

The JPI Oceans Knowledge Hub on Ocean Carbon Capacities is led by Norway and co-led by Germany, with Belgium, Greece, Ireland, Poland, and Portugal as participating countries.

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# Strengthening Europe's Ocean CO<sub>2</sub> Monitoring



#### STRENGTHENING EUROPE'S OCEAN CO, MONITORING

The world's oceans absorb about a quarter of the carbon dioxide  $(CO_2)$  produced by human activities, playing a crucial role in reducing the effects of climate change. Since ocean waters hold approximately 50 times more carbon than the atmosphere, any change in the ocean's ability to take in carbon will significantly affect atmospheric  $CO_2$  levels and our efforts to mitigate and adapt to climate change.

Therefore, monitoring carbon in the oceans is essential for guiding policy decisions, as highlighted by the Ostend Declaration on Operationalising the Surface Ocean Carbon Value Chain<sup>1</sup>. With initiatives like the Paris Agreement, the United Nations Decade of Ocean Science, and the ambitions of the European Oceans Pact to improve Europe's role in global ocean governance, strengthening ocean carbon observation is both a scientific necessity and a political responsibility.

As the 29th Conference of the Parties (COP29) of the United Nations Framework Convention on Climate Change calls for the development of carbon trading systems, having robust and trustworthy ocean carbon data becomes even more critical.

However, despite its growing importance, the incremental rate of high-quality ocean carbon data per year is going down, and **the entire system for managing ocean carbon information is under strain**.

Action is therefore needed to tackle the following three challenges:

**1.** Laboratories worldwide depend on a single U.S. supplier for ocean carbon reference materials, standards that ensure accuracy and comparability in seawater CO<sub>2</sub> measurements<sup>2</sup>.

**2.** The numbers of measurements of carbon dioxide levels at the ocean's surface have been declining dramatically since 2017, leaving gaps in our understanding of how much  $CO_2$  the oceans are absorbing<sup>3</sup>.

**3.** There is no system in place for the regular assessment of Europe's seawater  $CO_2$  observing efforts, making it difficult to identify weaknesses, track progress, and ensure long-term improvement.

Therefore, the JPI Oceans Knowledge Hub on Ocean Carbon Capacities calls on the EU, European governments, funding agencies, research infrastructures, and the international community to support efforts to:



### 1. European Ocean CO<sub>2</sub> Reference Materials Hub



Accurate tracking of carbon in the ocean requires certified reference materials of known chemical composition. These act as measurement standards to ensure analytical data are reliable and comparable across laboratories. Currently, the global supply depends on a single U.S. provider, the Scripps Institution of Oceanography, creating a risk of disruption.

Establishing a European Ocean  $CO_2$  Reference Materials Hub is a critical strategic decision that Europe cannot afford to postpone. This decisive action will secure a stable supply, protect the integrity of climate data, and support future carbon markets.

This will contribute to reinforcing Europe's climate-governance infrastructure and help set a benchmark for global collaboration, especially with the Global South, by harmonising measurements and elevating Europe's role in oceancarbon stewardship worldwide.

## 2. Improve CO<sub>2</sub> observations on research vessels and beyond

Important ocean areas are still not well studied, which limits our knowledge of how much carbon the ocean absorbs and weakens climate efforts. Although Europe has a strong research vessel fleet, many ships either don't have or don't fully use equipment that measures carbon dioxide levels in seawater because of technical and operational challenges. This is a missed chance to boost Europe's role in global ocean carbon monitoring.

With focused policies, training, and partnerships, Europe can fully use these systems and increase coverage by also involving commercial vessels. This will ensure reliable data reaches global products like the Surface Ocean  $CO_2$  Atlas (SOCAT) and the Global Carbon Budget.

Filling these gaps is vital for accurate carbon accounting, effective climate action, and improving Europe's contributions to ocean  $CO_2$  monitoring globally.

# 3. Regular audit of surface ocean CO<sub>2</sub> observations



To make sure more  $CO_2$  measurements have a lasting effect, regular checks of the ocean  $CO_2$  monitoring network are needed. Without these, problems and gaps can go unnoticed, weakening climate reports and limiting good policy and investment decisions.

A clear and transparent audit system, which has so far been missing, supported by practical assessment tools such as a traffic light system, can help identify where improvements and resources may be needed. The results can inform upgrades and support progress tracking.

This contributes to greater efficiency, effectiveness, and resilience in Europe's observation efforts and supports its role in global ocean management.





