



Breaking Ice and Barriers: A Tale of Partnership, Preservation, and Promise

The Arctic, far more than a cinematic expanse of ice, serves as a crucial gauge for our planet's health. Its delicate balance is under threat, with alarming changes unfolding across its vast landscapes. The urgency to understand these shifts has never been greater. By gathering comprehensive data on the Arctic ecosystem, we aim to decode its present state, anticipate future scenarios, and mobilise global action. EU scientists are at the forefront of this endeavour, highlighting the pivotal role of collaborative efforts in both understanding and preserving this unique and fragile environment.

Where the Northern Lights dance across the midnight sky and polar bears roam the icy landscapes lies the Arctic. A place of extraordinary beauty, boundless wilderness, and home to some of the world's most tenacious species. However, as remote and distant as its ethereal landscapes are, the Arctic is a bellwether for the impacts of climate change, with consequences that reach far beyond its snowy borders.

There's an idiom that the Arctic is the «world's refrigerator,» a cool bastion that helps regulate Earth's climate. But, as the effects of global warming become increasingly evident, this is no longer a given. Scientists warn that since 1979 the Arctic is heating nearly [four times faster](#) than the global average, a phenomenon known as Arctic amplification.

With sea ice melting at unprecedented rates, this once-constant landscape is morphing into a tapestry of unknowns. And the reverberations of these changes echo across the globe, disrupting weather patterns and exacerbating sea-level rise. However, the Arctic doesn't only face threats from above, but also from below.

Rising sea temperatures, dwindling oxygen levels and a mounting influx of pollution - particularly plastics - are dramatically altering the under-ice world.

Studying the polar regions, however, presents unique challenges. The Arctic's extreme and volatile conditions, its remoteness, and its vast size all contribute to the formidable obstacles faced by researchers. "But we know that understanding the transformations occurring in the Arctic is crucial to predicting global climate trends and safeguarding marine ecosystems," says Dr. Véronique Garçon of the [Global Ocean Oxygen Decade \(GOOD\)](#) programme. "The deep waters of the Arctic form part of the global 'conveyor belt' of ocean circulation, influencing deep water masses worldwide. Therefore, sampling in the Arctic is also essential for understanding changes in deep waters."

In collaboration with an international team of 20 members, Garçon is tasked with promoting more observations and citizen science initiatives to increase the number of observations concerning oceanic oxygen levels.

She adds, “Over the last 50 years, oxygen levels have dropped by about two per cent in the ocean. While climate models attempt to simulate these processes, a lack of precise data leaves us grappling with large uncertainties. So, while collecting data here is a huge undertaking, we simply cannot ignore this critical region.”

Uniting Sectors to Support Arctic Research

Despite the advances in remote sensing, the technology has limited observation capacity in Polar regions, explains Dr. Veronica Willmott Puig of the Alfred Wegener Institute (AWI). “This means that, despite the difficulties, we truly have no choice but to conduct on-site investigations.”

However, there are only three research icebreakers in Europe capable of collecting data in the Arctic year-round: the research vessel *Polarstern* from Germany, operated by AWI; the Icebreaker *Oden* from Sweden, operated by the Swedish Polar Research Secretariat; and the research vessel *Kronprins Haakon* operated by the Institute of Marine Research from Norway.

Willmott Puig is the project manager for the EU-funded [Arctic Research Icebreaker Consortium \(ARICE\)](#) initiative. Coordinated by AWI's International Cooperation Unit, the project aims to provide Europe with better capacities for marine-based research in the ice-covered Arctic Ocean by better coordinating the existing polar fleet, providing transnational access to research icebreakers outside of Europe, and collaborating with the maritime industry in a Ships and Platforms of Opportunity Programme.

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Willmott Puig says, “The number of research icebreakers is limited, and they are typically prioritised for use by researchers of their respective nations. Not every country has the resources and capacity to build, operate, and maintain these expensive vessels. However, many countries have strong polar programmes that need access to these vessels. This is why international cooperation and cross-sector partnerships are absolutely crucial.”

