

# Space-Based Weather Capabilities in the Arctic

## Meeting Report

### Background

In January 2015, the Secure World Foundation hosted a discussion on why space capabilities are important for sustainable Arctic development. The event highlighted the role space plays for monitoring conditions in the Arctic and examined how improved understanding could aid in facilitating sustainable economic development and the stewardship of natural resources.<sup>1</sup> Much has changed since then as the environment continues to change and increasing security concerns continue to draw attention to the region.

Additionally, the United States assumed chairmanship of the Arctic Council with a focus on three areas that all could benefit from enhanced space capabilities: Improving Economic & Living Conditions for Arctic Communities; Arctic Ocean Safety, Security & Stewardship; and Addressing the Impacts of Climate Change. These priorities are reflected in U.S. Arctic policy.<sup>2</sup>

Central to these objectives is the ability to accurately forecast daily and extreme weather conditions impacting commercial maritime and aviation activities, search and rescue operations, and scientific research. Advanced weather imaging will bring significant economic and social benefits to northern communities and environmental monitoring will be critical to better assess the impact of climate change on the North. Yet the data from the current network of satellites do not adequately address communications, weather and environmental situational awareness at higher latitudes.

Convened by Harris Corporation and the Secure World Foundation and held along the sidelines of the Space Foundation's 32nd annual Space Symposium, this roundtable drew upon the January 2015 Secure World Foundation discussion about space capabilities in the Arctic and focused squarely on the role of enhanced space-based weather capabilities for sustainable development of the Arctic and better scientific understanding of the changing climate. Specifically, the roundtable sought to:

- Discuss known current or proposed programs or projects that could improve space-based weather capabilities in the Arctic
- Discuss opportunities and challenges that exist towards achieving improved weather capabilities
- Identify challenges that could be addressed jointly by interested stakeholders and create impetus for future collective action to address common challenges

This report captures highlights from the not-for-attribution discussion that could be leveraged for future dialogue for participants and other interested stakeholders. A list of participants is included in the last section.

### Discussion Format

Following brief introductions during which participants outlined their individual or organizational interest in improved weather capabilities in the Arctic, the moderator led the discussion by raising questions that were distributed beforehand to participants. These centered on three of the key policy priorities within the U.S. Arctic Strategy, specifically:

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<sup>1</sup> <http://swfound.org/news/all-news/2015/01/swf-holds-event-on-space-and-the-arctic>

<sup>2</sup> <http://www.state.gov/e/oes/ocns/opa/arc/>

- Enhancing scientific monitoring and research on local, regional, and global environmental issues.
- Ensuring environmentally-sustainable natural resource management and economic development in the region.
- Meeting U.S. national security needs.

Following this discussion, the group considered pending questions and next steps that could inform ongoing efforts.

### Discussion Highlights

A key theme in the discussion focused on rapidly evolving needs for weather and other information critical to operations in the Arctic. Seasonal sea ice thickness forecasts were among those listed as particularly useful. However, as one participant put it, the region is “under-observed” and stakeholders “make do” with what are often sporadic observations driven by research, rather than operational needs. The group agreed on the need for an operational network that meets long-term needs, improves predictability, and advances understanding of complex phenomena, such as the interface between ice and weather. Given how parts of the Arctic are opening up due to ice melting, this area is becoming increasingly dynamic and will only see more actors attempting to use it, so this comprehensive approach is very much needed in order to establish a baseline of need for all users.

The group also considered the need for observations from other platforms that serve to augment space-based measurements. In-situ observations were considered particularly important, such as the surface observing network, essential for constraining and improving the efficiency of satellite observations, as well as improving medium to longer-range forecasts. Participants also discussed the value of information on underwater conditions, and noted that it would be useful to explore the transition of government classified data to researchers, such as salinity measurements from submarines. Finally, enhanced communications were also deemed a key infrastructure need to augment other services, such as search-and-rescue.

Effectively communicating to decision makers that observational and other needs are not being met by current capabilities was recognized as a significant challenge. A participant noted that engaging policymakers to commit the necessary resources will first require a comprehensive gaps assessment. It would be useful to better communicate, for example, that geostationary satellites cannot image the Arctic region very well, making polar-orbiting satellites uniquely valuable to meet observational needs.

Misperceptions, such as assuming that Arctic issues are isolated to the region, or that the weather needs are limited to climate change issues, are detrimental in making the case for enhanced observational capabilities and were deemed a contributing factor in what was described as a current state of “inertia.” To better articulate needs, a participant noted the importance of improving communication of the impacts of Arctic issues to the taxpayer. Emphasis on the national security significance of the Arctic, as well as of burgeoning commercial activity in the region, were both considered useful themes to frame conversations with decision makers. A participant noted the need to elevate discussion at the White House, while another said that connecting with the Arctic Executive Steering Committee (AESC) - which aims to establish and coordinate agency priorities and activities in support of the National Strategy for the Arctic Region - could help increase the saliency of these issues.

Commercial activity was described as a driver for change in shifting perceptions and interest in the region. A participant reflected on a mismatch, however, in the speed of this change and agency processes

to determine requirements, in which this dynamism has not yet been integrated. A participant suggested an approach that separates requirements for warning and forecasting needs.

Integrating the various stakeholders in the requirements conversation was considered a necessary step to make progress towards development of operational capabilities. Among the stakeholders considered important in the national conversation for a whole-of-government approach are: Department of Defense (as well leadership from the relevant services, including Navy, Air Force, and Coast Guard), Department of Commerce and the National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA).

A brief discussion focused on how these challenges are manifest within Canada. It was noted that the Polar Communications and Weather project (PCW), which, as initially conceptualized, would have helped satisfy satellite communications and Earth observation requirements in the Arctic, is struggling. There is currently an emphasis on tactical communication needs, with environmental needs taking a secondary role. A participant noted that while Arctic needs are deemed important within Canada, there is currently not a “whole-of-Canada” approach to ensure gaps are being filled. It was further noted that one of the contributing factors is a shift in how Canada fulfills its needs; in the past Canada used to leverage U.S. capabilities offered for free, while investment in PCW and other capabilities would amount to several hundred million dollars. Also, Canada has citizens living in the Arctic who depend upon services and communication, so accurate weather prediction is of particular importance to them.

A participant noted the need to connect national-level conversations with ongoing efforts at the international level, beyond those of the Arctic Council. Discussion of the relevant international bodies included the World Meteorological Organization (WMO) and its Executive Council Panel of Experts on Polar and High Mountain Observations, Research and Services, the International Civil Aviation Organization (ICAO), and the Group on Earth Observations (GEO).

Participants expressed interest in remaining engaged in ongoing discussions, especially as these involve additional relevant stakeholders, including other Arctic Nations, such as Russia, which derives a significant portion of its income from north of the Arctic Circle. Follow-on conversations may focus on examining some of the specific challenges derived from the discussion, such as: defining operational requirements and the resources and capabilities needed to meet them; sustaining engagement and partnerships with stakeholders in government, industry, and academia; coordinating and improving messaging on impacts of Arctic issues to decision makers and the taxpayers; and improving engagement with relevant international bodies for enhanced coordination and cooperation to satisfy shared needs.

#### Participating Organizations

- Canadian Aeronautics and Space Institute
- Harris Corporation
- Johns Hopkins University – Applied Physics Laboratory
- National Oceanic and Atmospheric Administration – National Environmental Satellite, Data, and Information Service
- Office of Senator Cory Gardner
- Satellite Industry Association
- Secure World Foundation
- University Consortium of Atmospheric Research