



Study of Environmental Arctic Change (SEARCH) Community Position Paper: Arctic Observing Network (AON)

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Drafting of this position paper was led by Craig Lee, chair of the SEARCH Observing Change Panel (OCP), with input from the OCP and SEARCH Science Steering Committee. The paper has been revised in response to community feedback gathered during an open comment period.

SEARCH Input to the NSF-led Arctic Observing Network (AON) Governance Discussion

On behalf of the Study of Environmental Arctic Change (SEARCH) through the Observing Change Panel (OCP) and the Science Steering Committee (SSC), this paper offers feedback in response to the recent NSF efforts to engage the research community in discussions about the U.S. Arctic Observing Network (AON).

As part of its overarching focus on quantifying and understanding Arctic change, SEARCH has historically served multiple functions for the research community, including coordination and the communication of science priorities, plans and implementation approaches to various federal agencies. The NSF AON has referenced the SEARCH community science and implementation plans in AON Announcements of Opportunity and other communications, and the SEARCH OCP has served as a venue for organizing input from the research community. As such, the NSF-AON effectively originated as the SEARCH observing system. Since its inception, AON activities have broadened beyond the original SEARCH objectives, creating a need to refine the network's focus and revise the organizational structures and funding models that support the AON.

US investment in the AON, with significant NSF support, has resulted in rapid build-out of some parts of the system, with guidance provided by community-generated science and implementation plans (e.g., AON 2010, SEARCH 2005). Currently the focus for AON efforts includes system maintenance and growth, expanding the network to encompass a broad range of US agency activities, delivery of products to a broad range of stakeholders, and coordinating activities with national and international partners.

Within the last few years SEARCH has brought together the scientific community to discuss AON-related issues (ADI 2012, Payne et al. 2012, AON 2010, SEARCH 2005a, SEARCH 2005b, SEARCH 2003). This community position paper synthesizes relevant information from these documents but also reflects recent discussions by the SEARCH OCP and SSC using input from the broader research community. We focus on addressing three issues that were a part of the Arctic Hub webinar series

(https://www.arctichub.net/groups/longtermobservingmgt/webinar_recordings):

- i) Governance – including processes for planning and prioritizing AON activities and for evaluating AON efforts for performance and scientific merit;
- ii) Network integration – the development of an integrated AON—a **system** of observing assets designed to optimize the use of available resources to address prioritized scientific and operational objectives;
- iii) Sustainable Funding—implementing a funding model that can support both the integrated nature of the AON, addressing research-community and stakeholder driven questions, and provide stability to ensure sustained climate-scale observations.

AON coordination and support should be developed within an interagency framework such as that offered through IARPC.

As the AON evolves to include the needs of diverse stakeholders, planning and implementation must occur within a broad, interagency framework. This will facilitate the identification of shared science and operational priorities that provide focus to AON activities, and allow development of implementation strategies that, when appropriate, span multiple agencies. The IARPC Observing Systems Collaboration Team provides a possible model. Broad participation in the development of observing priorities and implementation strategies could be cemented by calling upon each agency to appoint and empower an AON representative/advocate from within their own ranks. Although NSF's majority support of existing AON activities makes it the natural lead for the Observing Systems Collaboration Team, the appointment of a co-chair from a mission-oriented agency could provide a useful perspective on the needs and constraints of the broader AON.

Through its role within IARPC, we urge NSF to pursue the development of a defined governance structure based upon partnership with other agencies and strong involvement by the scientific community.

Future AON development should be underpinned by a well-defined governance structure. In addition to the IARPC-specific recommendations described above, this structure should assign clear roles to relevant groups, including the scientific community and AON-contributing agencies (e.g., the role/Terms of Reference of the AON IARPC Collaboration Team). To facilitate interagency coordination and streamline implementation the governance structure needs to assign responsibilities for defining AON priorities, coordinating and implementing funding opportunities, and evaluating AON system performance and scientific relevance.

We suggest the development of a Steering Group with vested authority to guide and implement AON.

A key component of a governance structure should be a Steering Group. This Steering Group would work within the framework provided by IARPC and should be vested with authority to provide official advice and guidance on strategic planning, systems integration and decision making to support AON development. A Steering Group would ensure that long-term AON governance is guided by members with a clear understanding of the AON charge (endorsed by the science community, AON-contributing agencies and stakeholders) while also providing long-term corporate memory to the AON governance structure. The specific structure and composition of this body would require focused discussion within IARPC and the broader AON community. A funded AON Coordinator position is also important to ensure the interagency AON meets the needs of the scientific and stakeholder communities. A dedicated AON coordinator would provide a point person for organizing and guiding community efforts toward network integration, data and product delivery, system evaluation and ongoing planning.

