

THE ARCTIC SEA ICE

RESTORATION RESEARCH FUND

Photo: © U.S. Coast Guard photo by Petty Officer 3rd Class Patrick Kelley

The Case for a Frozen Arctic

Climate disruption poses an unprecedented threat to nature and civilization. The climate system is changing faster and differently than our best forecasting and modeling has predicted. The rate of warming per decade that climate agreements were based on has accelerated unexpectedly, now about double its previous rate. And now a large portion of warming is not only driven by greenhouse gas concentrations, but also by other warming-influenced changes to Earth's surface and atmosphere through feedbacks that reduce the planet's reflectivity.

This does not change the reality that we need to continue to rapidly reduce greenhouse gas emissions, remove legacy carbon pollution, and implement wide-scale adaptation. However, given the accelerating pace of change in the Earth's energy imbalance that is increasingly undermining Earth system stability, these actions alone are no longer sufficient to reduce serious climate risks.

Our understanding of climate change and its severe risks and impacts has undergone an enormous shift, but our policy and action have not followed. Now is the time to update our understanding and our toolkit of options to forestall or avoid dangerous tipping points and ecosystem loss through rigorous and responsible research, development, and demonstration.

The nonlinear and irreversible risks of this accelerated warming are coming into focus: A report on [Global Tipping Points](#) published in 2023, and updated in 2025, led by the University of Exeter with support of more than 200 researchers from over 90 organizations in 26 countries, opens with these sentences: ***"Harmful tipping points in the natural world pose some of the gravest threats faced by humanity. Their triggering will severely damage our planet's life-support systems and threaten the stability of our societies."*** The report emphasizes that tipping points risk are non-linear and potentially irreversible, demanding new approaches and coordinated action to respond to these risks.

A frozen Arctic plays a keystone role: The Arctic either directly contains or is connected to 10 of the 26 global tipping points identified in the report. And three of these are at high risk at current levels of warming including the Greenland ice sheet, northern permafrost, and the sub-polar gyre, a critical ocean circulation system that is part of the Atlantic Meridional Overturning Circulation (AMOC). The tipping of any one of these systems would have severe, cascading and life-threatening impacts globally.

Arctic sea ice is in many ways the lynchpin to slowing or even avoiding many of these tipping points because of its direct connection to overall temperatures in the Arctic. Ice is highly reflective, reflecting a substantial portion of incoming solar radiation back into space. As sea ice shrinks, darker ocean surfaces are exposed, and they absorb more solar energy and heat up more rapidly. This leads to a cycle of more ice melt and further warming—known as a positive feedback loop. As a result, temperature rise in the Arctic is four times higher than the global average, a phenomenon known as "Arctic amplification."

Arctic sea ice is one of the fastest declining systems on the planet due to anthropogenic climate change. At current rates of loss, summer sea ice is expected to disappear as early as 2035 [in all emission reductions scenarios modelled by IPCC](#). The rapid warming associated with this loss puts critical global tipping elements at risk.

Approaches to maintain and rebuild Arctic sea ice may be one of the most powerful Earth system levers we have to reduce planetary heating and avoid climate tipping points.

The Arctic has been a critical pillar in the Earth's climate system. Keeping it frozen is vital for maintaining global climate stability, protecting ecosystems, and preventing far-reaching impacts on human societies.

