific and Administrative Coordinator

Trust-IT Services communicating to markets

Project Coordinator

MARIS

Technical Coordinator

VLIZ

seascape BELGIUM

Ifremer

NERSC

ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

COMMpla Communication Platforms and Online Solutions

nubisware BRIGHT SOLUTIONS

EMBRC EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE

POKaPOK

OCEANSCOPE

EMBL

hcmr ΕΛΚΕΘΕ

Institute of Oceanology Polish Academy of Sciences

HUB Ocean

EuroGOOS European Global Ocean Observing System

IEEE France Section

LIÈGE université

National Oceanography Centre | British Oceanographic Data Centre

MERCATOR OCEAN INTERNATIONAL

egi

SORBONNE UNIVERSITÉ

CINECA

OGS National Institute of Oceanography and Applied Geophysics

Koninklijk Nederlands Meteorologisch Instituut Ministerie van Infrastructuur en Waterstaat

IRD Institut de Recherche pour le Développement FRANCE

FORTH INSTITUTE OF COMPUTER SCIENCE

cmcc Centro Euro-Mediterraneo sui Cambiamenti Climatici

AWI ALFRED-WEGENER-INSTITUT HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

SOCIB Balearic Islands Coastal Observing and Forecasting System

hidrográfico marinha·portugal

SMHI

grnet

SIOS SVALBARD INTEGRATED ARCTIC EARTH OBSERVING SYSTEM

emso ERIC

UNIVERSITEIT VAN AMSTERDAM

ETH zürich

ETT

Blue-Cloud 2026 in a nutshell - The outputs

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 EOV 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 & EOV 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 EOV 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

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Blue-Cloud 2026 core services

VRE & Data Discovery & Access Services - status today

Funded by the European Union

Blue-Cloud 2026 core services: Data Discovery & Access Services - status today

EMODnet | Euro-Argo | EcoTaxa 2.5 | SeaDataNet | elixir ENA European Nucleotide Archive | EurOBIS European Ocean Biodiversity Information System | SOCAT Surface Ocean CO2 Atlas | ICOS Central Analytical Laboratory

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

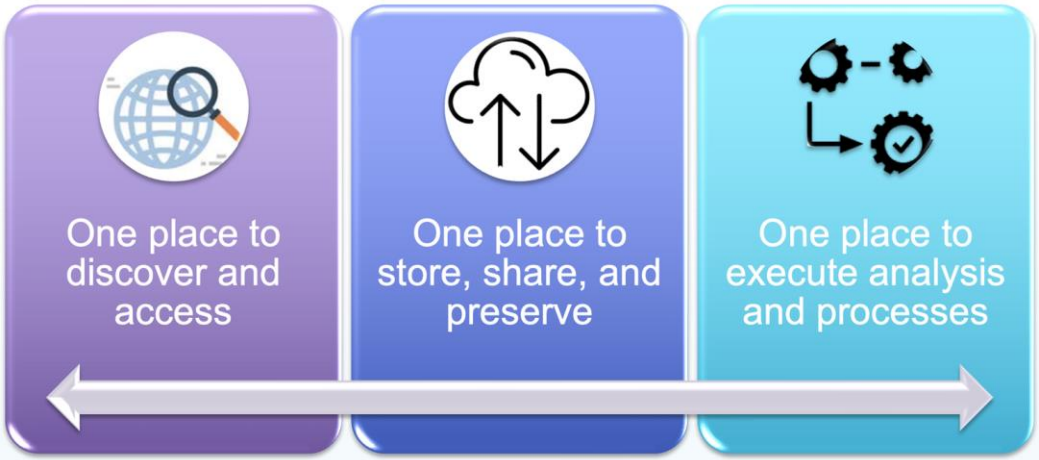
Facilitates managers of Blue Data Infrastructures:

- 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 EOV Work Benches

Blue-Cloud 2026 core services: Virtual Research Environment - status today



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

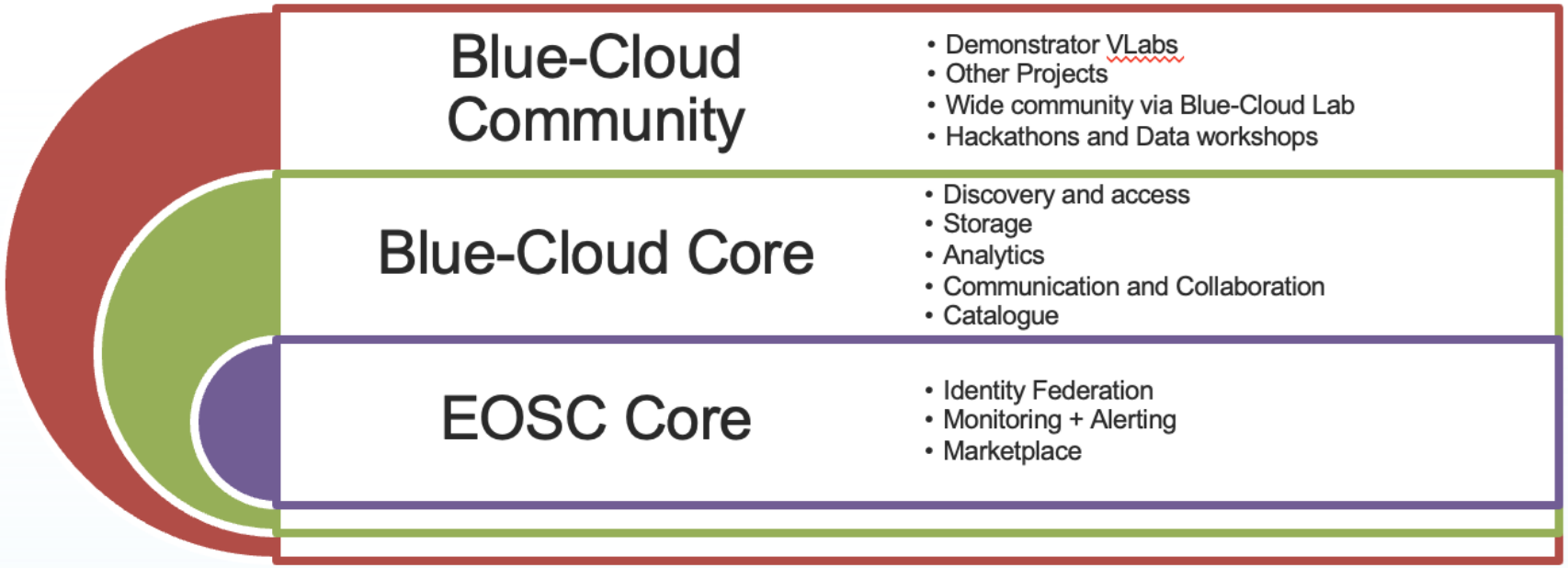
Data sharing
- Workspace
- Dataspace
- Repositories

