



European
Ocean
Observing
System

Strategy 2023-2027

Advancing EEOOS - the foundation of European ocean knowledge





Executive summary

Europe needs strong and connected ocean observing capacities. We need observations to understand, benefit from and respond to the dynamic ocean environment that is essential for life on Earth, especially in the face of ongoing climate change and its implications for European societies. The **European Ocean Observing System (EOOS)** combines, coordinates and develops ocean observing capabilities at all levels across Europe as the backbone for our understanding of ocean processes.

What is EOOS?

Adequate ocean observations underpin Europe's ambitions for sustainable development, protection of the marine environment, and preservation of its resources and services.

EOOS is the infrastructure, platforms, sensors and people that gather the required data and information about Europe's ocean, seas and coastal waters to meet these needs.

EOOS aims to enhance coordination and collaboration in Europe's ocean observing. It strives for a systematic and efficient approach to collecting high-quality information on the state and variability of the marine environment and life within.

To achieve a sustained EOOS that meets user needs, the **EOOS Framework** offers a collaborative structure for key European actors in ocean observing to align and develop the components of a fully functioning and complete EOOS, and the resources needed to sustain it. As EOOS advances, it will be a central focal point for strategy, stakeholder engagement and innovation across Europe's diverse ocean observation and monitoring communities.

E00S Strategy 2023-2027

E00S' Vision is of a **European Ocean Observing System that is sustained and meets the specific needs of users**. The Strategy 2023-2027 sets out the direction of E00S' development towards this in the coming period as it transitions from a successful initiation stage of networking and structuring towards a sustained operational phase with concerted implementation activities.

To advance towards its Vision, during the current Strategy period **E00S' Mission** is to **coordinate and integrate European communities and organisations operating, supporting and maintaining ocean observing infrastructures and activities, fostering collaboration and innovation**. The Mission will be achieved by fulfilling three objectives:

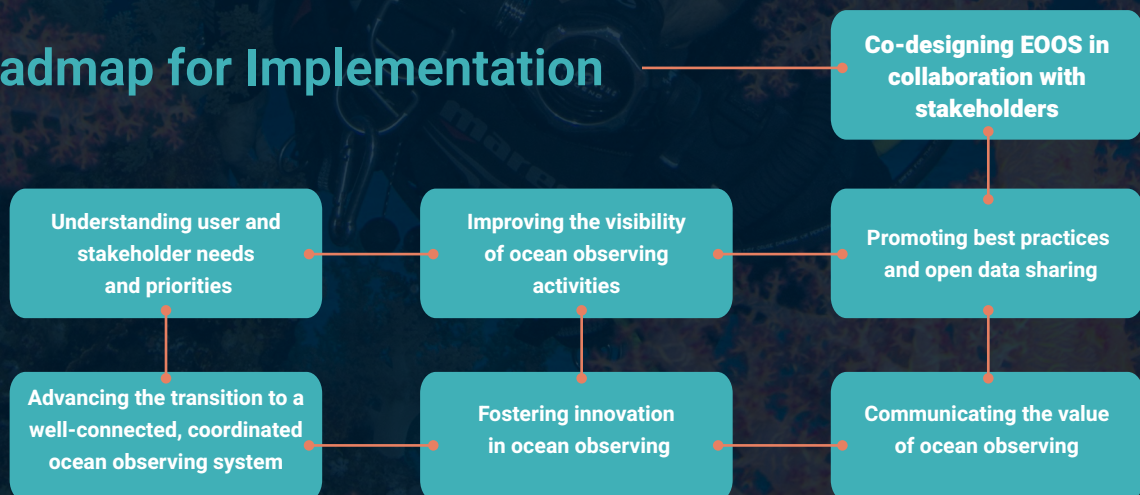
Unite the European ocean observing community through the E00S Framework, to collaboratively design and work towards a sustained multi-platform, multi-network and multi-thematic E00S that meets the specific needs of users

Engage with European providers of services and products derived from ocean observations to improve collaboration across the marine knowledge value chain

Advise governance, funding and policymaking to implement recommendations towards a sustained E00S

The E00S Strategy 2023-2027 is accompanied by a **Roadmap for Implementation**, with the following activities:

