Arctic Stabilization Initiative

Phase I Expression of Interest — Mixed-Phase Cloud Thinning (MCT)

Instructions: Please complete all sections below. This Expression of Interest (EOI) is a preliminary screening step; applicants who advance will be invited to submit a full proposal. Please observe the suggested word limits and submit by September 16, 2026.

How this document is organized:

- **Program Background** — introduction to ASI, its stage-gated structure
- **Phase I Scientific Objectives** — the program's core scientific questions and capabilities it is working toward
- **Award Information** — award sizes, number of awards, period of performance, indirect cost terms
- **Guidelines and Evaluation Criteria** — who may apply and the review criteria
- **How EOIs Will Be Used** — what happens after submission
- **Submission Form (Sections 1–9)** — describes the information requested

By submitting this application you consent to our terms of use and privacy policy, including use of your personal data. Renaissance Philanthropy's privacy policy can be found at https://www.renaissancephilanthropy.org/privacy-policy.

Visit ASI's website https://www.arcticstabilization.org/funding-opportunities to apply.

Program Background

The Arctic Stabilization Initiative (ASI) is a 5-year $60M research initiative to produce the evidence needed to assess whether regionally targeted interventions could - alongside rapid decarbonization and carbon removal - help stabilize at-risk Arctic climate systems. In parallel, ASI works to identify and engage with governments, multilateral institutions, and Indigenous rights-holders that could make use of this evidence.

ASI's research advances through stage gates. Stage gates provide a mechanism for advancing from one stage of research to another by demonstrating that sufficient evidence for understanding of a critical uncertainty has been achieved to justify taking another step. At the end of each phase, we evaluate which decision-critical uncertainties remain and what is required to resolve them. We proceed to more demanding approaches only when decision-critical uncertainties remain that existing approaches cannot resolve, and we deprioritize interventions that are no longer plausible, reallocating resources to other promising interventions that are under-resourced relative to their potential. Our first focus is Mixed-phase Cloud Thinning (MCT).

About 60% of Arctic clouds are characterized as mixed-phase, meaning they contain both ice crystals and supercooled liquid water. In concept, MCT enhances ice formation in Arctic clouds to deplete the clouds of condensate, thereby reducing their heat-trapping effect, cooling the surface, and preventing sea ice loss. Across proposed Arctic-targeted interventions, MCT stands out in several dimensions:

- Tractability: MCT is operationally equivalent to cloud seeding, with state and agency-supported cloud seeding programs already running across 11 U.S. states and Canada and elsewhere globally. This may lower technical, regulatory, and political barriers.

- Strategic timing: MCT may be most effective during sea-ice thickening and transition seasons, where delaying the shift from reflective ice to dark open water by even a few weeks could yield outsized cooling benefits.

- Scalability and co-benefits: Low infrastructure and resource intensity relative to other proposed interventions, in part due to cascading cloud processes that help propagate the effects of seeding. Potential increases in snowfall and sea-ice reflectivity could reinforce a cooling cycle through the rest of the year.

Predictive understanding of MCT, however, remains quite limited. Uncertainty compounds along the full causal chain: from how aerosols affect mixed-phase clouds (MPCs), to how cloud changes affect the surface and TOA energy budget, to how the Arctic climate system responds. Existing models struggle to represent many of the essential physical processes, and observational data to better constrain these processes are scarce. Evaluation of MCT requires a carefully staged integration of natural experiments, targeted observations, and multi-scale modeling, which ASI is designed to support.

ASI is currently in Phase I of its Scientific Assessment Initiative, a multi-phase effort to build the benchmarks, models, and predictive understanding needed to evaluate MCT against the program's core scientific questions. Phase II will develop and test the observational approaches needed to resolve core questions about how background aerosols interact with Arctic mixed-phase clouds and how susceptible those clouds are to aerosol changes. Following Phase II, if critical uncertainties remain that a cloud seeding experiment could resolve, and approved by the Independent Oversight Committee, Phase III carries out a small-scale outdoor experiment designed in collaboration with Indigenous partners.

We begin Phase I with an initial focus on sea ice decline: loss of areal extent, which controls the Arctic's reflectivity, and loss of ice mass, which shapes future extent. However, the Arctic is a highly coupled system and decline is also occurring over frozen land surfaces and ice sheets. Thus, over the course of the program, we plan to expand upon the initial focus to consider all at-risk Arctic surfaces. See https://www.arcticstabilization.org/ for details on ASI's four phases and the stage-gated approach.