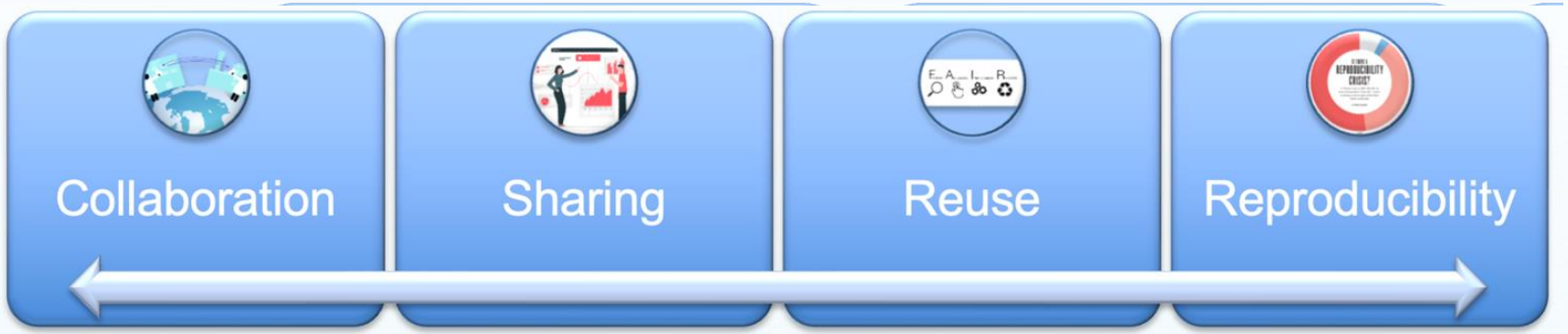
Data analytics
- High Throughput Computing
- Notebook
- RStudio

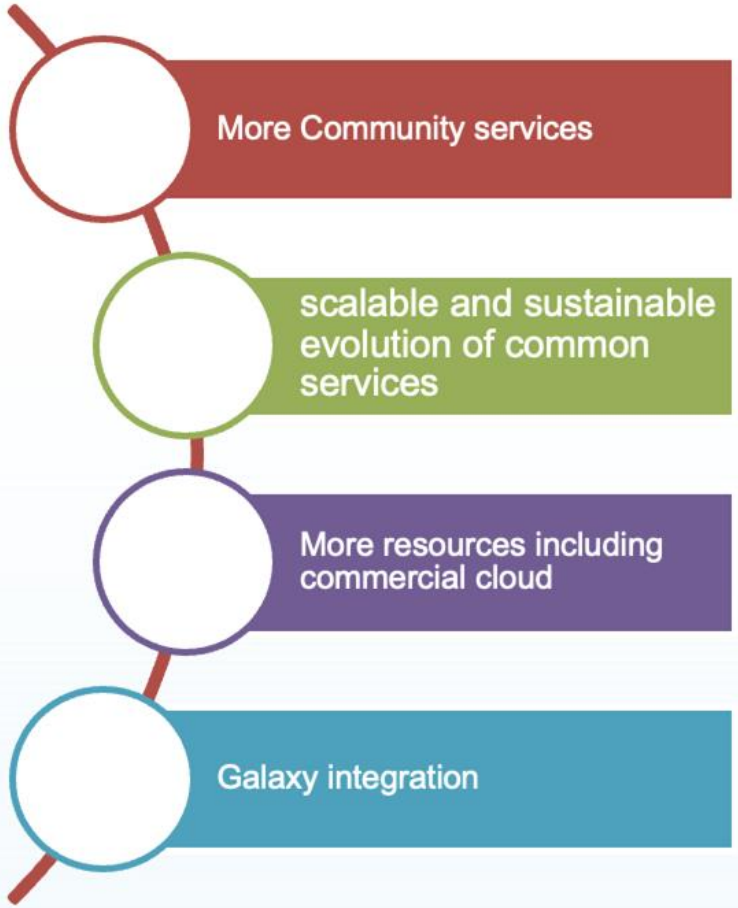
Social networking
- Messages
- Posts and replies
- User profiling