Roadmap for Implementation



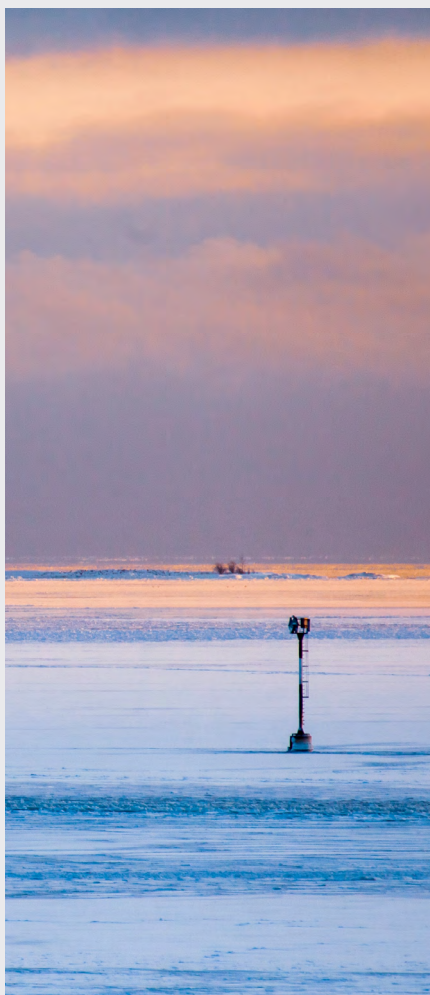
Introduction

Europe needs strong and connected ocean observing capacities. This is necessary to understand, benefit from and respond to the dynamic ocean environment that is essential for life on Earth, especially in the face of ongoing climate change and its implications for European societies. By synergistically federating and further developing its ocean observation capabilities as the European Ocean Observing System (E00S), Europe will enhance the effectiveness and efficiency of efforts to understand its ocean, seas and coastal waters.

What is E00S?

Adequate ocean observation underpins Europe's ambitions for sustainable development, protection of the marine environment, and preservation of its resources and services.

The **European Ocean Observing System (E00S)** is the infrastructures, platforms, sensors and people that gather this essential data and information about Europe's ocean, seas and coastal waters.



Effective coordination and collaboration are key to E00S as it aims to meet the growing needs of users. E00S will be a central focal point for strategy, stakeholder engagement and innovation across Europe's diverse ocean observation and monitoring communities. It strives for a systematic and efficient approach to collecting high-quality information on the state and variability of the marine environment and life within.

To achieve a sustained E00S that is able to meet users' needs, the **E00S Framework** has been developed. The Framework offers a collaborative structure for key European actors in ocean observation to align and develop the components of a fully functioning and complete E00S, and the resources needed to sustain it.



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By aligning and integrating existing ocean observation initiatives, the EOOS Framework aims to help ensure their quality, usefulness, efficiency and value for money. This includes avoiding duplication and finding synergies or complementarities between activities, leveraging the best possible value from Europe’s ocean observation capabilities and resources.

The **EOOS Framework** takes a broad and inclusive perspective of the observations and stakeholders within its scope. It strengthens coordination and dialogue between all those planning, resourcing, managing, implementing, and aggregating ocean observations at European, regional, national and sub-national levels. Actors engaged in the EOO Framework include representatives of observing systems, networks, initiatives and agencies, operators, research infrastructures, data aggregators, service providers, funders and industry. Reflecting the interrelation of all environmental processes in the dynamic oceanic realm, actors in the EOO Framework take cross-thematic perspectives on ocean observation to establish stronger interconnections between their activities.

The **EOOS Framework** focuses on ocean observation capability, including the infrastructure and activities engaged in coastal, open ocean, deep sea and seafloor observations in a multidisciplinary, Europe-wide transnational and cross-sectoral approach. It includes automated and non-automated in situ observations, non-satellite remote sensing, and sampling/laboratory analysis components of European ocean observing, with real-time (or near real-time) and delayed modes of data collection. While striving for fully sustained observing in all European waters and bordering sea basins, EOO includes and is enhanced by project-based and research-driven activities alongside operational programmes and capabilities from both the public and private sectors. The EOO Framework also connects with space-based Earth observations, data

processing and services, modelling and forecasting, and other essential communities within and beyond the ocean realm (e.g. climate, atmospheric, terrestrial, social).

