

Response by the **Integrated Carbon Observation System** European Research Infrastructure Consortium, ICOS ERIC to the Call for Evidence for an EU Ocean Observation Initiative

The Integrated Carbon Observation System (ICOS ERIC) welcomes the opportunity to respond to the Call for Evidence for an EU Ocean Observation Initiative (OOI) and would like to share with the European Commission the following considerations.

Marine knowledge, research and innovation. European Research Infrastructures (RIs) are the backbone of systematic and long-term observation of the ocean. ICOS focuses on measuring CO₂ dissolved in surface ocean water, and together with satellite information, the data provided by ICOS is key to assessing the global carbon budget and the role of the ocean as a carbon sink. This role is likely to change drastically in the future as global warming increases, it is thus vital for Europe to have access to reliable, near-real-time and long-term datasets to monitor this evolution and take action based on scientific evidence. However, an alarming rapid decline in ocean observation worldwide is occurring, as pointed out at the recent Earth Information Day (COP30).

The OOI should leverage the support provided by the European Commission through the R&D framework programs. This funding stream has been instrumental in launching ambitious projects that strengthen collaboration, develop new ocean technologies, and expand observations to under-sampled regions of critical importance for Europe, like the Arctic and the Southern Oceans. ICOS has experience of such projects that have demonstrated transformative technological and methodological developments, and the ability to support EU competitiveness. The continuous support of the Commission is irreplaceable, but currently, the upgrade of existing distributed RIs to conquer new areas of science and technology is notably difficult, if not impossible. The OOI could break down barriers to the expansion of existing RIs and maximize what they have already achieved.

This is particularly true because the data collected by RIs like ICOS is not only necessary to assess the state of the ocean through direct observations; it is also crucial for the optimal use of current and future satellite information. Any disruption in the availability of critical datasets may endanger e.g. the huge investment Europe has made in the Space Component of Copernicus. ICOS data is also an integral input to numerical models for mapping current and future states of the ocean, ocean health, as well as weather and climate projections for Europe in a changing climate.

Governance and international cooperation. The most crucial objective a revised European governance of the ocean should achieve is the reduction of the current fragmentation of structures and efforts. ICOS welcomes the perspective of the formal Commission – Member State Forum to be established through the Ocean Act as a place to actively coordinate European and national efforts and facilitate their implementation. Currently, multiple groups perform similar measurements (e.g. surface carbon) and place their data in different repositories, which might lead to duplication or to the production of data that is difficult to locate and access or poorly interoperable. Many Member States also operate expensive cruises in under-observed regions of the ocean, and they should be strongly encouraged, either to expand the portfolio of measurements they perform during cruises, or at least to share the collected data through established data portals. This would significantly increase the coverage of ocean observations for a limited additional budget, while maximizing the massive investment such cruises represent. Along similar lines, the OOI could facilitate clearance mechanisms between coastal states by fostering new legal frameworks, which could encourage RIs to integrate new autonomous platforms in their operations. Novel autonomous platforms and unmanned vehicles, with necessary standardizations, would be powerful tools in under-observed and hard-to-observe regions of the ocean. As global ocean observations decline, the Commission's mandate in the OOI to support autonomous platforms, alongside conventional platforms, is of strategic importance.

International cooperation is unavoidable if humanity is to tackle the issues brought by climate change: it is a prerequisite for high-level scientific achievements and must not be reduced because of the current

geopolitical situation. On the contrary, Europe must strengthen collaboration with key partners who are already strong in the ocean domain (Australia, Canada, Japan, New Zealand, South Africa...) and the OOI must encourage European RIs to increase their connections to similar structures internationally. It is crucial, however, that European solutions make use of the assets the Commission has already developed (EMODnet, Copernicus, DTO...) while fully aligning with the relevant global frameworks (IOCCP, GOOS, EOVs, SOCAT...). Europe should see ocean observation as a critical infrastructure and make use of its RIs in the marine domain, to continue and lead the path to scientific multilateralism. It is critical also because climate change and ocean variability beyond European borders does considerably impact Europe itself.

Simultaneously, international cooperation must be paired with a significant increase in European strategic autonomy. The reliance of European researchers on equipment, calibration standards and reference materials provided by only a handful of actors outside of Europe is a clear mid- to long-term risk. The experience accrued in ICOS with its robust measurement protocols, quality control and data management, as well as its central laboratories able to provide some of the calibration standards needed for observation, is available. Together with other RIs in the ocean domain, ICOS can provide a solid backbone to develop European capacity in this field. The OOI can efficiently help RIs mitigate the risk of dependency on non-European actors, which could also support the development of a competitive market in Europe.

The Ocean Observation Initiative will be a key element for the implementation of the European Ocean Pact as a single framework for ocean-related policies. By providing the necessary coordination, the OOI will set the foundation for a successful European Ocean Research and Innovation Strategy. If this strategy is to shape the future of ocean science in Europe, it must build on the achievements made by Research Infrastructures in the marine domain.

ERICs like ICOS are not only strategic assets for Europe. They have built, in their structures and operations, the practice of pooling resources from several countries to produce results that are more than the sum of their parts. Because they federate large, European scientific communities, RIs are a natural place for cross-border collaboration between Member States. This applies to research but increasingly also to the creation of actionable knowledge that can support evidence-based decision-making. ICOS is ready for a fruitful dialogue with the Commission to further develop these roles.

For further information

Integrated Carbon Observation System (ICOS) www.icos-ri.eu

ICOS Ocean Thematic Center (OTC) www.icos-ri.eu/observations/ocean

GEORGE project <https://george-project.eu/>

TRICUSO project <https://tricuso.eu/>

Earth Information Day 2025 <https://unfccc.int/event/earth-information-day-2025-mandated-event>