Research Object Publishing
- Catalogue
- Thredds
- GeoNetwork

It is implemented as a System of Systems promoting Open Science







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Blue-Cloud 2026 WorkBenches

Funded by the European Union

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

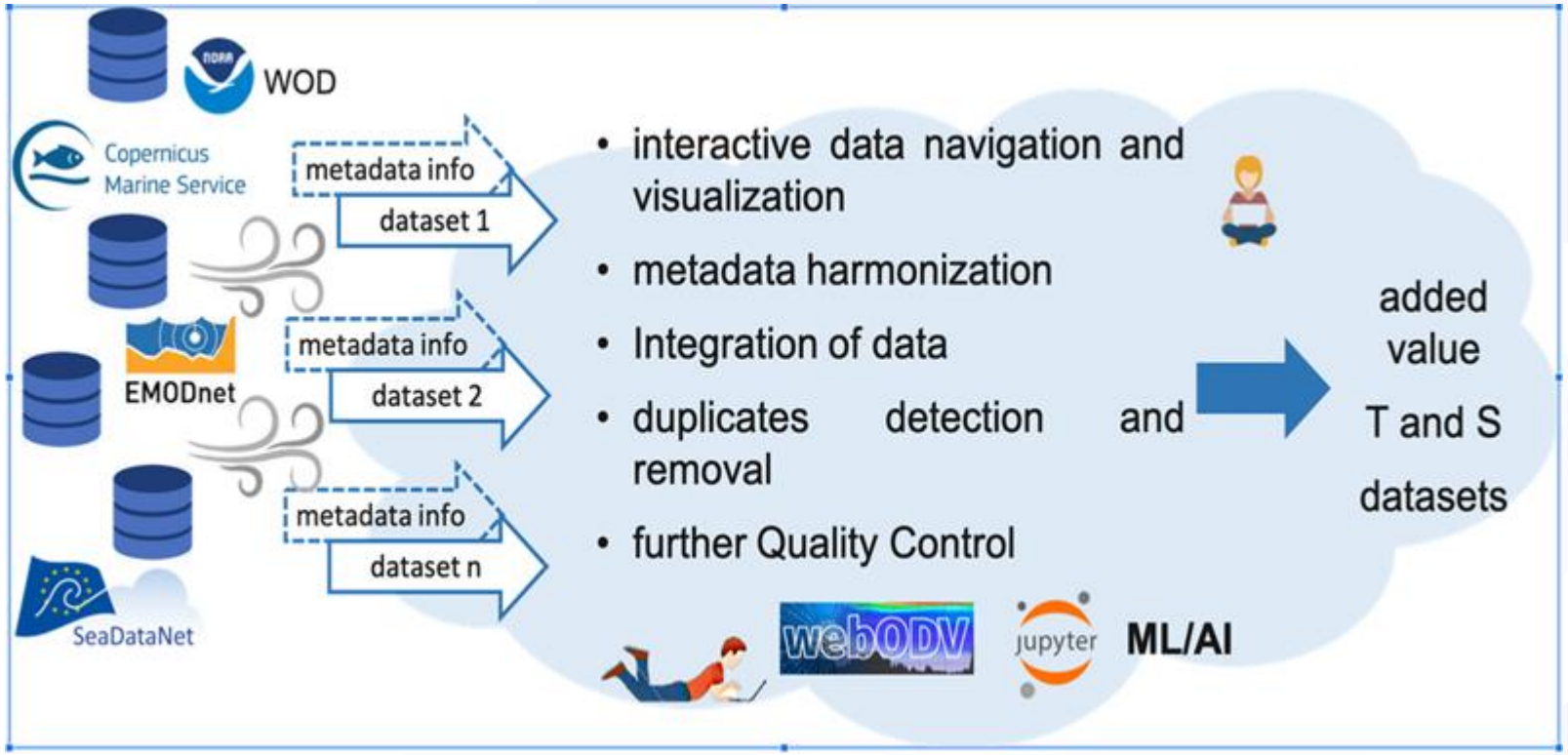
Workbenches or pipelines will be built to obtain the highly qualified datasets that can use other data sources or be adjusted depending on expert needs

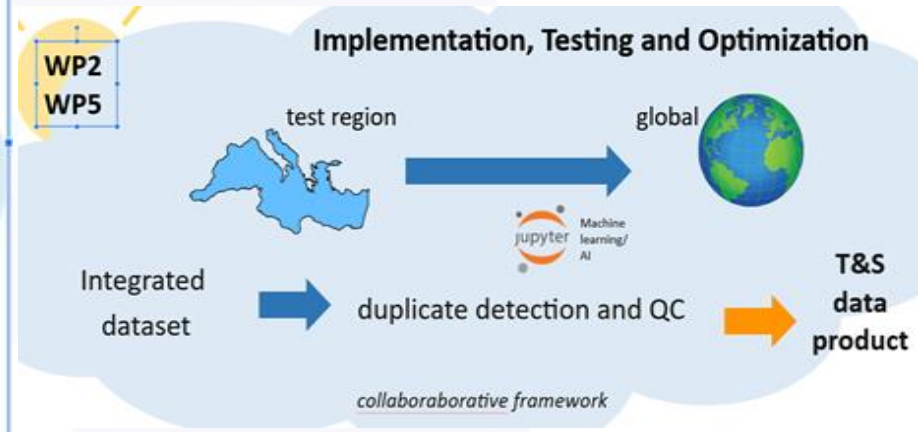
The challenge is to deal with large in situ datasets, i.e. to both access the relevant data and make developments on it. Blue Cloud 2026 will allow this thanks to the high level performance D4science VRE based on cloud computing associated with big data technology, a large datasets repository (datalake)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

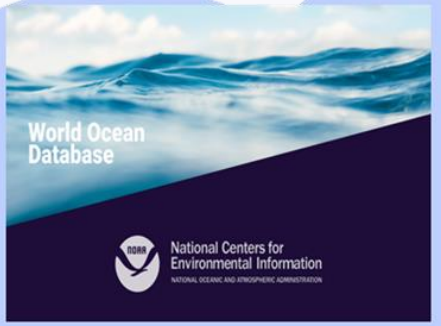




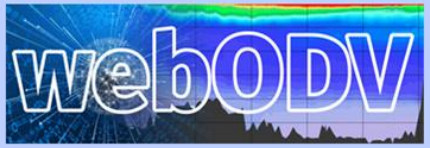
Example for the chemical workbench:

