The Contribution of Space Technologies to Arctic Policy Priorities

Polar View
Earth Observation for Polar Monitoring

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Executive Summary

This report compares the needs of Arctic stakeholders (as articulated in policies and strategies) with the contribution different types of satellite technologies (communications, weather, navigation, earth observation, surveillance, and science) can make to meet current and future requirements. It will help the European Space Agency (ESA) understand Arctic issues, increase the synergy between ESA activities and Arctic initiatives, and assist ESA in preparing relevant Arctic related programme proposals to meet future requirements.

The Arctic is changing. At the root of much of that change is global warming. The Arctic is warming much faster than the rest of the planet, and as a result, sea ice is receding. One impact of this is the opening of Northern sea routes and the prospect of dramatically increased levels of commercial shipping. A second impact is the easier access this provides to the resource wealth of the region - hydrocarbons, minerals, and fish. A third impact is the detrimental effect it is having on land and marine wildlife. These impacts have subsequent reverberations. The increase in economic activity is multiplied many times over as supporting infrastructure and systems are put in place. With the increased activity come pollution and the danger of environmental and humanitarian disasters. With the economic gain comes the desire to protect rights and investments, and the resulting potential for conflict. All of this is at odds with the traditional livelihoods of the Arctic's indigenous peoples.

The world has taken notice of the Arctic – of both the economic opportunities and the environmental threats. So far, there has been a remarkable spirit of cooperation among Arctic stakeholders as they recognize the common problems and needs that they all face.

Not surprisingly, there is considerable interest in the region on the part of the eight Arctic States: Canada, Norway, Iceland, Sweden, Finland, Denmark, Russia, and the United States. That interest has manifested in policies across all areas: safety, the environment, sustainable economic development, sovereignty, and indigenous and social development.

However, non-Arctic states have recently also turned their attention northward. Examples of such countries that have been examined in this report include France, Germany, India, and China. Of particular relevance here is the European Union that has had a northern policy since 1999 and will be issuing a revision in 2012. The interests of these states are focused on economic development, the environment, and safety.

In many cases, the joint interests of nations have been articulated in international agreements of various forms, often under the auspices of international organizations such as the United Nations and its groups. Such agreements tend to be in areas where there are aligned interests among nations, such as search and rescue or environmental protection.

Industry is also focusing on the potential opportunities that the Arctic presents. Industrial interests are obviously in economic development, but there is a realization that such activity must come with safety and environmental responsibility in mind.

The Arctic is a challenging region in which to live and work. Distances are vast, the weather is difficult, and for much of the year it is dark. Although increasing, Arctic populations are small. Space technologies have many attributes that make them ideal for application in the Arctic context. Satellites can see remote areas that could not be accessed in any other way. They can cover wide areas with relatively little infrastructure. And, they can provide types of information that are not available from any other source. Space technologies can contribute to Arctic policy priorities in many ways:

- **Communications** satellites can bring communities across the Arctic and around the world closer together, help bring education and health to isolated people, support the extraction and transportation of natural resources, and facilitate the provision of aid to people in distress.
- **Earth Observation** satellites can help vessels navigate through and around ice and icebergs, monitor pollution and environmental change, locate natural resources, and assist authorities in protecting national borders.
- **Navigation** satellites can help vessels, aircraft, and vehicles navigate more safely and efficiently, provide position information to assist in mapping and surveying in regions that frequently have poor charts available, and aid in locating and tracking vessels and people in distress.
- **Surveillance** satellites can help authorities locate vessels and people in distress, identify illegal activities that endanger ecosystems and resources, and help aircraft and ships avoid collisions.
- **Science** satellites can help protect electricity transmission lines and pipelines from harmful solar storms, provide information that will assist in the delineation of national boundaries, and help to monitor the progress climate change.

The following table summarizes the contribution that six classes of space technologies (communications, weather and climate, navigation, earth observation, surveillance, and science) can make to five key policy areas (safety, environment, sustainable economic development, sovereignty, and indigenous and social development) and their related sub-issues.

The Applicability of Space Technologies to Arctic Policy Areas

Legend		Policy Areas																					
		Safety						Environment				Economic Development			Sovereignty				Indigenous and Social Development			
Low Applicability		Marine Transportation	Air Transportation	Land Transportation	Policing	Search and Rescue	Disaster Management	Pollution	Climate Change	Biodiversity	Environmental Protection	Resource Development	Infrastructure	Transportation Efficiency	National Boundaries	Border Protection	Defence	Maintaining Presence	Traditional Livelihoods	Health	Education	Connectivity
Medium Applicability																							
High Applicability																							
Space Technologies	Communications																						
	Weather and Climate																						
	Navigation																						
	Earth Observation																						
	Surveillance																						
	Science																						

The report shows convergence of policies among states, as well as with capabilities of satellites systems. Space technologies have been contributing to Arctic policy priorities for quite some time. However, these assets will need to be renewed and enhanced if the increasing future challenges of the Arctic are to be met. The recent failure of Envisat provides a reminder of the limited life of space assets. And the delays in the launch of the European Sentinel Missions and in the funding of the Canadian Radarsat Constellation Mission are examples of how plans to replace space assets can become undone.