ASI is pleased to announce its Phase 1 research grants. The first step is an Expression of Interest (EOI) that details how prospective grantees will advance core scientific objectives.

Phase I Scientific Objectives

Phase I begins a multi-year effort to develop a modeling-observational framework capable of addressing the core scientific questions linking aerosol perturbations to cloud response, surface and top-of-atmosphere (TOA) energy impacts, and sea ice:

1. To what extent are Arctic MPCs susceptible to ice-nucleating particle (INP) perturbations, and how frequently and at what scale are susceptible clouds present regionally and seasonally?
2. What controls the sensitivity of the net surface energetic and TOA forcing to susceptible MPCs, and how does this translate to changes in outcomes of interest, such as surface temperature and sea ice extent, spatially and seasonally?
3. How does the magnitude, scale, and duration of an INP perturbation affect MPCs and outcomes of interest?
4. What would the regional-scale responses be to MCT given the bounds on net surface energetic and TOA forcing from Question 2?

These questions span a causal chain linking MCT to its outcomes and scale of impact: the effect of an INP perturbation on cloud microphysics, of the cloud microphysical state on the cloud radiative effect, of the cloud radiative effect on the surface and TOA energy budget, and of the net surface energy balance on sea ice extent, mass change and other outcomes of interest. Frameworks that evaluate this chain can be expressed at varying levels of formality, from conceptual decompositions to explicit chains of sensitivities, and no single formulation is prescribed.

The program is working toward a capability that can:

C1. Link process models, larger-scale models, and observations into a coordinated framework for evaluating the causal chain of processes underpinning MCT

C2. Support evaluation through geophysical variable relationships, surface energy budget relationships, and other diagnostics that reveal process behavior and model bias, and

C3. Estimate what sea ice and other surfaces experience energetically.

This Phase I RFP invites proposals for conceptual frameworks that would enable capabilities C1-C3, for approaches that address one or more links of the causal chain, and for alternative framings that could contribute to a shared for a fit-for-purpose capability. If Phase I succeeds in producing a shared conceptual framework and a sufficient number of candidate components, subsequent phases may further develop the capability.

Examples of contributions in scope include:

- Approaches that distinguish microphysical effects on cloud properties from meteorological drivers of variability – e.g., sorting MPCs by meteorological regime to isolate their susceptibility to INPs from confounding meteorological effects
- Approaches that connect high-resolution process modeling or process-scale understanding to larger scales
- Multi-scale modeling to assess MCT scalability
- Proposals that help define or improve the susceptibility or causal-chain framework itself
- Contributions that connect observations to model evaluation or model development (especially those that combine observations with models at different scales). These may include Geophysical-Variable (GV) frameworks, or relationships between variables that encode process behavior, such as the distribution of net surface longwave radiation, the relationship between net surface longwave radiation and other energy budget variables (e.g. turbulent heat flux), or the relationship between updraft velocity and ice mass. We encourage exploring other GV combinations that reveal process understanding and/or provide observational constraints on models.
- Parameterization development
- Approaches that constrain how sea ice responds to changes in the surface and TOA energy budget, including feedbacks that amplify or buffer ice growth and thickness, such as the insulating effects of snow and ice cover, and circulation and dynamical effects on ice growth, extent, and export.

EOIs should identify which of the four questions (Q1-Q4) and which capabilities (C1–C3) the proposed work addresses. Section [2] of the submission form asks for this directly. We will prioritize integrated approaches that address multiple elements of the proposed framework (e.g., multiple links in the causal chain), or more narrowly focused proposals when exceptionally strong and addressing a critical gap.

Award Information

ASI expects to fund approximately eight to ten projects through this solicitation, from a pool of roughly $5.5M. Individual awards are anticipated to range from about $400K to $1.1M. Smaller, targeted proposals are welcome and will not be disadvantaged relative to larger ones. Budgets may be refined in discussion with the program before award. Awards will carry a period of performance of approximately 18-24 months.

Awards carry an indirect cost rate of 10%.

Timeline:

- **August 19, 2026** — EOI opens
- **September 16, 2026** — EOI submissions due
- **October 2026** — invitations to submit full proposals
- **Mid-November 2026** — full proposals due

- **Early January 2027** — award notifications
- **Early 2027** — projects begin

Guidelines and Evaluation Criteria

Applicants must fill out the attached form by September 16, 2026.