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**



SeaDataNet

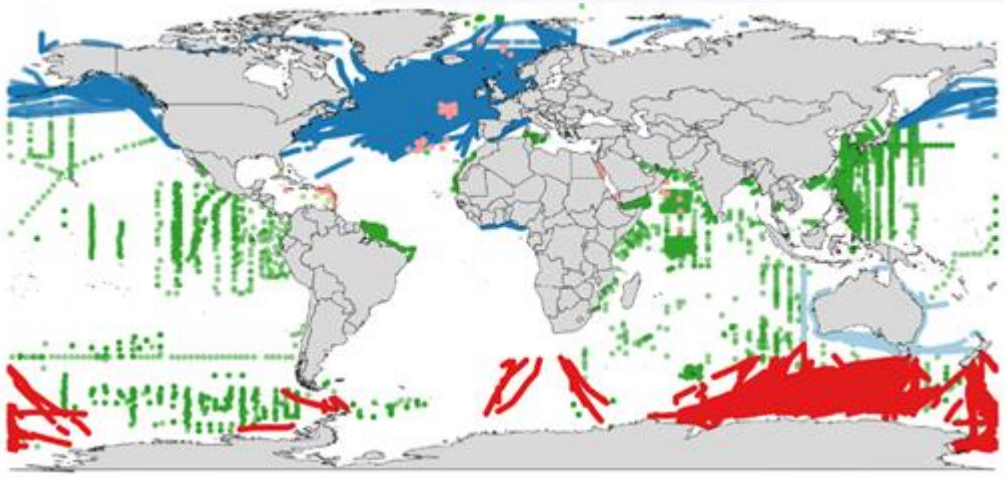


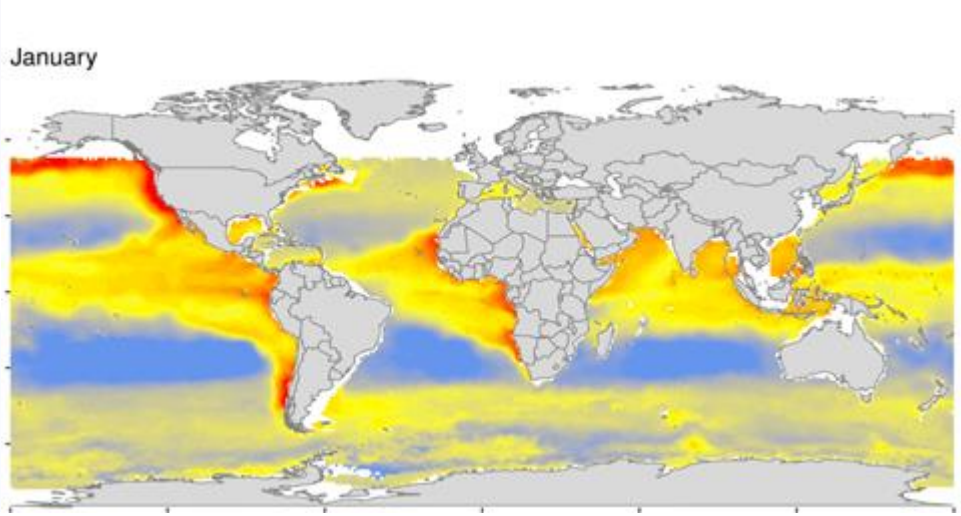
Blue Cloud Eutrophication data products

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)

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Blue-Cloud 2026
Virtual Labs

Funded by the European Union

Coastal Ocean observations along Europe

new!

Coastal currents from observations

Carbon-Plankton Dynamics

Marine Environmental Indicators

Global Fisheries Atlas

Blue Data Infraestructures

Copernicus Marine Service

EurOBIS European Ocean Biodiversity Information System

SeaDataNet

EMODnet CENTRAL PORTAL Your gateway to marine data in Europe

SOCAT SURFACE OCEAN CO2 ATLAS

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EcoTaxa 2.5

ICOS Integrated Carbon Observation System

MGnify

ENA European Nucleotide Archive

emso ERIC

SIOS

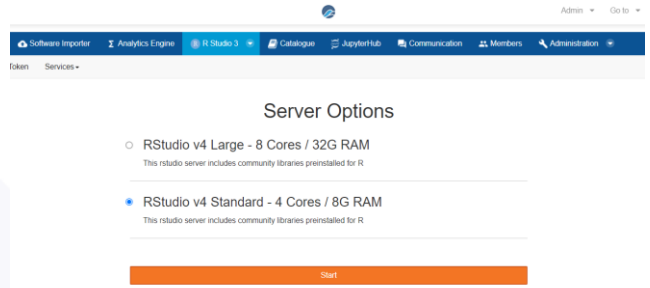
Euro-Argo

JERICO RESEARCH INFRASTRUCTURE

DEMONSTRATING OPEN SCIENCE VIA VIRTUAL LABS

MARIS · Consiglio Nazionale delle Ricerche · VLIZ · cmcc · Koninklijk Nederlands Meteorologisch Instituut · FORTH · hidrográfico marinha portugal · IEEE France Section · IRD · OGS · LIÈGE université · Istituto Nazionale di Geofisica e Vulcanologia · SOCIB Balearic Islands Coastal Observing and Forecasting System

Blue Cloud VRE



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Home /

Data Catalogue

eosc

zenodo

Coastal Ocean observations along Europe

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

hidrográfico marinha·portugal

SOCIB Balearic Islands Coastal Observing and Forecasting System

IEEE Advancing Technology for Humanity

JERICO RESEARCH INFRASTRUCTURE

- 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

Copernicus Marine Service

- SST fields
- NEMO 3D T,S, SSH, Current
- ERA5 Surface Meteo Params

SeaDataNet

- Physics, BGC, Biology

EMODnet CENTRAL PORTAL Your gateway to marine data in Europe

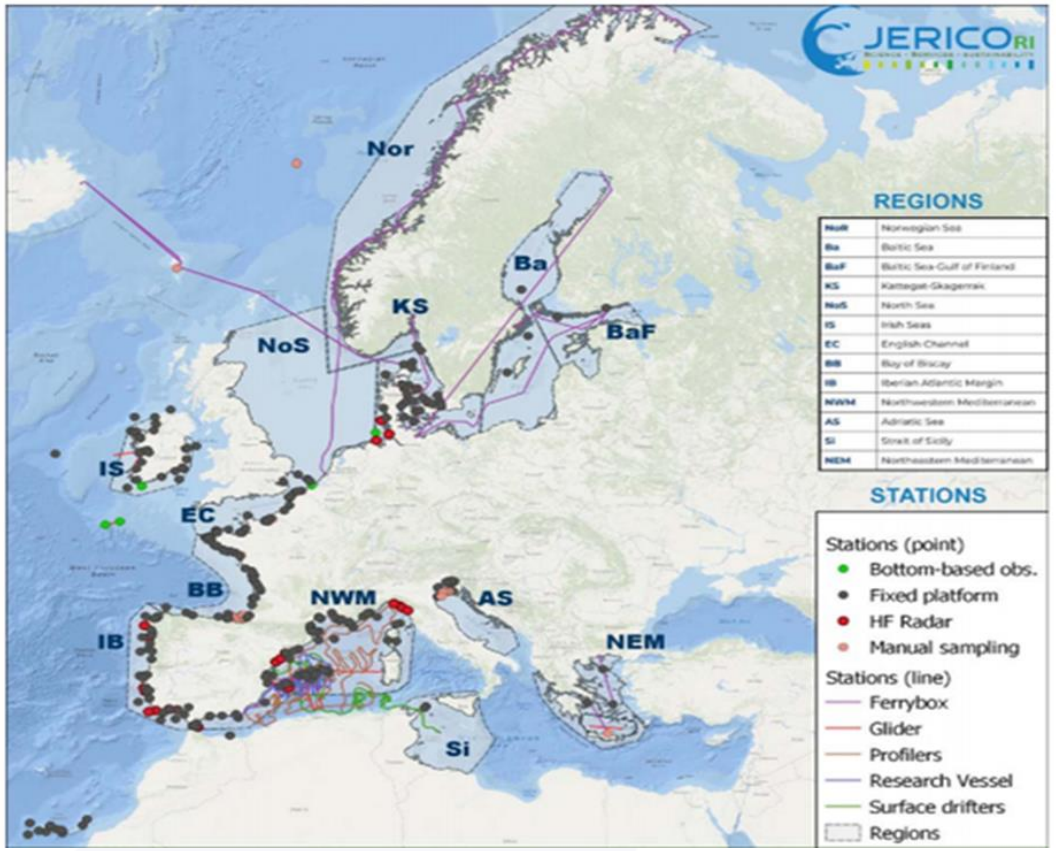
- Physics, Chemistry, Biology, Bathymetry