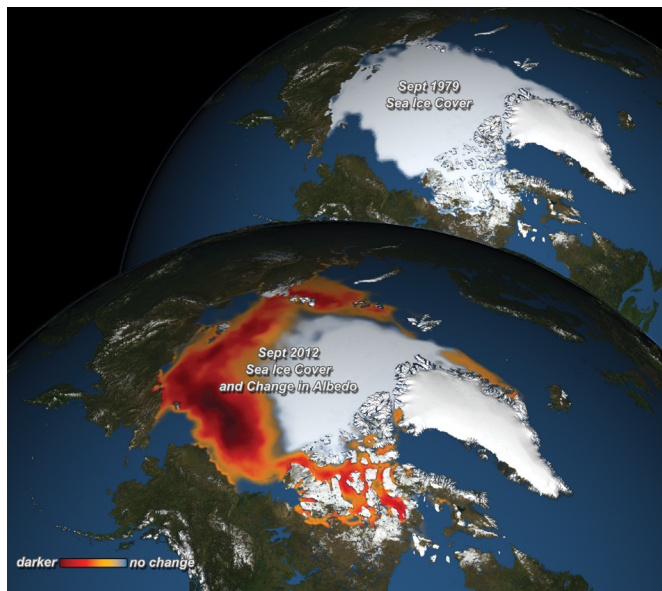
Is Prolonging Arctic Sea Ice Possible?

At this point, it is very unlikely that reducing emissions of greenhouse gases, coupled with clean-up of legacy CO₂ pollution, will happen in time to bring down the planet's temperature enough to avoid the further loss of Arctic sea ice and reduce the risks of crossing global tipping points.

Because of the risks associated with that further loss, [Ocean Visions](#)—in partnership with an international, multidisciplinary team of experts spanning climate and earth science, governance, and Arctic issues—spent over a year identifying and assessing a range of potential approaches to slow or reverse Arctic sea ice loss.

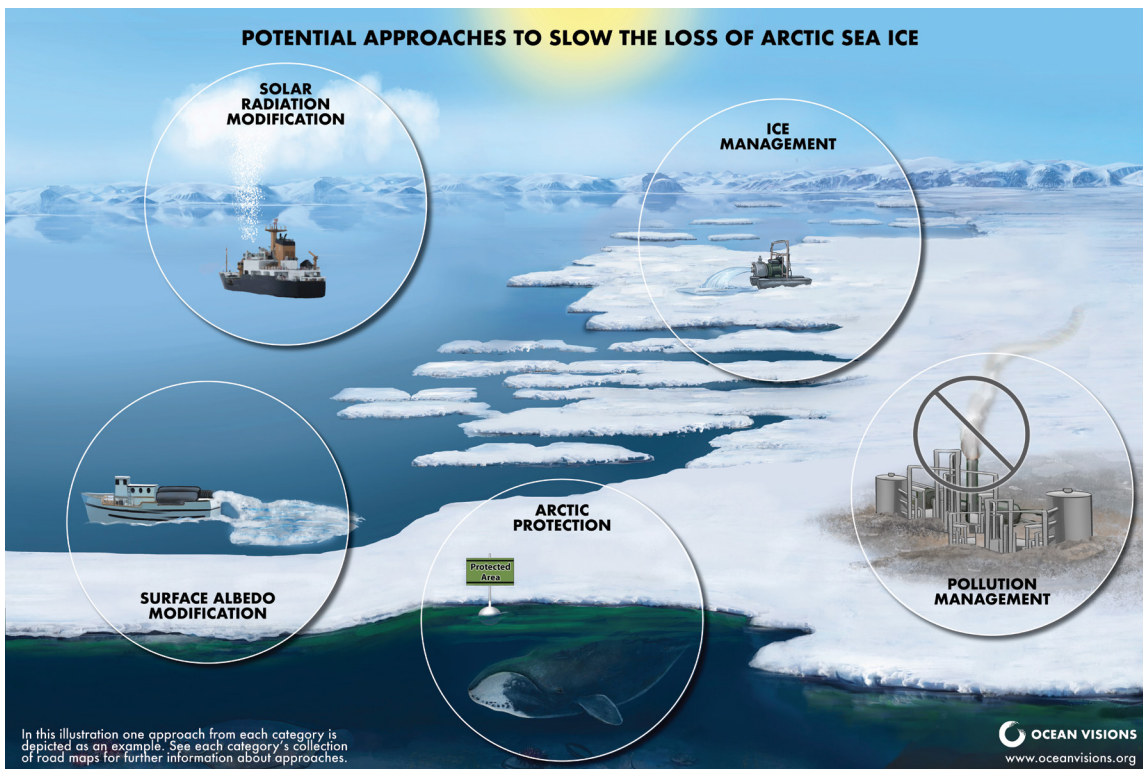
This Arctic Sea Ice Road Map reviewed 21 potential approaches which can be grouped in five main categories: Arctic Protection; Pollution Management; Ice Management; Surface Albedo Modification; and Solar Radiation Modification. The Road Map synthesizes the best available science on each technique and assesses each on parameters such as technology readiness level, potential impact on temperature and sea ice, scalability, costs, socio-ecological co-benefits and risks, and governance considerations, among others. It identifies existing knowledge gaps and **first-order priorities**—the most important next set of actions needed to further advance our understanding of each approach.

