

Blue-Cloud: Developing a marine thematic EOSC cloud to explore and demonstrate the potential of cloud based open science in the domain of ocean sustainability

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The **European Open Science Cloud (EOSC)** is an initiative launched by the European Commission in 2016, as part of the **European Cloud Initiative**. EOSC aims to provide a virtual environment with open and seamless services for storage, management, analysis and re-use of research data, across borders and scientific disciplines, leveraging and federating the existing data infrastructures.

Following its launch several Calls have been published and several projects have been granted for developing (parts of) the EOSC. For the marine domain a dedicated call was launched as part of 'The Future of Seas and Oceans Flagship Initiative', combining interests of developing a thematic marine EOSC cloud and serving the Blue Economy, Marine Environment and Marine Knowledge agendas.

The winning H2020 **Blue-Cloud project** is dedicated to marine data management and its aims are:

- To build and demonstrate a Pilot Blue Cloud by combining distributed marine data resources, computing platforms, and analytical services
- To develop services for supporting research to better understand & manage the many aspects of ocean sustainability
- To develop and validate a number of demonstrators of relevance for marine societal challenges
- To formulate a roadmap for expansion and sustainability of the Blue Cloud infrastructure and services.

The project will federate leading European marine data management infrastructures (SeaDataNet, EurOBIS, Euro-Argo, Argo GDAC, EMODnet, ELIXIR-ENA, EuroBioImaging, CMEMS, C3S, and ICOS-Marine), and horizontal e-infrastructures (EUDAT, DIAS, D4Science) to capitalise on what exists already and to develop and deploy the Blue Cloud.



Figure 1: Blue-Cloud federated infrastructures

The federation will be at the levels of data resources, computing resources and analytical service resources. A Blue Cloud data discovery and access service will be developed to facilitate sharing with users of multi-disciplinary datasets. A Blue Cloud Virtual Research Environment (VRE) will be established to facilitate that computing and analytical services can be shared and combined for specific applications.

This innovation potential will be explored and unlocked by developing five real-life demonstrators addressing societal challenges in the domains of genomics, fishery, aquaculture, biodiversity and environment. The demonstrators will showcase how Blue-Cloud can support ocean science research therefore contributing to the vision of the **United Nations Decade of Ocean Science for Sustainable Development**.

The modular architecture of the VRE will allow scalability and sustainability for near-future expansions, such as connecting additional infrastructures, implementing more and advanced blue analytical services, configuring more dedicated Virtual Labs, and targeting more (groups of) users. During the project, a roadmap to 2030 for expansion and sustainability of the Blue-Cloud federated infrastructures and services mobilising input and support of all major stakeholders, also beyond Europe, will be produced. This roadmap will set the basis for a global Blue-Cloud and will be a first step towards the establishment of a transparent and accessible ocean (a '**Digital Twin of the Ocean**') in support of the Green Deal priorities.

The presentation will describe the vision of the Blue-Cloud framework and the role that Blue Cloud will have in supporting the European Open Science Cloud and the Digital Twin of Ocean establishment.

The Blue-Cloud data discovery and access service (to find and retrieve data sets from a diversified array of key marine data infrastructures dealing with physics, biology, biodiversity, chemistry, and bio genomics), the Blue-Cloud VRE (to facilitate collaborative research using a variety of data sets and analytical tools, complemented by generic services such as sub-setting, pre-processing, harmonizing, publishing and visualization) and the technical architecture of Blue-Cloud will be presented via 5 real-life use-cases to demonstrate the impact that such innovation can have on science and society.