General Bathymetric Chart of the Oceans GEBCO

- Bathymetry

NETCDF

Shiny



Coastal currents from observations

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

LIÈGE université GHER

SOCIB Balearic Islands Coastal Observing and Forecasting System

cmcc Centro Euro-Mediterraneo sui Cambiamenti Climatici

Copernicus Marine Service

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

Jupyter notebooks
DIVAnd analysis

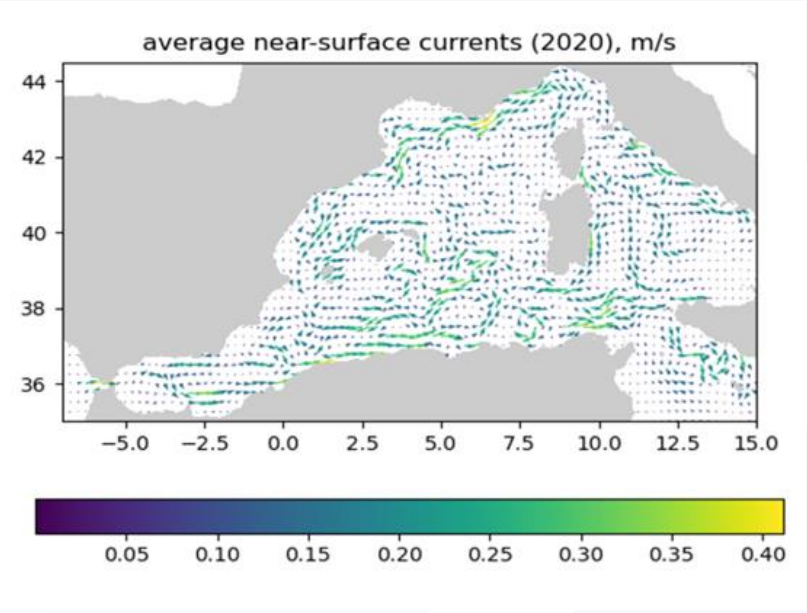
Gridded surface currents

Initialise the oil spill forecasting model (MEDSLIK-II)

EMODnet

GEBCO General Bathymetric Chart of the Oceans

Bathymetry

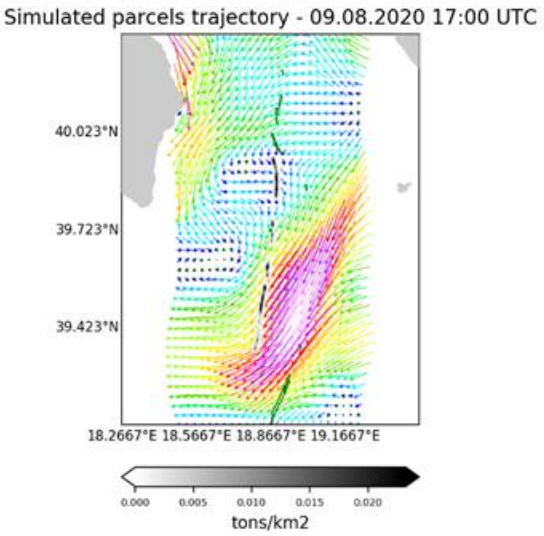


jupyter

julia

NETCDF

SANIFS + ECMWF (1% wind drift)



OpenStreetMap

Coastline

ECMWF EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

Wind speed

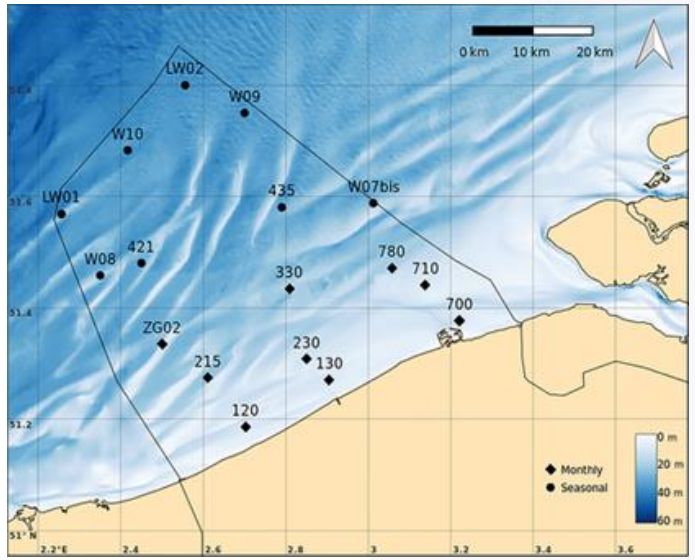
Carbon-Plankton Dynamics

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

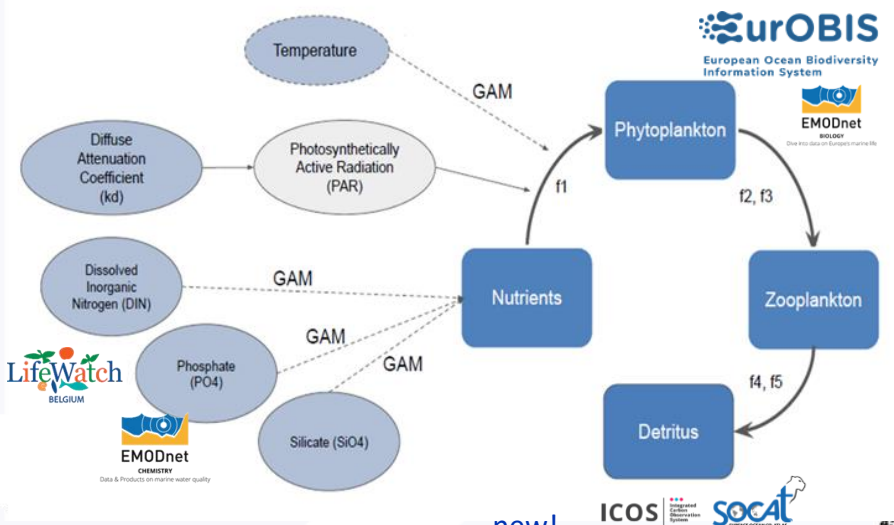
VLIZ OGS Istituto Nazionale di Oceanografia e di Geofisica Sperimentale