Faced with these hurdles, the need for partnerships across diverse sectors becomes paramount. One such groundbreaking collaboration is between [ARICE](#) and [Ponant](#), a world leader in luxury cruise expeditions.



Icebreaker Le Commandant Charcot in Svalbard, north of Arctic Circle, June 2023. Photo credit: Xavier Boymond

The ARICE-Ponant partnership arose from a desire to improve access to the Arctic, avoid duplicating efforts, and ensure scientists have access to different vessels. ARICE uses its external evaluation panel to ensure the excellence of the science projects on the Ponant's new state-of-the-art icebreaker, *Le Commandant Charcot*, explains Willmott Puig. “Thus, we've established a beneficial partnership where Ponant provides the infrastructure, and we ensure the quality of the science conducted. One such project which was [selected for implementation](#) this year is the GOOD-IMDOS project.”

Fuelled by the success of their pilot expedition in 2022, the GOOD-IMDOS project aims to deepen our understanding of the ocean's oxygen levels, the health of planktonic ecosystems, and the disturbing prevalence of microplastic pollution in the Arctic. Over the next five years, the expedition will contribute valuable data to the United Nations' Decade of the Ocean Science for Sustainable Development (2021-2030), GOOD, and the Integrated Marine Debris Observing System (IMDOS) of the Global Ocean Observing System (GOOS).



Scientists use manta trawl net to sample microplastics during GOOD-IMDOS research campaign in the Arctic, June 2023. Photo credit: Xavier Boymond

Garçon says, “It’s challenging to conduct research in the Arctic, so when we learned that the *Charcot* was going there every year, we saw it as a unique opportunity for long-term data collection. The collaboration with Ponant, facilitated by ARICE, allows us to reach places that were otherwise inaccessible. It’s the perfect example of how private and public sectors can work together to achieve common goals.”

Another benefit of the ARICE-Ponant partnership is rooted in the sustainable design and features of Ponant’s 300-million-euro icebreaker vessel. Constructed with scientific exploration in mind, the *Charcot* is designed for efficient, minimal-impact operations in polar regions. It utilises innovative LNG (Liquefied Natural Gas) technology, which drastically reduces emissions, making it one of the cleanest ships to sail the polar seas. Furthermore, onboard waste management and water treatment systems are implemented to minimise the vessel’s environmental footprint. Notably, *Charcot* has advanced research facilities, highlighting a commitment to sustainable exploration and data collection without compromising the integrity of the Arctic ecosystems under investigation.

The partnership is not just about data collection. It also invites passenger participation, thus creating a multi-faceted citizen science programme that fosters public engagement and awareness around the preservation of our ocean.

Willmott Puig says, “The passengers on these types of cruises are concerned about climate change and generally interested in science. The scientists on board give talks about their research, and passengers are also welcome to visit the laboratories and see the work being done. The more enthusiastic passengers have assisted with activities like drilling ice cores in the sea ice and helped with sample collection.”

The EU’s Commitment to Arctic Observations

The European Union (EU) recognises the urgent need for comprehensive Arctic observations and is committed to supporting initiatives that enhance our understanding of this critical region. As such, there’s a renewed focus on the Arctic in European policy.

“Climate change in the Arctic, and its impact on global climate, is a significant challenge that will impact everyone worldwide, hitting local communities the hardest... As such, the updated [EU Arctic policy](#) aims to preserve the Arctic as a region for peaceful collaboration and cooperation, mitigate the effects of climate change, support sustainable development, and ensure the well-being of Arctic communities for future generations,” explains Willmott Puig, also a representative of the [European Polar Board](#), a strategic body representing the collective efforts of European countries to promote and foster international cooperation in Arctic and Antarctic research.

This commitment is reflected in the projects funded by the EU, which focus on increasing international cooperation, infrastructure sharing, and enhancing data collection and management. “Ensuring collected data is publicly available is also a significant aspect of these projects,” Willmott Puig adds.

