

# Background and Rationale

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***The National Science Foundation (NSF)*** – The NSF is "the premier federal agency supporting basic research at the frontiers of discovery, across all fields, and science and engineering education at all levels". The NSF aspires to four interrelated goals – discovery, learning, research infrastructure, and stewardship – as an integrated strategy to deliver new knowledge at the frontiers, meet vital national needs, and work to achieve the NSF vision (NSF Strategic Plan 2006–2011). There are established priorities at NSF that govern the allocation of funds and resources to achieve NSF's strategic goals. NSF identifies and funds research at the frontiers of science and engineering through a "bottom up" approach that is intended to track research advances in the United States and around the world through direct contact with the research community to identify the horizons of inquiry and areas of research that are most likely to result in spectacular progress.

***The Office of Polar Programs (OPP)*** – The NSF relies on its Directorates and Offices to manage its research portfolio within targeted research areas based on disciplines or other considerations. NSF is divided into seven directorates that support science and engineering research and education. In addition, some of the divisions within NSF's Office of the Director also support research and researchers such as the Office of Polar Programs (OPP). The Office of Polar Programs (OPP) manages and initiates National Science Foundation funding for basic research and its operational support in the Arctic and the Antarctic. Organizationally, OPP has two science divisions — one each for the Arctic and the Antarctic. The U.S. Antarctic Program (USAP) supports research that can be done exclusively in Antarctica or that can be done best from Antarctica. The Antarctic Division within OPP funds and manages the U.S. Antarctic Program, which supports research in aeronomy and astrophysics, organisms and ecosystems, earth sciences, glaciology, and ocean and climate systems.

***Antarctic Integrated and System Science (AISS)*** – Increased funding for polar science during the International Polar Year 2007–2008 allowed for creation of a new program within OPP, Antarctic Integrated and System Science (AISS). The AISS program addresses two of the five discovery investment priorities detailed in NSF's Strategic Plan:

- ***"Promote transformational, multidisciplinary research. NSF will emphasize investigations that cross disciplinary boundaries and require a systems approach to address complex problems at the frontiers of discovery.***
- ***"Foster research that improves our ability to live sustainably on Earth. To strengthen our understanding of the links between human behavior and natural processes, research may range from investigations of deep oceans to urban centers and from basic energy science to climate science***

The AISS Program was created to fund and manage interdisciplinary research projects that cut across existing Antarctic Division programs. It was recognized that each year a significant number of proposed projects did not easily fit into the current mix of OPP programs and that they often transcended traditional disciplinary boundaries. The advent of the International Polar Year 2007–2008 and the characteristics that were encouraged in IPY programs made it even clearer that certain projects would be better served by a cross-cutting Antarctic Division program. Building on the success in the Arctic System Science program, the following questions are asked:?

- ***Are there Antarctic research themes and topics that would be better served by integration and a systems approach to their organization? ?***
- ***Are there lessons to be learned from the experiences in Arctic System Science that would facilitate an integrated and systems approach in Antarctica?***

AISS is also an outgrowth of a basic tenant of modern Earth Sciences that certain disciplinary and interdisciplinary questions can not be addressed in isolation from other elements of the "system". Antarctica is a synergistic system of interrelated phenomena, governed by complex interactions between the geosphere, atmosphere, hydrosphere, biosphere, and heliosphere. These "spheres" and their attendant chemical, physical, biological and dynamical processes act over spatial scales from molecular to continental (even global) and over temporal scales of milliseconds to millions of years. The history and future of change in Antarctica is determined by a complex set of inter-linked processes which have been operable for millions of years. A fundamental precept in the Earth Sciences is that these processes can be probed, deciphered and modeled and that once they are understood, one can utilize that knowledge to forecast future change. AISS seeks to transcend traditional disciplinary boundaries to search for a deeper understanding of the physical, chemical, biological and human interactions that determine the past, current and future states of Antarctic and lend clues to Antarctica's role in the Earth system.