

## EU Ocean Observation Initiative - Call for evidence

The French National Centre for Scientific Research (CNRS) is Europe's leading research-performing organisation, recognised for its excellence in fundamental and applied science and for its commitment to advancing knowledge and innovation for the benefit of society. As a major actor in marine and coastal science and a key contributor to European and international ocean observation and governance initiatives, the CNRS plays a central role in producing, structuring and sharing marine knowledge to support sustainable ocean management.

The CNRS welcomes the European Commission's call for evidence on the forthcoming EU Ocean Observation Initiative, which represents a crucial step toward strengthening Europe's capacity to observe, understand and protect the ocean in a rapidly changing geopolitical and environmental context. This initiative, complementary to and coherent with the future Ocean Act, to which the CNRS has also contributed, addresses the urgent need to secure Europe's autonomy in ocean observation, reduce fragmentation, and establish an integrated, fit-for-purpose system that delivers actionable marine knowledge.

Drawing on its operational experience and on Europe's strong scientific assets, the CNRS therefore submits the following contribution to support the development of a coherent, future-oriented and strategically robust European Ocean Observation Initiative.

### CNRS Contribution

In response to the challenges identified in the Call for Evidence, notably Europe's strategic dependencies, geopolitical vulnerabilities, persistent observation gaps, fragmentation of efforts and the escalating triple planetary crisis, the CNRS proposes a set of structured and operational recommendations aimed at establishing a coherent, resilient and future-proof European Ocean Observation Initiative.

Building on France's unique maritime footprint, the second largest Exclusive Economic Zone in the world, the CNRS emphasises that Europe's observation strategy must cover the full ocean continuum, from coastal and nearshore systems to the open ocean. Both domains are equally essential for understanding and managing marine change, even though they require distinct observation infrastructures, technologies and governance approaches.

Addressing these obstacles requires more than incremental coordination. It calls for a legally anchored governance framework, sustained investment in long-term observation capacities, reinforcement of Europe's autonomous access to the sea and to critical data flows, consolidation of public stewardship of marine data, acceleration of technological innovation within a competitive European market, and the recognition of ocean observation as both a scientific mission and a strategic public function.

The recommendations below are articulated around eight mutually reinforcing pillars designed to ensure scientific continuity, strategic autonomy and societal impact.

#### **1. Establishing a robust and operational governance framework for a European Ocean Observation System**

The CNRS strongly supports the establishment of a formal legal framework to govern and coordinate the European Ocean Observation System. A structured European Commission–Member State Forum should be created to define strategic priorities in ocean observation, research and innovation, ensure coherence of investments, and provide long-term visibility.

This Forum should:

- set priorities for observation activities at European scale;
- conduct regular gap analyses, including scientific, technological and geographic coverage;



- review system performance, costs and socio-economic and environmental benefits;
- ensure structured stakeholder involvement, including Regional Sea Conventions; and
- maintain close operational links with EU digital marine services, notably Copernicus Marine, EMODnet, WISE-Marine and the future European Digital Twin of the Ocean (DTO), in order to regularly assess EOOS performance and coherence across the marine knowledge value chain.

The Forum should rely on a permanent European coordination structure (such as an EOOS office or technical centre) and on well-organised national coordination mechanisms capable of implementing transnational recommendations. Existing national frameworks could serve as valuable references in this regard. For instance, in France, the multi-agency governance structure **Fr-OOS** (French Ocean Observing System), in which the CNRS actively participates, provides a coordinated interface among research organisations and institutions involved in marine observation, supporting coherence, data sharing and strategic alignment at national level. Such experiences could usefully inform the design of European coordination mechanisms. National systems should provide regular reporting on the status of observation infrastructures and forward planning, while benefiting from European strategic guidance.

Funding of European Observing System should reflect shared responsibility. Member States should ensure the sustainability of national observing systems, while the European Commission should co-fund global and pan-European networks and support coordination, harmonisation and research and innovation activities. Coastal observing systems should remain primarily under national responsibility, complemented by EU support for standardisation and technological development.

Governance arrangements must be designed to reflect ecological realities. Planning should consider both sea-basin logic and biogeographical and ecosystem-based specificities. Particular governance attention is required for polar regions and deep-sea areas, which involve specific scientific, logistical and geopolitical challenges.

In parallel with the establishment of a strengthened governance framework, it is crucial to consolidate and reinforce the existing ocean observation capacities on which Europe's future integrated system must build. The current landscape, though scientifically rich and interconnected, remains fragile and unevenly supported across domains and regions. Sustained investment is therefore required to secure the continuity and interoperability of existing infrastructures, which already provide the foundation of Europe's ocean observation capacity. The CNRS also stresses the importance of maintaining and further developing the strong synergies between in situ and space-based observation, particularly through satellite altimetry and ocean colour, which represent one of Europe's distinctive scientific strengths and an essential bridge between physical, biogeochemical and ecosystem monitoring.