The **EOOS Framework** is a community-driven initiative following a joint, inclusive approach. Following EOO’s inception in 2010, the development of the EOO Framework started in 2015 led by the European Global Ocean Observing System (EuroGOOS) and the European Marine Board (EMB). Since then the EOO Framework has grown from a concept to an established initiative with a clear governance structure. During the period 2023-2027, the EOO Framework will explore opportunities to expand its coordination capacities to realise an efficient and cost-effective EOO. Complementary to this Strategy, an EOO Roadmap for Implementation 2023-27 details key focal areas for the coming five years.

The **EOOS Framework** is developed through a federation of partners. The governance of the EOO Framework is overseen by a Steering Group, chaired by EuroGOOS and EMB. Three further expert bodies contribute to specific aspects of EOO’s development: an Advisory Committee, which brings together a broader stakeholder base, a Resources Forum, which represents European ministries and funding agencies responsible for ocean observing, and an Operations Committee, which represents the diversity of the ocean observing implementers at national, regional and pan-European levels.

Vision ✓

A European Ocean Observing System that is sustained and meets the specific needs of users.

✓ **Mission**

To coordinate and integrate European communities and organisations operating, supporting and maintaining ocean observing infrastructures and activities, fostering collaboration and innovation.

Objective 1

Unite the European ocean observing community through the E00S Framework, to collaboratively design and work towards a sustained multi-platform, multi-network and multi-thematic E00S that meets the specific needs of users.

The E00S Framework provides a platform for the diverse community operating, supporting and maintaining ocean observing infrastructures and activities to collectively improve the coordination and integration of observations, and meet the needs of users of ocean data, information and services. This includes efforts to remove organisational and regulatory obstacles and reduce resourcing limitations to synergistic multi-platform, multi-network and multi-thematic European ocean observing. It will incentivise sustained observation of Essential

Ocean Variables (EOVs) to address gaps, particularly in biogeochemical and biological observations. Through the E00S Framework, emerging priorities are identified for innovations in ocean data management, technologies, and scientific or other applications of ocean observations.

The E00S Framework strives to be open and inclusive. It connects and helps to exchange best practices in ocean observing operations and technology. The E00S Framework assists in identifying capacity building needs to

close gaps in ocean observing capability between regions, sectors and disciplines, and throughout the ocean knowledge value chain. To maximise the benefits of ocean observations for all, E00S relies on findable, accessible, interoperable and reusable (FAIR) data principles, in line with the European Open Data and Open Science policies.



Objective 2

Engage with European providers of services and products derived from ocean observations to improve collaboration across the marine knowledge value chain.

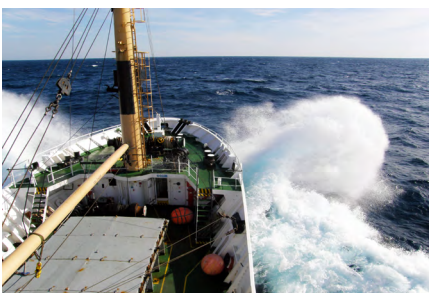
The E00S Framework helps to improve collaboration across the marine knowledge value chain, connecting ocean observing implementers with marine data services and users.

The E00S Framework will improve coordination in the identification of gaps and requirements in European ocean observing, for example, by [Copernicus Marine Service](#), [European Marine Observation and Data Network \(EMODnet\)](#), the future [Digital Twins of the Ocean \(DTO\)](#), etc. This will help better inform optimised E00S design and implementation.

All actors engaged in the E00S Framework are encouraged and supported to proactively improve connection between existing ocean observing assets according to known gaps, requirements and data availability, reducing duplication and saving costs. Furthermore, **greater coordination between E00S Framework actors and their ocean observing assets will help to better align European ocean observations with user requirements.**

Through coordination via the E00S Framework, European ocean observing activities can be optimised to most

effectively meet the needs of users, and new observing activities and services can be developed to meet emerging requirements.



Objective 3

Advice governance, funding and policymaking to implement recommendations towards a sustained EOOS.