Eligible applicants include:

- U.S. and foreign universities
- U.S. nonprofit organizations with 501(c)(3) tax-exempt status
- Non-U.S. nonprofit organizations with an Equivalency Determination (ED)
- Non-U.S. nonprofit organizations without 501(c)(3) status or an ED
- For-profit entities
- B-Corporations

The ASI scientific review committee will review each proposal and assess against the following equally-weighted criteria:

- **Scientific Alignment:** The extent to which the proposed work:
    - Directly addresses one or more of the Phase I scientific questions listed above (Q1-Q4)
    - Clearly identifies which capabilities it advances (C1-C3)
    - Stronger proposals make explicit how their inputs, outputs, or diagnostics could connect with, or be evaluated against, other elements of the framework.
- **Feasibility.** The extent to which the proposed approach could plausibly deliver its contribution within the program's scope, timeline, and budget, given the methods, data, and personnel proposed
- **Team and Organizational Expertise:** Relevant expertise of key personnel in Arctic clouds, aerosol-cloud interactions, sea ice, modeling across scales from process-scale to regional and large-scale, or observational platforms, and the track record of the organization and any named collaborators in delivering comparable work.

How EOIs Will Be Used

ASI will review EOIs against the criteria below and invite full proposals from those that advance. The frameworks and approaches proposed across EOIs will also inform how ASI structures the invited round, including where components connect and where convenings should focus. Strong EOIs identify which questions and capabilities the work addresses, and indicate how the proposed component could operate alongside others in a coordinated framework.

ASI's Phase I is a coordinated portfolio, and funded projects will be expected to engage with the broader cohort through in-person convenings and shared evaluation. Full proposals should speak to how the team would contribute to and draw from that collective effort.

Please direct any questions to info@arcticstabilization.org

1. Organization Information

Organization Name (legal name of grantee)	
Organization Street	
Organization City	
Organization State	

Organization Zip Code	
Organization Country	
Tax ID / registration number	
Website	
Primary contact name & title	
Contact email & phone	
Legal status (e.g., 501(c)(3), university, other)	

2. Project Snapshot

Project title:

Requested grant amount: $

Proposed project duration: From _____ to _____

Relevant scientific question(s) addressed (Q1-Q4):

Capabilities addressed (C1–C3):

Primary discipline(s)/methods (e.g., process modeling, remote sensing, field observations):

Geographic/regional focus (if applicable):

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3. Proposed Approach (500 words max)

Describe the technical approach: methods, models, observational datasets, or diagnostics to be used or developed. Explain how the approach contributes toward the coordinated framework above, including, where relevant, the conceptual framework it proposes, assumes, or reframes and/or the component(s) of the framework it addresses. A fully elucidated framework is not expected at the EOI stage. Applications that advance will have the opportunity to elaborate in a full proposal.

4. Goals and Anticipated Outcomes (200 words max)

What specific results do you expect? Where possible, state anticipated outcomes in terms of the variables of interest and how they would be evaluated against observations or other models.

5. Alignment with Phase I Scientific Objectives (200 words max)

Identify which of the four Phase I scientific questions (Q1-Q4) this project primarily addresses, and which capabilities (C1-C3) it contributes to. Note any expected linkages to other components of the framework (e.g., providing inputs another team's model would use, or diagnostics against which another team's output could be evaluated).

6. Organizational and Team Capacity (200 words max)

Describe relevant experience with Arctic clouds, aerosol-cloud interactions, sea ice, modeling, or relevant observational platforms. Identify key personnel and their roles, any collaborating institutions or investigators, and access to the models, observational datasets, or facilities the proposed work requires.

7. Budget Estimate

Category	Estimated Cost
Direct labor	
Subcontractors	
Materials/equipment	
Travel/publications	
Other indirect costs	
Total	

Other anticipated funding sources for this project (if any):

Note: ASI allows up to 10% indirect costs.

8. Additional Information (optional, 100 words max)

Anything else the review committee should know (e.g., prior related work, complementary ongoing projects, urgent timing considerations).

9. Conflicts of Interest (100 words max)

Please describe any potential conflicts of interest, including any personal ties to Renaissance Philanthropy or the ASI team.

Attachments

- CV/biosketch of key personnel (2-page CV or biosketches of key personnel, including relevant publications)

Letters of collaboration are not required at the EOI stage and will be requested with full proposals.