Seasonal and monthly records from 2011-2022

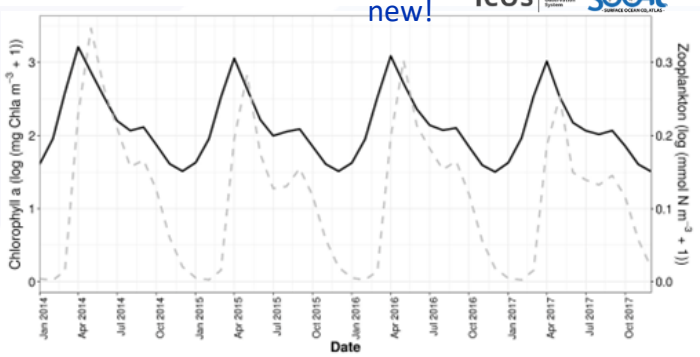
Train and validate the NPZD model for the Adriatic

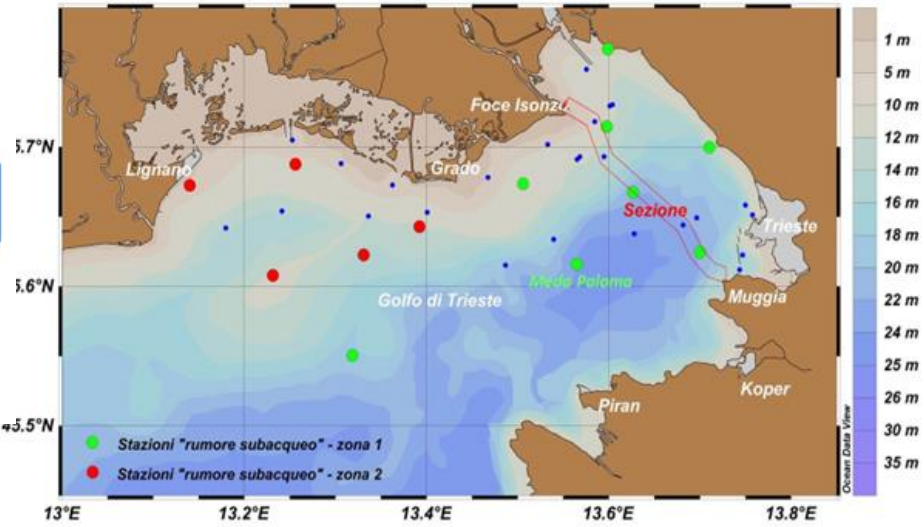


Mortelmans et al. (2019)



new!





ogs.it

Marine Environmental Indicators

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

SERVICES

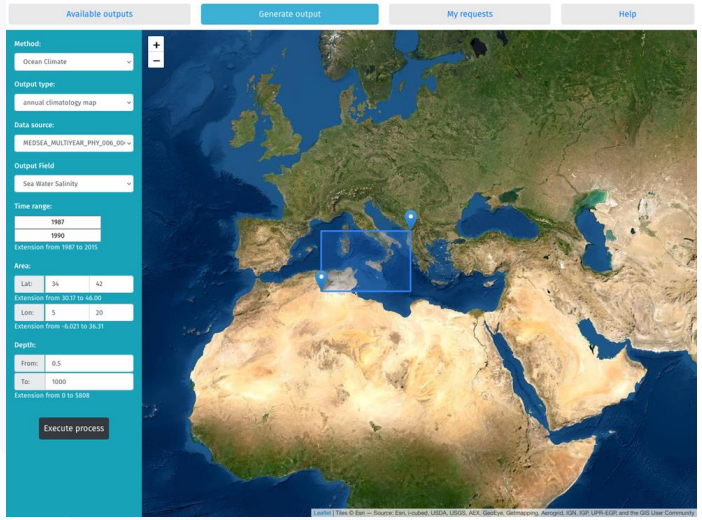
- Marine Environmental indicator (MEI) generator
- Ocean patterns and ocean regimes indicators
- Storm severity index
- Easy access to carbon data
- Ocean heat content
- Enhance Storm Severity Index (SSI v2)

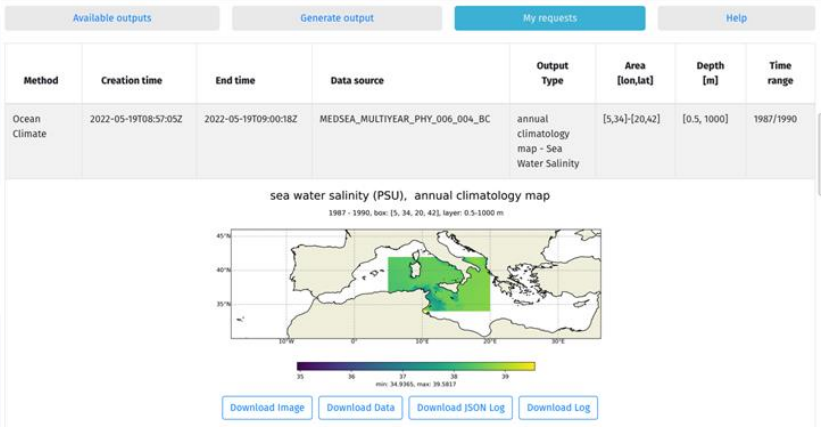
new!