The EOOS Framework advances the transition from disconnected ocean observing activities to a joined-up, efficient and more cost-effective EOOS. To this end, dialogue and collaboration with authorities, funders and policymakers will be increased at national, regional and European levels, to ensure effective governance of European ocean observing. This work promotes policy and funding schemes that are conducive to or directly support the development of a sustained EOOS that meets users’ needs.

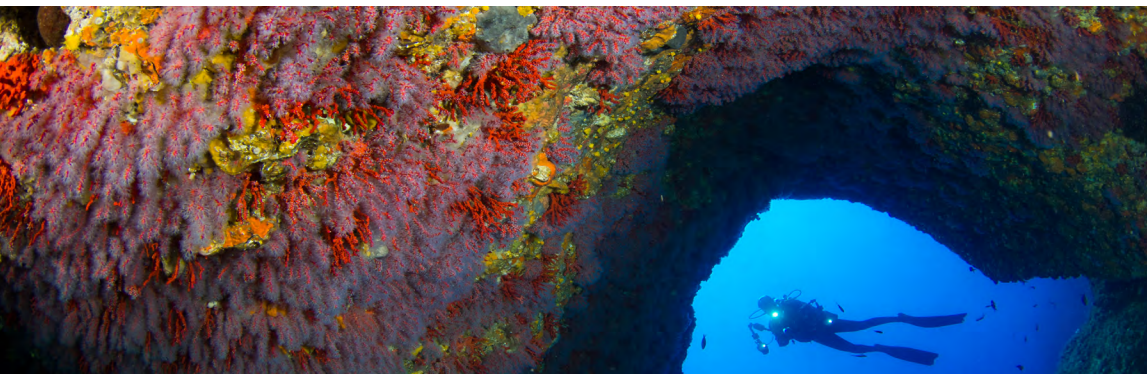
As EOOS matures it is increasingly indispensable for the implementation of marine and other policies at national, regional, European and

international levels. It will underpin the **European Green Deal Actions** and related policies and initiatives, such as [Common Fisheries Policy \(CFP\)](#), [Biodiversity Strategy 2030](#), [Marine Strategy Framework Directive \(MSFD\)](#), [Integrated Maritime Policy \(IMP\)](#) with relevant ocean observations. The EOOS Framework will support the implementation of the upcoming European Commission initiative “Ocean Observation – Sharing Responsibility”. Broader policies and initiatives supported by EOOS include the UN Agenda 2030 and associated agreements (e.g. Paris Agreement, Sendai Framework, and the future legally binding instrument under the United Nations Convention on the Law of the Sea Intergovernmental

Conference on Marine Biodiversity of Areas Beyond National Jurisdiction (UNCLOS BBNJ)).

The EOOS Framework further strengthens Europe’s role in global ocean initiatives. These include GOOS, the UN Decade of Ocean Science for Sustainable Development 2021-2030 and endorsed actions, the GEO Blue Planet initiative and the Global Earth Observation System of Systems (GEOSS), the G7 Future of the Seas and Oceans Initiative (G7 FSOI) and Partnership for Observation of the Global Ocean (POGO), among others.





Strengthening and sustaining E00S

To achieve an optimised and sustained E00S a consolidated European ocean observing community is crucial. The E00S Framework facilitates joint strategic development, stakeholder engagement, innovation and future planning by the European ocean observing community. It connects previously fragmented European ocean observing components and removes barriers to improve information sharing, facilitate dialogue and advance collaboration. The improved integration and coordination at national, regional and pan-European scales enabled by the E00S Framework strengthens ocean observing in Europe and enhances Europe's role in ocean observing globally.

The E00S Framework promotes the inclusion of all available observations and data in existing European initiatives. These include the European Marine Observation Data Network (EMODnet), E00S' long-term data management and sharing platform, underpinned by SeaDataNet, and Copernicus Marine Service. These services are utilising the observations coordinated via the E00S Framework. By facilitating delivery of the ocean observations necessary for its optimisation, the E00S Framework supports the development of the Digital Twins of the Ocean (DTO). Connecting with these different actors and elements, the E00S Framework improves information sharing and efficiencies throughout the ocean observing value chain, and reduces obstacles to achieving a fully effective and sustained E00S.