We note that NSF has encouraged and supported SEARCH and the SEARCH OCP to facilitate gathering input from the broader research community to define science priorities, plan, and evaluate the NSF component of AON.

NSF's most recent investment to support the creation of the SEARCH Science Office (SSO) is an important next step (see Summary of New SEARCH Framework & Plan: <http://www.arcus.org/search-program>). The SSO has been designed to facilitate ongoing engagement with the scientific research community (ADI 2012, AON 2010). At the broad level, overarching science priorities will be used to guide strategic decisions regarding the allocation of resources for AON-development (e.g., SEARCH 5-year goals; Murray 2012; IARPC 2012). The SSO, its partners, and the scientific community will continue to refine these priorities and strategies. However, one of our highest priorities should be to move from strategic thinking to tactical planning. For AON this will require that we find the appropriate balance between long-term observations and new observing efforts in order to support a relevant and adaptive AON.

We urge NSF to *implement* guidance from the scientific community on AON design and optimization strategies for an integrated AON.

Integrated AON: SEARCH promotes the development of an integrated, multi-purpose AON, underpinned by core observing activities designed to meet a broad range of stakeholder needs, from climate science to the support of day-to-day activities in Arctic communities. From the design and optimization perspective, the 2012 ADI Report provides guidance on the development of an integrated AON which includes integration of a system of observing assets. The AON needs to encompass pan-Arctic observations at seasonal to decadal scales, but must also include focused observations and product delivery to support diverse stakeholders that include Arctic residents, industry and government decision-makers. Given the multi-disciplinary breadth and range of ongoing short-term and long-term observing activities there is no single blueprint approach that can be universally applied towards optimizing the AON. The ADI Report reviewed several funding and design strategies for long-term observations (e.g., LTER, NEON) and found that a unique approach for AON development was necessary.

One way to achieve an integrated AON at smaller scales is through the development of regional hubs (e.g., a Barrow "Flagship" Observatory) and showcase projects. These may act as examples of mechanisms that can foster long-term observations from a multi-user and multi-disciplinary perspective (Payne et al. 2012). Certain showcase projects already have broad interagency support. For example, the Arctic Landscape Conservation Cooperative will help to coordinate multiple agency efforts to focus on terrestrial change detection.

We suggest NSF adjust its strategy for reviewing, funding and evaluating the sustained (decades) observing efforts required to address high-priority questions regarding the Arctic's role in climate.

Sustainable Funding: Many of the high-priority questions posed in community science plans (e.g., IARPC, SEARCH) will require integrated, multi-disciplinary observations spanning years to decades to address, pointing to the need for a new approach to funding. The broader AON

serves multi-disciplinary, multi-user information needs across the Arctic, and thus needs significant investment that has not yet been realized. An interagency funders circle is needed to implement multi-agency funding for sustained observations (Payne et al. 2012, AON 2010). Joint sponsorship of core observing activities would also reduce the risk to a single agency for maintaining sole responsibility for long-term observing investments.

Within NSF, the current funding model lacks the flexibility required to pursue some of the fundamental questions regarding the mechanisms that govern Arctic climate. These studies require measurements collected over extended timescales that sit beyond the reach of most NSF support mechanisms. Similarly, it has been challenging for the research community to find support for long-term observations from other US agencies. A sustainable funding model should offer long-term stability while utilizing regular evaluation for performance and continued scientific relevance. We propose a funding and evaluation model that facilitates greater interagency coordination and would lead towards a sustainable AON on decadal scales. The traditional NSF review model may not be the best approach for an integrated AON. Rather, the evaluation of funding priorities within AON should weigh both the integrity of the entire AON and the quality of each element as a stand-alone project. This approach will ensure AON is built with a core foundation of sustained observing assets. NSF can also help the research community by providing more guidance on existing NSF funding mechanisms (e.g. Major Research Equipment and Facilities Construction) that may support long-term observations.

Summary

We urge NSF to seek input from the research community regularly and early in any NSF-led efforts to plan and develop an integrated US AON, and suggest that near-term efforts should include:

1. Developing a governance structure with clearly defined and communicated roles for the research community and AON-contributing agencies, particularly as they relate to developing science and observing priorities, and implementation strategies. It is important for NSF to play a strong leadership role in the development of an interagency Arctic Observing System, particularly through IARPC activities.
2. Establishing a Steering Group with the authority to provide AON oversight and guide AON development. Inclusion of the research community is necessary to represent the NSF science-focused component of the broader U.S. interagency AON.
3. Developing a sustainable funding structure for the broader AON with interagency support building on IARPC and OSTP facilitated efforts. From the NSF-perspective the research community needs more guidance on how to use existing NSF mechanisms to fund AON activities.

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