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NATIONAL SCIENCE FOUNDATION
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NSF 18-048

Dear Colleague Letter: Stimulating Research Related to Navigating the New Arctic (NNA), One of NSF's 10 Big Ideas

February 22, 2018

Dear Colleague:

In summer 2017, the first ship to traverse the Arctic Northern Sea Route without assistance from ice-breaking vessels completed its journey. That transformational moment drives home both the opportunity and the imperative for the United States, a Nation with an important Arctic presence, to ready itself for the new Arctic.

The Navigating the New Arctic (NNA), one of [NSF's 10 Big Ideas](#), embodies NSF's far-sighted response to this profound challenge. NSF recognizes that broad engagement between existing programs throughout the Foundation will be needed to meet this challenge. NSF will build on its leadership in supporting Arctic science and observations to advance understanding of and predict the rapid and complex environmental and social changes in the Arctic region and to provide the tools and knowledge that will enable resilience for a globally-significant part of our world.

NSF will leverage its support of fundamental geoscience, engineering, computing, information, biological and social, behavioral, and economic research to achieve NNA objectives. NSF seeks, through its ongoing investment in the basic sciences and education, to amplify understanding of these changes by the public and the next generation of Polar scientists. In this way, NSF will enhance the Nation's strategic and economic advantages in an international context while safeguarding human welfare and environmental sustainability in the Arctic.

This Dear Colleague Letter (DCL) invites proposals in FY 2018 that will advance NNA research through convergent approaches to emerging scientific, engineering, societal, and education challenges, and builds upon the [NNA awards](#) resulting from the FY 2017 [DCL on Growing Convergence Research at NSF](#). A systems-based approach is strongly encouraged, including research that both contributes to, and leverages, large data sets from enhanced observational technology and networks. Knowledge co-production with local and indigenous communities, advancing public participation in research, and international partnerships are also strongly encouraged as possible means to achieve NNA objectives.

NNA research proposals in response to this DCL may focus on topics such as the following:

- Establishment of observational research sites, observational platforms, or networks of sites to document key aspects of the changing Arctic coupled across terrestrial, marine, glacial, atmospheric and social systems. These may involve developing and deploying new sensor-cyber systems that can withstand extreme Arctic conditions and provide continuous analysis and interpretation of Arctic change, including changes in biogeochemical and geophysical state and changes in populations and ecosystem characteristics. Projects may serve as a proving ground for systems involving tight integration of sensors and computing for closed-loop data collection and observation of the new Arctic, which face unique challenges in this environment. These cyber-physical systems could involve real-time adaptation and control, autonomy, artificial intelligence, and big data.
- Studies to understand and forecast changes in the biogeochemical, geophysical, ecological and social processes occurring in the new Arctic. These can include human responses and adaptations as they intersect with environmental change. They may also take advantage of advances in the biological sciences to understand the organizational principles and trajectories of change in Arctic living systems.
- Studies of feedbacks between the design and engineering of urban and rural civil infrastructure and changes in natural ecosystems such as thawing permafrost and sea ice retreat and social systems such as increasing marine commerce. Proposals addressing the frequency, nature, changes, and intensity of natural hazards and their consequences for both social and built systems are of interest. Proposals related to cyber-physical systems and smart infrastructure, and to Arctic communication infrastructure challenges, are also of interest.
- Studies that advance STEM education through Arctic research activities. These may include increasing the number, diversity, and expertise of Arctic researchers; encouraging collaboration between education researchers, local governments, and educational institutions; improving STEM education in local communities; and other activities that capitalize on Native experience and knowledge in conjunction with disciplinary and interdisciplinary scientific training. Involvement of local institutions of higher education, including Tribal College and Universities Program (TCUP)-eligible institutions, is encouraged.

Successful proposals must describe scientifically and technically sound research plans based on relevant theory and founded on existing scientific and engineering bodies of knowledge. Proposals will be evaluated based on their intellectual merit and broader impacts, as well as their potential contribution to the goals of NNA. Proposals that employ convergent approaches and involve significant community engagement through co-production of knowledge and capacity building are particularly encouraged. In that spirit, submissions may be made to existing programs and solicitations in any NSF directorate consistent with the scope of the funding opportunity.

In particular, NSF draws attention to the Arctic Sciences Section, which can accept NNA relevant proposals in its Arctic Natural Sciences, Arctic Social Sciences, Arctic System Science, and Arctic Observing Network programs. The section has no proposal deadlines, which allows NSF to accept any NNA relevant proposal and coordinate its co-review and funding across the agency. Questions

can be directed to any of the [Arctic Sciences Section program officers](#) and Diane McKnight (dmcknigh@nsf.gov) will coordinate with a team of NNA program officers from throughout the agency.

Questions regarding proposals regarding NNA that address in whole or in part should be directed as follows:

- Sensing and cyber-physical systems should be directed to David Corman (dcorman@nsf.gov);
- Fundamental engineering research associated with civil and environmental infrastructure challenges should be directed to Richard Fragaszy (rfragaszy@nsf.gov) or Karl Rockne (krockne@nsf.gov);
- Biological or ecological research should be directed to John Schade (jschade@nsf.gov);
- The objectives of the [Improving Undergraduate STEM Education \(IUSE\) program](#) and [Tribal Colleges and Universities \(TCUP\) program](#) should be directed to the cognizant program officers listed in those program solicitations;
- How people and social organizations are responding and adapting to the changes ongoing in the Arctic, or that advance the science of public participation, should be directed to Daisy Chang (cchang@nsf.gov), Colleen Fitzgerald (cfitzger@nsf.gov), or Anna Kerttula (akerttul@nsf.gov); and/or
- International dimension should be directed to Claire Hemingway (chemingw@nsf.gov).

Proposals for Research Coordination Networks (RCNs) that will serve to identify NNA questions that require convergent integration across disciplines, as well as conference proposals and proposals for EARly-Concept Grants for Exploratory Research (EAGER), should be submitted to the Arctic System Science program which will coordinate with other NSF programs for their review and funding. In order to highlight NNA focus, proposal titles should be prefaced with "NNA:".

This is not a special competition or a new program; proposals in response to this DCL must meet the requirements and deadlines of the program to which they are submitted. Organizations submitting proposals to programs and funding vehicles without deadlines are encouraged to submit proposals by May 1, 2018, to be considered for FY 2018 funding.

Sincerely,

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