Most European ocean observing infrastructures and activities are publicly funded by national investment (often from limited-term, unsustainable resources, or through European research infrastructures). Opportunities to improve the future sustainability of



funding for the contributing components of E00S are currently underutilised. With its Resource Forum, the E00S Framework helps to coordinate long-term investment from a diversity of sources to sustain the infrastructures and activities that constitute E00S.

The anticipated European Commission initiative “Ocean Observation – Sharing Responsibility” aims to achieve a common EU approach for measuring once and using marine data for many purposes. It will further highlight the need for greater efficiency and coordination of ocean observing by all data collection efforts, both public and private, by proposing joint planning of observing activities and a framework for collaboration on a national and EU scale. The E00S Framework enables the exchange of best practices and expertise among the ocean observing community, coordinating across sectors to enhance the benefits of ocean observing for society.

Technological advancements in ocean data collection and delivery are driving a new information-rich era. Increases in the amount and frequency of data collection and delivery are leading to challenges in data management and use. The E00S Framework enables the necessary coordination of ocean observation to enhance abilities to derive useful information and services from data. New virtual research environments (such those developed by the European Open Science Cloud (EOSC) and Blue-Cloud) and the DTO are prime examples of initiatives that can only realise their full potential in serving user needs when supported by information derived from observations. The development of intelligent and agile ocean observing strategies, supported by new technologies, and the promotion of best practices for open access to ocean data, metadata and computational power will improve the efficiency of E00S and its ability to meet user needs.

The success and strength of a sustained E00S that meets society’s growing demand for ocean data and information relies on stakeholder engagement across science,



industry, policy and society. Stakeholder interactions and dialogue are ensured through the EOOS Framework with participation in the EOOS governance bodies, joint actions and events. Reflecting the specific growing demands from stakeholders, special effort is dedicated to connecting and integrating European efforts in biological ocean observing with global initiatives and networks, such as the Biology and Ecosystems Panel of the Global Ocean Observing System (GOOS BioEco Panel) and the Marine Biodiversity Observation Network of the Group on Earth Observations Biodiversity Observation Network (GEO MBON).

EOOS is developed in the context of the Framework for Ocean Observing of the Global Ocean Observing System (GOOS). The EOOS Framework benefits from the platform provided by EuroGOOS as the GOOS Regional Alliance for Europe, with dedicated resources for coordination of European ocean observing. The EuroGOOS Strategy 2030 guarantees in-kind support for the EOOS Framework until the development of a dedicated institutional capacity. Ensuring a sustainable organisational foundation for the EOOS Framework is key to the future of EOOS.

The EOOS Strategy 2023-2027 provides direction to advance EOOS from a well-structured multi-actor network towards a platform for coordinating and operationalising user-driven ocean observing. A complementary Roadmap for Implementation provides details of the approaches that EOOS plans to apply within the scope of this five-year strategy.

List of acronyms and abbreviations

Agenda 2030	UN 2030 Agenda for Sustainable Development
BBNJ	Biodiversity Beyond National Jurisdiction
CFP	EU Common Fisheries Policy
DTO	Digital Twin of the Ocean
EBV	Essential Biological Variable
ECV	Essential Climate Variable
EEA	European Environment Agency
EMB	European Marine Board
EMODnet	European Marine Observation and Data Network
EOOS	European Ocean Observing System
EOV	Essential Ocean Variable
EOSC	European Open Science Cloud
EU	European Union
EuroGOOS	European Global Ocean Observing System
FAIR	Findable, Accessible, Interoperable and Reusable
G7 FSOI	The Group of Seven Future of the Seas and Oceans Initiative
GEO	Group on Earth Observations
GEO MBON	GEO Marine Biodiversity Observation Network
GEOS	Global Earth Observation System of Systems
GOOS	Global Ocean Observing System
GOOS BioEco Panel	GOOS Biology and Ecosystems Panel
IMP	EU Integrated Maritime Policy
MSFD	EU Marine Strategy Framework Directive
POGO	Partnership for Observation of the Global Ocean
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNDOS	UN Decade of Ocean Science for Sustainable Development 2021-2030

This Strategy has been prepared by EuroGOOS and the EMB in consultation with the EOOS Steering Group, Advisory Committee, Operations Committee and Resource Forum, as well as the DG MARE, the Global Ocean Observing System (GOOS) and the EuroSea project (European Union Horizon 2020, grant agreement No 862626).

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