To move forward with responsible exploration of the most promising approaches, Ocean Visions created the *Arctic Sea Ice Restoration Research Fund* ("Fund"). The Fund pools resources from individual donors to provide crucial financial



Sea Ice Loss Reduces Arctic Reflectivity and Drives Accelerated Regional Warming.

support necessary to advance the research and development (R&D) needed to increase societal knowledge of these potential options. The Fund operates with high transparency and robust governance. It supports only scientifically rigorous research that is conducted transparently, with information sharing and a clear line of sight to related issues, such as governance, equity, risks, and justice. To date, the Fund has awarded \$2.5m dollars for R&D into three of the high-potential interventions identified in the Road Map: mixed phase cloud thinning, marine cloud brightening, and blocking ice export from the Arctic. You can learn more about these efforts [here](#).



Ocean Visions' Arctic Sea Ice Road Map assesses 21 known and potential approaches to slow sea ice loss. They identify the most important research priorities and form the scientific foundation of the Fund, ensuring resources are directed where they will have the greatest impact.

OBJECTIVES OF ARCTIC SEA ICE RESTORATION RESEARCH FUND

Support high-quality research, development, and demonstration efforts (as appropriate) on the highest-potential approaches identified in the Ocean Visions Sea Ice Road map, especially those areas not supported by current public or philanthropic means of support.

Deepen collective understanding of these techniques and their potential benefits, risks, costs, applications, unintended consequences, and others.

Encourage multidisciplinary research teams that encompass ice and climate science, Arctic and ocean ecology, modeling, engineering, social sciences, and governance.

Create a credible space for inquiry and community review and discussion of results in this highly sensitive area of work.

Promote transparency around Arctic sea ice research via open data sharing to build broader public trust.

Governance of the Fund

The Fund is governed by Ocean Visions, a non-profit organization that pursues bold solutions to stabilize the climate and restore the ocean. Ocean Visions has a multisectoral Network of partners made up of leading research institutions, the private sector, and public-interest organizations, who work together to fully explore and advance responsible and effective ocean-based climate solutions. Ocean Visions is governed by a Board of Directors who have ultimate authority and fiduciary responsibility for the Fund. An Executive Management Team inside Ocean Visions leads the Fund.

Additionally, the Fund is developing a multi-tiered governance structure to prioritize integrity, inclusivity, and scientific excellence, ensuring that research is conducted responsibly.

Key elements include:

International Advisory Board

→ This Board will be composed of 5–7 experts from various geographies, cultures, and fields, including Arctic and climate science, ecology, engineering, environmental ethics, and public policy. The board will guide the strategic direction of the Fund, help determine the most critical research priorities and ensure the upholding of ethical standards.

Independent Review Committee

→ The Fund uses a multidisciplinary, multi-sectoral committee to assist in reviewing grant applications, to ensure that funded research is the most effective path to answers and is consistent with the best available scientific knowledge and standards.

Stakeholder and Scientific Engagement

→ The Fund takes a flexible engagement approach that will scale with the size of the Fund, targeted at convening the scientific community and creating opportunities for broader stakeholder input. Activities will include scientific convenings, workshops, side events at relevant meetings, listening sessions, roundtables, and targeted consultations. These activities are intended to facilitate dialogue, transparency, and information flow about the Fund and its priorities, and to gather feedback.