- 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)





Global Fisheries Atlas

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

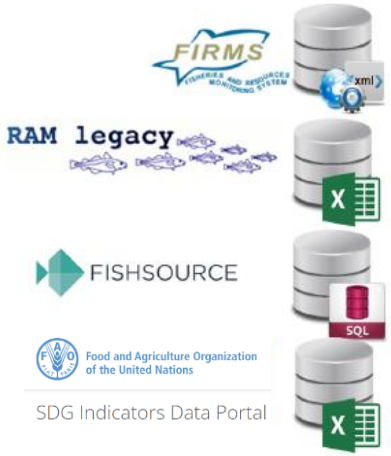
IRD Institut de Recherche pour le Développement FRANCE

FORTH Foundation for Research & Technology - Hellas

Consiglio Nazionale delle Ricerche

GRSF Catalog (Knowledge level)

Fisheries Atlas (data level)



Fetch
Transform

RDF Format

GRSF staging KB

Data curation & validation

GRSF KB & Catalogue

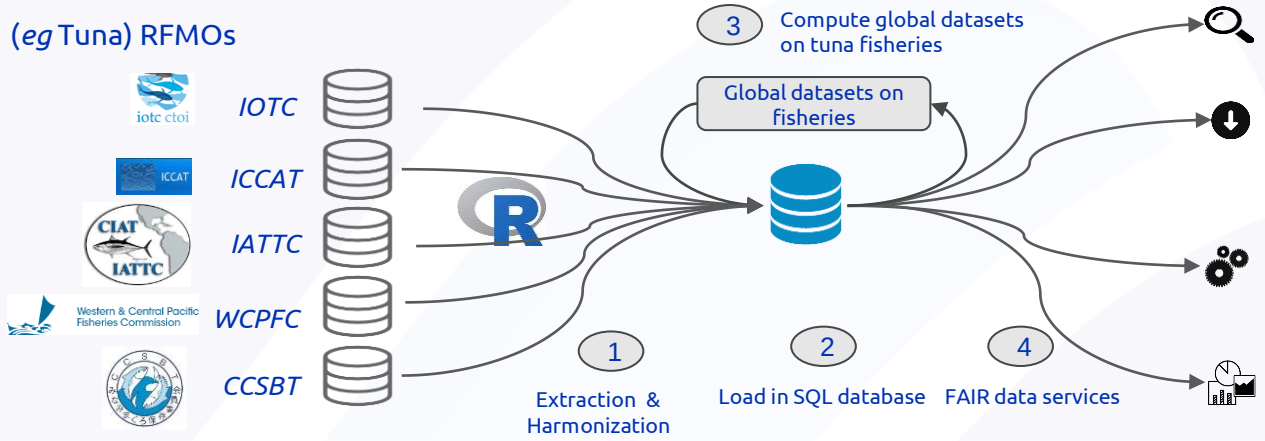
ckan

Data processing: records cleaning, standardization, dissection & merging

new!

Workflows merging

(*eg* Tuna) RFMOs



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?

GeoNetwork opensource

GeoServer

zenodo

GitHub

RStudio

doi

OpenLayers

Shiny by RStudio

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Blue-Cloud 2026 Training Academy & Outreach

Funded by the European Union

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

- **2654** combined followers on social media (target 3000 by December 2023)
- **900+** newsletter contacts - Newsletter client moved to EU-based Mailjet
- **8** new video interviews and **1** promotional video published in 2023

