

**SEARCH-AON-DAMOCLES-SASS**  
**Arctic Observation Integration Workshops**  
17–20 March 2008, New York, USA

**SUMMARY**

A series of three workshops will be held 17–20 March 2008 to advance planning and implementation of an integrated Arctic Observation System that is responsive to the critical scientific issues of environmental arctic change. Sponsored by the National Science Foundation (NSF), the workshop series will include three interrelated meetings: (1) A 1.5-day NSF Arctic Observing Network (AON) PI meeting, (2) A half-day workshop on optimizing deployment of Lagrangian platforms for observations of the ocean-ice-atmosphere system, and (3) A two-day workshop to improve observing and modeling activities for understanding recent arctic sea ice change and its impacts throughout the arctic system. Participants ( $\approx 80$ –100) will include representation from the U.S and international arctic observational and modeling communities.

**MOTIVATION**

Implementation of an Arctic Observing System is currently underway. Several significant observing efforts are building up to full scale, namely the NSF-supported Arctic Observing Network (AON) and the European Union's "Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies" (DAMOCLES) project. In addition, groups within the U.S. arctic research community are working on projects focused on understanding and synthesizing change within the arctic system, including SEARCH "Understanding Change" projects and Synthesis of Arctic System Science (SASS) projects funded through NSF's Arctic System Science Program (ARCSS). There is a well-recognized and urgent need to bring together these different groups of experts in a workshop setting to foster interdisciplinary and international integration of observing efforts.

The drastic arctic sea ice retreat observed in 2007 underscores the *immediate* need for increased integration and coordination. The sea-ice cover retreated to well below its previous record minimum extent, with potentially substantial physical, biological and socio-economic impacts on the Arctic. This event raises a number of important questions with respect to our ability to forecast similarly large events on short (i.e. this upcoming year), inter-annual, and decadal timescales, and also our strategy for combining observational efforts with modeling studies directed at improving our understanding of arctic change.

**WORKSHOP SCOPE**

The workshop series will be organized around three interrelated components and de facto is a series of three closely related workshops (with participants encouraged to attend all three to foster broader integration):

**1. Arctic Observing Network (AON) PI Meeting**

This 1.5-day meeting will serve both as an AON progress review as well as a planning meeting for developing cross-disciplinary efforts and pursuing focused integration activities. NSF's AON Program comprises more than two-dozen projects that are collecting and analyzing data from

different components of the arctic system in response to the questions formulated by the scientific community in the context of SEARCH. The first AON PI meeting in spring 2007, held immediately after announcement of the funded projects, was primarily focused on implementation issues for individual projects. This second AON PI meeting will focus on coordination of activities into an integrated network that is responsive to the needs of the scientific community and stakeholders. Representatives from DAMOCLES and other relevant observing efforts will be invited to the AON PI meeting to provide important opportunities for international collaboration.

## **2. Lagrangian Platform Workshop**

This half-day workshop, held as a joint SEARCH-DAMOCLES effort ("S4D"), will evaluate the adequacy and future utility of Arctic Ocean observing system components. Recent extremes in sea ice extent and mobility motivate re-examination of Arctic Ocean observing system Lagrangian elements, as such as ice-tethered technologies and mobile autonomous platforms, which will need to compensate for, and in some cases exploit, an operating environment marked by greatly decreased year-round ice cover. Questions to be addressed at this workshop will include: What mix of observations would aid in tracking, understanding, and ultimately forecasting change? How should existing platforms be modified to adapt to the changing environment? What new technologies and approaches should we pursue?

SEARCH and DAMOCLES both include efforts to adapt autonomous and Lagrangian technologies for Arctic Ocean observing activities. This workshop will incorporate knowledge of new technical and environmental developments into an evaluation of the role these platforms might play in the Arctic Observing System. Goals include: identifying technical and scientific challenges, beginning the integration of the diverse platforms and technologies, and outlining a plan for development and implementation of autonomous and Lagrangian observing systems.

## **3. Lessons from the 2007 Arctic Sea-ice Minimum**

This two-day workshop will focus on assessing the efficacy and identifying gaps of current observing and analysis/modeling activities to understand and predict arctic sea ice change in a broader context. The record sea-ice minimum observed in the summer of 2007, which exceeded the previous record of 2005 by a further reduction of almost 25%, is likely to have a significant impact on a number of components of the arctic system. In hindsight, the rapid retreat observed in 2007 may have been anticipated in advance. For 2008 it will be critical to track the evolution of the sea-ice cover and its interaction with atmosphere, ocean, and land surfaces, and provide analysis and assessment in the context of improving our understanding of and responses to arctic environmental change. Workshop participants will integrate existing observations and model-based projections to address the questions of how this signal will propagate through the arctic system, and whether the minimum is part of a continuous decline. In addition, participants will make recommendations for observing efforts for the coming years.

Investigations of sea ice retreat cut across disciplines to encompass "observing change," "understanding change," and "responding to change" science and involve a broad array of international efforts, including SEARCH, ARCSS/SASS and DAMOCLES, thus providing both scientific motivation and a clear starting point for integrating diverse cross-disciplinary and international science efforts.

## WORKSHOP GOALS

Overarching workshop goals include:

1. Evaluate the present observing system with respect to its ability to track rapid ongoing change and produce recommendations for optimization and addressing gaps in 2008 and beyond.
2. Improve integration of cross-disciplinary and international observation efforts.
3. Evaluate existing observing technologies/platforms and on-going development efforts in the context of potentially rapid changes in operating environment (e.g., dramatic decreases in summertime ice extent) and recommend possible adaptations.
4. Produce an integrated overview of the 2007 sea ice minimum, including prospects for continued decline or recovery.
5. Develop a dialog on integration and long-term sustained arctic observing with relevant agency partners.

## WORKSHOP OUTCOMES

Anticipated workshop outcomes include:

1. Strengthened coordination and integration between NSF AON, DAMOCLES and other key international observing arctic projects that will lead to logistical and science support synergies and will close key thematic and spatial/temporal observational gaps.
2. Strengthened connections between arctic observing efforts and Understanding Change, Responding to Change and ARCSS/SASS projects.
3. Improved understanding of the remarkable sea ice decline in 2007 and repercussions through the components of the arctic system.
4. Specific guidance—through recommendations in the workshop summary—for improving the observational, modeling, and synthesis efforts to track, interpret, and respond to either accelerated change or recovery following the 2007 minimum in the sea ice cover.
5. Guidance (through recommendations to NSF) for enhancing observational approaches and technologies to optimize performance and adaptability in the rapidly changing Arctic.

Workshop timing will allow for workshop products and outcomes to inform discussions at the 2<sup>nd</sup> Sustained Arctic Observing Network (SAON) Workshop to be held in April 2008 in Canada.

## WORKSHOP PARTICIPANTS

The series of workshops will include representation from the AON and broader arctic science community, with approximately 80–100 expected participants, including:

- AON PIs/project representatives (≈30–40)
- U.S. agency representatives (≈10)
- DAMOCLES PIs/project representatives (≈15)
- Other international program representatives (≈10)
- ARCSS-Synthesis of Arctic System Science (SASS) PIs/project representatives (≈20)
- Other SEARCH representatives (≈10)