Funding Sources

The Fund combines contributions from foundations, family offices, government, international organizations, and private sector donations. No support is accepted from any company engaged in oil and gas or any other fossil fuel operations. Clear guidelines have been established to prevent any conflicts of interest that could compromise research integrity or the credibility of the Fund itself.

Grant-Making Process

Grant-Making Process Section

→ The Fund drives outcomes via a combination of different funding models scoped to the complexity and timeline of the questions to be answered. Examples include innovation prize competitions, competitive calls for research and development, scoping and implementation analyses, directed-design contracts, and multidisciplinary assistance to optimize and accelerate emerging technologies.

High-priority research areas are identified in the road maps, with funding opportunities calibrated to the income of the Fund and the imperative to move money quickly into the field.

To advance these priorities, the Fund typically will use one of the following two approaches:

Research and Development Funding

→ This tier provides mid-level funding for early-stage research projects to quickly determine whether an approach can pass first principles reviews, and has the possibility of being technically, economically, and/or socially feasible at a scale that would make a difference. Also in this category are more comprehensive research and development projects that would include specific tests of technologies at smaller scales to develop evidence on their performance. This funding generally falls between \$100,000 and \$1,000,000, with a duration of one to three years.

Demonstration Funding

➔ Larger funding opportunities (up to \$3 million) will be made available for scaled field trials as appropriate, likely managed by multi-institutional, interdisciplinary research collaborations, and potentially with matching requirements as appropriate. This larger funding would be aimed at further developing the direct evidence needed for societal consideration of further use or abandonment of the tested approaches.

Schedule

Funding Rounds

➔ Will occur 1–2 times per year, guided by Advisory Board priorities and Fund resources. Each round may use different mechanisms.

Initial Screening

➔ Members of the Advisory Board and other recruited technical experts would conduct a preliminary review to ensure alignment with the Fund's goals and criteria.

Expert Review

➔ Applications that pass the initial screening would undergo a more rigorous review process by the Independent Review Committee, involving experts in climate science, social impact assessment, and engineering, among others.

Selection Criteria and Decision-Making

Each funding round will lay out in detail the purpose and the specific details of what is sought. All applications would be evaluated based on the parameters identified in the Funding Round.

In addition, all funding rounds would include focus on the following criteria:

Scientific Merit

➔ The quality and innovativeness of the research design and methodology, its likelihood of producing information that can clearly inform next steps, and its support by the best available science.

Interdisciplinary Approach

➔ Research proposals would have to demonstrate a clear understanding of ecological, social, and ethical dimensions, with some plan to address them, alongside the technical details of the research.

Feasibility and Risk Assessment

➔ All proposals would be evaluated for the risks the proposed research might pose to people and nature, and how they would mitigate those risks, the stage gates that field-based projects will use to continue or halt research, and the threshold triggers that would cause a research project to terminate.

Decision-Making Body

Final recommendations on awards are made by the Executive Management Team, with feedback from the Advisory Board. Application review and evaluation criteria and awarded project summaries will be made publicly available in the interests of transparency.

Monitoring and Accountability

The Fund will use a robust monitoring and evaluation framework to ensure that projects are completed on time and meet predetermined goals.

This includes:

Progress Reports

➔ Biannual progress reports from grantees.

Site Visits and Audits

➔ Periodic reviews by Fund representatives to validate data and progress.

Impact Assessments

➔ Evaluation of completed projects for their scientific contributions and policy implications, using independent external reviewers and monitoring and evaluation of research projects against pre-listed stage gates and stop triggers.

Conclusion

The Arctic Sea Ice Restoration Research Fund fills a current void in the international arena on climate intervention research related to Arctic sea ice. At the moment, there is little money available from traditional government or other science funding sources for this sort of research. By catalyzing and enabling rigorous and transparent research, fostering interdisciplinary collaboration, and engaging the public and stakeholders, the Fund will contribute to an informed and responsible exploration of Arctic Sea Ice restoration, and in doing so, fill a critical gap in the current global response to the climate crisis.