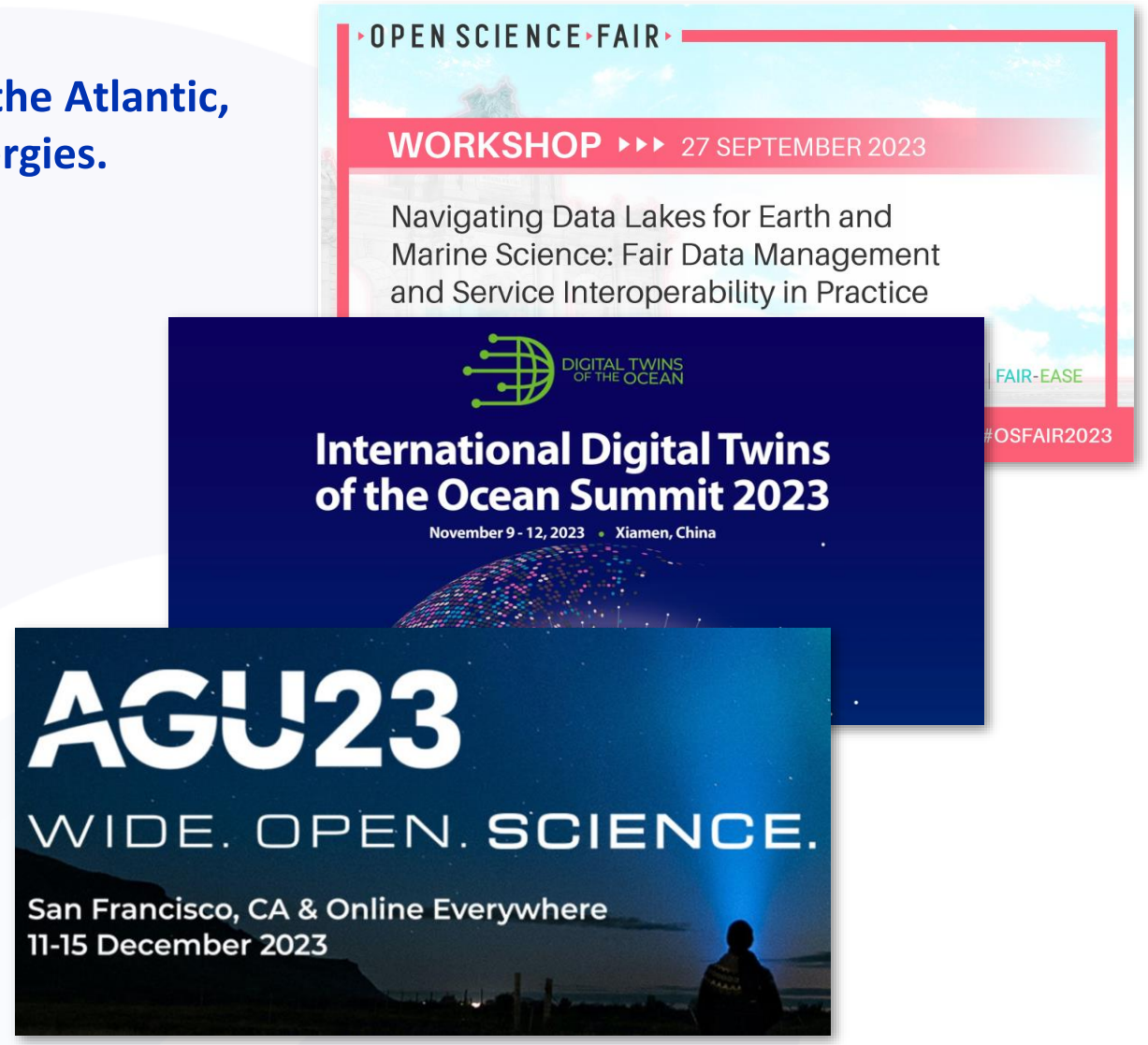
Key actions

- 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

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

Key upcoming events

- 20-22 September - EOSC Symposium in Madrid
- 25-27 September - Open Science FAIR in Madrid
- 3-5 October - EuroGOOS International Conference in Galway
- **9-12 November - DITTO Summit in Xiamen**
- 29-30 November - EMODnet Open Conference in Brussels
- **11-15 December - AGU 2023 in San Francisco**
- 10-12 April 2024 - Ocean Decade Conference in Barcelona
- 27-29 May 2024 - IMDIS in Bergen



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.

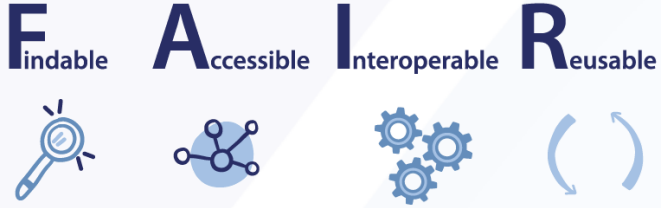
Also thanks to new international partners, our content is reaching specialist audiences in extra-EU countries more than in the previous project.

Blue-Cloud Training Academy

26 September - 16:00 CEST

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

This webinar will explore the challenges and solutions in applying the FAIR foundational components on the journey from FAIR Principles to FAIR Practices to achieve FAIRification in the marine data community. It will look at the standards and practices supporting interoperability and efficiency which focus on the findability and accessibility of data/metadata.
150 people registered as of now



Past webinars

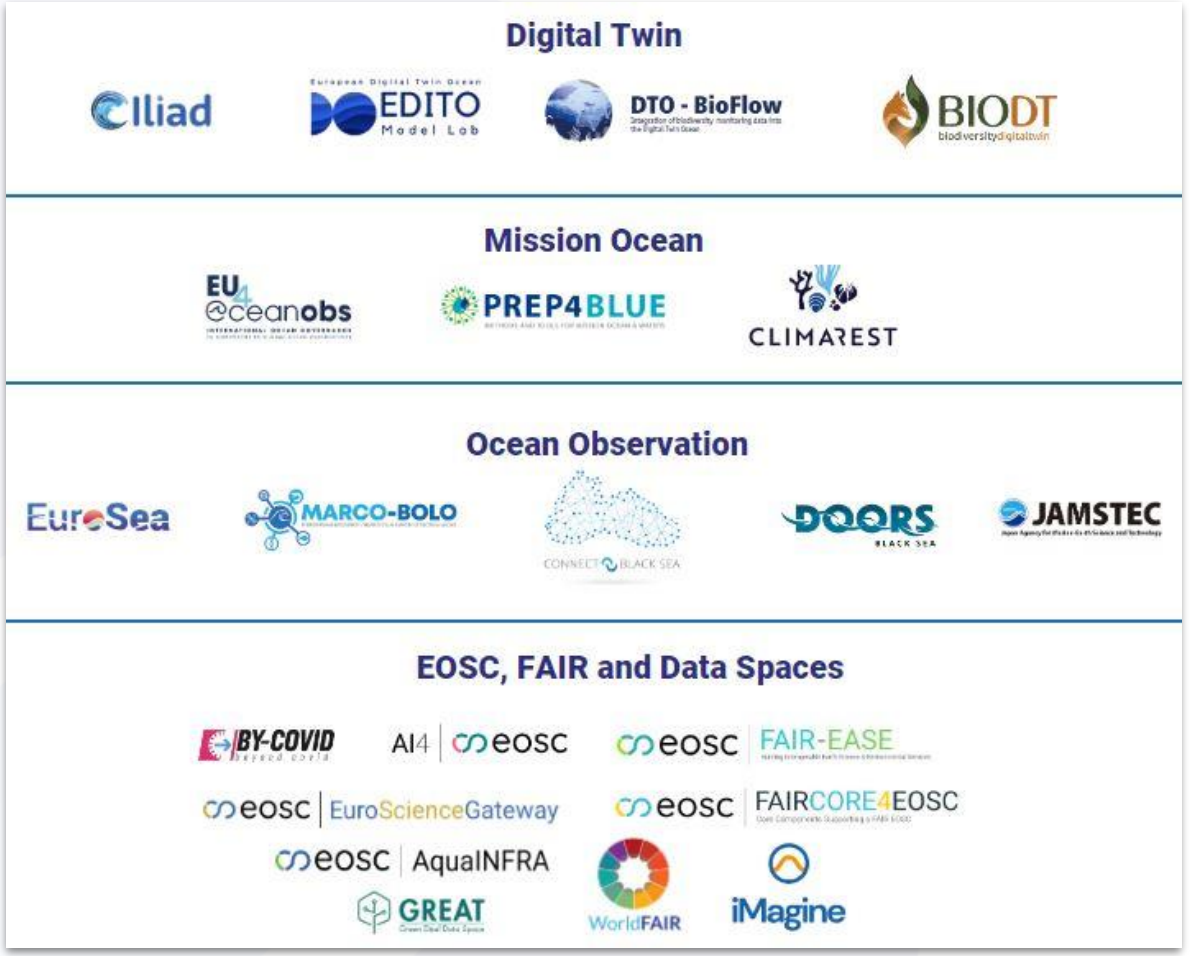
- 17 March - Blue-Cloud VRE
  - 127 registrants
  - 160 views on YT
- 8 June - Blue-Cloud VLabs
  - 99 registrants
  - 77 views on YT

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 EOV 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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