Finally, governance structures should anticipate the progressive integration of socio-economic observation, an area currently underdeveloped but essential for comprehensive cumulative impact assessments.

## **2. Securing Europe's strategic autonomy and research capacity at sea**

Strategic autonomy in ocean observation depends on Europe's ability to access the sea, operate and renew its research infrastructures, and secure the integrity of its data flows. Growing structural constraints, including rising operational costs, ageing fleets and increasing reliance on private operators outside harmonised European standards, risk weakening this capacity.

A coordinated European approach to oceanographic fleets is therefore necessary. The Initiative should strengthen mechanisms such as EuroFleet, support fleet renewal and accompany the transition towards low-carbon operations. At the same time, a European framework should clarify the conditions under which private operators contribute to research missions, while ensuring that public operators remain the reference standard for scientific protocols, ethical compliance and data governance. Clear rules on data ownership, quality control and long-term accessibility are essential.



Strategic autonomy also requires securing observation data against critical dependencies. Open data systems, including satellite constellations and in situ networks such as Argo, must remain accessible while being protected against fragmentation, uncontrolled appropriation or strategic vulnerability.

### **3. Making long-term biodiversity observation a core pillar of EOOS**

Long-term biological observation should be explicitly recognised as a foundational component of the European Ocean Observation System. Sustained time series on living organisms, covering populations, communities and ecosystem functions, are indispensable for distinguishing natural variability from structural change, detecting cumulative pressures and evaluating the effectiveness of public policies. They underpin the implementation of the One Health approach and provide the scientific basis for assessing ecosystem resilience in the context of climate change and biodiversity loss.

To fulfil this role, biodiversity monitoring must be structured as a long-term infrastructure effort. Programmes such as **SEE-Life**, a CNRS-labelled programme, illustrate how structured, coordinated, quality-controlled observatories can ensure scientific continuity across spatial and temporal scales. Similarly, the network of **CNRS-labelled SNO** (Services Nationaux d'Observation), which constitute a cornerstone of France's marine research infrastructures coordinated under Fr-OOS, provides an existing backbone for developing and testing innovative methods and approaches for biodiversity monitoring. Such observatories should be considered essential infrastructures and supported through stable and dedicated funding mechanisms. Comprehensive monitoring should integrate genetic, taxonomic and functional dimensions, which respond differently to anthropogenic pressures and management measures. Particular attention should be given to under-observed yet climate-critical domains such as mesopelagic and deep-sea systems, given their central role in carbon sequestration and marine resource dynamics. Stable and dedicated funding mechanisms are therefore essential to secure continuity and methodological robustness over time.

### **4. Fully integrating the monitoring of human activities and cumulative impacts**

Ocean observation must progressively move beyond indirect pressure proxies towards direct, harmonised and spatially explicit monitoring of human activities at sea. As maritime uses intensify and diversify, the capacity to assess cumulative socio-ecological impacts in an integrated manner becomes a strategic requirement for effective governance.

The Initiative should therefore promote interoperable monitoring systems covering key maritime sectors, including fisheries, maritime transport, offshore renewable energy, tourism, marine litter and diffuse pollution, and ensure that these systems are embedded within a coherent framework capable of integrating physical, biogeochemical and biological parameters. Such integration is essential to support cumulative impact assessments and evidence-based maritime spatial planning.

In this perspective, a “multi-use by design” approach should guide future planning decisions, supported by the development of ecological compatibility criteria for combined uses (e.g. aquaculture and offshore energy). Emerging activities, such as marine carbon dioxide removal (mCDR) or new fisheries practices, further underscore the need for dedicated and scientifically independent observation frameworks capable of detecting ecosystem-level effects with sufficient resolution and robustness.

### **5. Accelerating innovation, market competitiveness and high-value observation products**

The Initiative should pursue a dual approach: strengthening Europe's technological and industrial competitiveness in ocean observation while developing high-value, policy-relevant products directly derived from observation data.

#### **Building a competitive European observation market**

Europe must strengthen its technological base and industrial competitiveness in ocean observation. The Initiative should support both disruptive and incremental innovation in:

- advanced sensors for biodiversity (eDNA, imaging, passive acoustics), pollutants and greenhouse gases;



- autonomous platforms (Argo floats, gliders, surface drones);
- low-cost observation systems to democratise access to data collection across research institutions and SMEs;
- eco-designed platforms reducing the carbon footprint of ocean observation operations, in line with EU climate neutrality targets;
- artificial intelligence tools for sensor management, onboard data processing and integration of heterogeneous datasets.