In 2024, POLARIN, a new EU project currently in Grant Agreement negotiation, will bring together 64 research infrastructures in both poles, including 38 research stations in both the Arctic and Antarctic, 12 polar vessels, including research icebreakers, 18 observatories, four sediment and ice core repositories, and seven data infrastructures. This extensive collaboration reflects the scale of the EU’s commitment to Arctic observations and monitoring.



Advanced research facilities on board the Ponant Science Charcot icebreaker. Photo credit: Xavier Boymond

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Further examples include the EU’s [Copernicus Marine Service](#), which offers both near-real-time and historical data, along with forecasts and visualisation tools to monitor sea ice extent, volume, ocean currents, and other facets of the Arctic’s marine environment. The recently launched [Copernicus Arctic Hub](#), an initiative designed to consolidate all data and derived products and information from all the Copernicus Earth Observation Services, strengthening the monitoring of the rapidly evolving Arctic environment. This Hub will act as a unified portal for all Copernicus data, information, and tools (spanning observations on land, at sea, and in the atmosphere). It aims to assist scientists, policymakers, and the general public in visualizing and comprehending the ongoing changes in a comprehensive manner, facilitating better predictions of future impacts. Additionally, there’s the [Arctic PASSION](#) project, driven by a fervor for scientific discovery, which aims to amass extensive data on the Arctic’s sea ice, ecosystem, and oceanic properties.

These projects are deepening our grasp of this delicate region, aligning with the goals of the EU Arctic Policy, which champions sustainable growth and environmental conservation. Willmott Puig enthused, “Europe’s investment in the Arctic is not just about collecting data. It’s about protecting the Arctic environment, its communities, and its ecosystems for future generations. The EU’s longstanding Copernicus programme, and initiatives like ARICE and Copernicus Arctic Hub, and now this partnership with Ponant, all contribute to our understanding of the region and how to best protect it.”

As the *Charcot* slices through the Arctic’s icy waters, it carries with it a beacon of hope. The ARICE-Ponant partnership, and projects such as GOOD-IMDOS, are more than just a collaboration; it’s a testament to the power of unity in the face of global challenges.

Both Garçon and Willmott Puig believe that public-private partnerships will play a crucial role in shaping the future of ocean science. Garçon says, “Such collaborations bolster our capacity to carry out large-scale expeditions and research projects, thereby accelerating scientific progress. In fact, the partnership between Ponant and ARICE exemplifies the power of such alliances.”

As we navigate the uncharted waters of a warming world, these partnerships act as a powerful catalyst for positive change. They enable us to pool resources, share expertise, and maximise our collective impact. They bridge the realms of science and the public, nurturing a deeper societal appreciation and involvement in preserving our oceans. Finally, it reminds us that the Arctic’s fate is not just a concern for those who call it home, but a global responsibility we all share.

Ultimately, our voyage towards understanding the Arctic’s evolving narrative is a collective endeavor. And as *Charcot* charts its course through the Atlantic sector of the Nordic Seas, journeying the icy pathways between Iceland and Svalbard, these collaborations underscore the significance of Arctic studies and the indispensable role of partnerships in enhancing our understanding of this rapidly changing region.



Members of Inuit community in the town of Ittoqqortoormi, east coast of Greenland.
Photo credit: Xavier Boymond

The article was written by Kira Coley, an independent scientific journalist, illustrated with photos by photographer Xavier Boymond as part of a communication campaign to showcase EU commitment to and the importance of Arctic ocean observing and monitoring. Coordinated by the EU4OceanObs team at Mercator Ocean International with funding from the EU, we would like to thank everyone who participated in the campaign, and agreed to be interviewed, photographed, and advise the project along the way – all experts and researchers from the Global Ocean Oxygen Network (GO2NE), the Global Ocean Oxygen Decade (GOOD) initiative, GEOMAR, AWI, the Ponant Science team, the community of IOC UNESCO, the European Commission, among many others.

<https://www.eu4oceanobs.eu/oceanobserving-awareness/arctic-observing/>