Strengthening this technological capacity requires a structured innovation ecosystem. Public–private partnerships are essential in research and development, particularly in sensor technologies and autonomous systems, provided that public authorities retain oversight of standards, interoperability and data governance principles. The development of downstream services and applications should be encouraged to support market uptake and value creation.

### **High-value products for policy and decision-making**

Raw observation data must remain the primary, independently accessible layer of the marine knowledge chain. While integration within the Digital Twin of the Ocean (DTO) is desirable, data products independent of modelling outputs remain indispensable to validate, continuously improve modelling systems and ensure transparency.

The Initiative should promote high-value products derived directly from observation data, including:

- real-time indicators for marine policy implementation (MSFD Good Environmental Status, biodiversity targets);
- early-warning systems for cumulative impacts;
- strategic datasets for maritime spatial planning and Blue Economy decisions.

In this context, the establishment of European ocean technology test sites would further accelerate innovation and deployment, provided that scientific actors are fully involved in defining strategic priorities and evaluation criteria.

## **6. Guaranteeing public stewardship of marine data and integrity of the knowledge value chain**

Marine observation data constitute a strategic public infrastructure underpinning Europe's environmental governance, maritime security and scientific leadership. Their governance must therefore remain under transparent and accountable public stewardship, ensuring that the integrity of the knowledge value chain is preserved from data acquisition to dissemination and reuse.

The Initiative should consolidate interoperability and functional complementarity between EMODnet, Copernicus Marine, WISE-Marine and the future Digital Twin Ocean, while clearly recognising in situ observation as the foundational layer of the system. At national level, existing infrastructures such as the **Data-Terra Research Infrastructure**, an EOSC node that was initiated by France in which the CNRS plays an active role, and its ocean component **ODATIS** provide valuable examples of integrated data management frameworks ensuring interoperability, long-term accessibility and cross-domain coherence between ocean, atmosphere, land and biodiversity observations. Long-term archiving, open standards, traceability mechanisms and rigorous quality control must be embedded as structural requirements rather than optional features.

In a context of increasing geopolitical competition and digital vulnerability, securing data flows, preventing fragmentation and safeguarding control over strategically sensitive datasets are essential conditions for Europe's scientific credibility and strategic autonomy.

## **7. Investing in people: recognising the profession of ocean observer**

Ocean observation relies on highly specialised professionals whose primary mission is to ensure the continuity, quality control and progressive methodological evolution of long-term observation systems. While these experts are often trained as scientists, their core function lies in sustaining operational



consistency and technical reliability over multi-decadal timescales, a role that remains insufficiently recognised within traditional academic career frameworks.

In this context, the Initiative could encourage reflection at European level on the formal recognition of the ocean observer profession, including the possible development of a European label or accreditation scheme inspired by existing national models, such as the French CNAP (Conseil National des Astronomes et Physiciens) framework. The CNAP, a national body under the Ministry of Higher Education and Research, oversees the recruitment and career management of scientists assigned to long-term observation services, including ocean, atmosphere and continental surface monitoring. This system provides a structured, state-recognised framework ensuring career stability, dedicated training and continuity of expertise across observation infrastructures. A similar European scheme could help secure long-term human capacities and reinforce the operational robustness and credibility of Europe's ocean observing efforts.

### **8. Strengthening ocean literacy and societal ownership**

Public engagement must be structurally embedded within the Initiative. The CNRS supports the development of European-labelled observatory sites in marine areas of high societal relevance. These sites could deploy state-of-the-art observation tools, test eco-sustainable methodologies and, where appropriate, contribute to the establishment of future Marine Protected Areas combining conservation and scientific research.

Public research vessels and observatories should serve as ambassadors of ocean science, enhancing visibility of the full observation value chain. In parallel, the Initiative should encourage the development of dedicated training programmes and university curricula covering the full marine observation value chain, from sensor design and system operation to data qualification, modelling and governance, thereby ensuring the availability of interdisciplinary skills and expertise essential to sustain Europe's strategic ocean observation capacities. Strengthening ocean literacy through education, cultural initiatives and alignment with the New European Bauhaus principles will foster societal ownership and long-term support for marine protection.

### **Conclusion**

→ The EU Ocean Observation Initiative represents a decisive opportunity to transform Europe's existing strengths into a coherent, strategically autonomous and scientifically robust system. By anchoring governance in a legal framework, investing in long-term biodiversity monitoring, reinforcing access to the sea, safeguarding public data stewardship and stimulating innovation within a competitive European ecosystem, the European Union can ensure that ocean observation delivers “the data we need, for the ocean we want”, while strengthening resilience, sovereignty and environmental responsibility. The CNRS stands ready to provide its expertise and operational experience in support of this initiative.