

# Above the Arctic

## Increased Security in the Arctic through Cooperation in Space

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### Abstract

Due to the Arctic's harsh environment and weather conditions, the region's settlements and infrastructure are limited. Space will play a unique role in providing the necessary means to control and secure operations in the Arctic for commercial, civil, and military activity for all stakeholders. Cooperation between nations with a common interest in the Arctic will increase security and forge closer bonds among allies. A strategy of cooperation, sharing of knowledge, and combined use of dual-use assets will increase the stakeholders' security while defraying costs.

This article will first look at how the use of space will provide increased security in the Arctic. It will then use the US and Norway's space and Arctic strategies as examples of coinciding topics of interest and illustrate how cooperation in these areas may be of benefit to both nations. Finally, using the United States and Norway as examples, the article will suggest three lines of effort in a combined space strategy among allies in the Arctic.

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All Arctic nations—including Norway, the United States, and Russia—are interested in the region due to its resources and strategic locations. Non-Arctic countries like China also see the potential in the Arctic region and are, therefore, declaring themselves as “near Arctic” states.<sup>1</sup> The increased potential for economic gain and military-strategic advantage has made the Arctic an arena for great-power competition and has led to increased military, civil, and commercial presence from many nations. In particular, Russia has “gradually reintroduced army, navy and air force elements into the region,” expanding its military footprint in the Arctic.<sup>2</sup> Increased activity in the area will increase the chances of conflict.<sup>3</sup>

The corresponding threats to the area are significant. In a fragile area like the Arctic, an accident from oil drilling or shipping would have dire consequences. Continued environmental change might also have considerable consequences on the wildlife and fisheries in the area, and further research and surveillance are of the utmost importance. A conflict in the area leading to the use of arms may have the similar detrimental consequences. The vast amounts of international waters and disputed rights to resources may lead to conflicts among Arctic nations and

other stakeholders claiming their rights to exploit the region. Increased activity has “fueled a demand for communication, navigation, and surveillance infrastructures.”<sup>4</sup>

In the *National Strategy for the Arctic Region* from 2013, then-President Barack Obama recognized the Arctic as “an amazing place” and that the climate changes in the Arctic represent emerging opportunities, as well as “very real challenges.”<sup>5</sup> These challenges are multifaceted, and many of them fall under the Department of Defense’s (DOD) responsibility.

### **Space as the Solution**

One obvious solution to the unique infrastructure challenges in the Arctic is space.<sup>6</sup> The fragile and harsh environment makes all human activity in the region challenging, and space capabilities reduce the need to build physical infrastructure. Commercial satellite services can support the need for increased communications, surveillance, and understanding of events, all the while increasing the cooperation among nations and partners. The use of space assets and space-based infrastructure in the polar region is not without challenges. However, by “optimizing existing and future space-based infrastructure, using low Earth, geosynchronous, and highly elliptical orbits, the United States can work cooperatively with other Arctic nations to build situational awareness, enhance operations, and strengthen a common rule-based order.”<sup>7</sup> This cooperation should also extend to European allies and partners.<sup>8</sup> Continued research and information sharing in a region formerly neglected due to the harsh environment should be the preferred measure to solve these issues. This calls for cooperation among allies with common, or at least overlapping interests, and necessitates increased military presence to provide security in the region.

### **Topics of Cooperation**

Even though interests and strategic goals in the Arctic may differ among stakeholders in the Arctic, the efforts and activities to achieve those goals often coincide. Using the United States and Norway as examples of allies with coinciding, but not equal, interests in the Arctic, we can find coinciding lines of effort and focus areas in the two nations’ space and Arctic policies and strategies, which could serve to establish common grounds for and areas of cooperation. The following table summarizes the different strategies and policies for both space and the Arctic and provides an overview of suggested areas of cooperation.

**Table 1. Strategies and policies for space and the Arctic, with suggested areas of cooperation**

| Areas of Cooperation  | United States  | Norway   | NATO                                     |
|---|--|--|--|
| International, allied, and partner cooperation within both domains                            | – US space policy<br>– <i>Department of the Air Force Arctic Strategy</i><br>– <i>Defense Space Strategy</i> | – <i>The Norwegian Government's Arctic Policy</i><br>– Norway's space strategy<br>– Norwegian Armed Forces <i>Long Term Plan</i> | – <i>NATO Strategic Concept</i>          |
| Space domain awareness  | – US space policy<br>– <i>Defense Space Strategy</i>   | – Norway's space strategy<br>– Norwegian Armed Forces <i>Long Term Plan</i>  | – <i>NATO's Overarching Space Policy</i> |
| Command, control, communication, intelligence, surveillance, and reconnaissance in the Arctic | – <i>Department of the Air Force Arctic Strategy</i><br>– <i>Defense Space Strategy</i>                      | – <i>Norway's Arctic Strategy</i> <sup>9</sup><br>– Norwegian Armed Forces <i>Long Term Plan</i>                                 | – <i>NATO Strategic Concept</i>          |
| Enhanced positioning, navigation, and timing  | – <i>National Space Policy</i><br>– <i>Department of the Air Force Arctic Strategy</i>                       | – Norway's space strategy  | – <i>NATO's Overarching Space Policy</i> |
| Launch capability   | – US space policy  | – Norway's space strategy  | —  |
| Exchange knowledge, education, research, development, exercises, and training                 | – US space policy<br>– <i>Department of the Air Force Arctic Strategy</i>                                    | – <i>Norway's Arctic Strategy</i><br>– Norwegian Armed Forces <i>Long Term Plan</i>  | —  |

The primary common ground in all the described policies and strategies is cooperation, and it is the foundation for all other topics discussed in this article. In some of the outlined topics, Norway and the United States have already established a unique cooperative relationship. Nevertheless, increased cooperation and understanding of the potential advantages of joined forces may lead to even more significant gains for both nations and may set an example of new or increased cooperation between the United States and other allied nations. Not limited to just the Arctic region, space domain awareness (SDA) is one of the most critical areas where allied nations should cooperate.

### ***Space Domain Awareness***

SDA is a major strategic goal for the United States, Norway, and NATO. Norway's GLOBUS radars, located in the city of Vardø in the northeastern part of Norway, have provided space situational awareness (SSA) for Norway, the United States, and NATO since 2001.<sup>10</sup> The system will be further improved after the completion of the GLOBUS III radar, a joint project of the US Air Force Space Command and the Norwegian Intelligence Service.<sup>11</sup> The system will be operational in 2022.<sup>12</sup> The radar site's primary mission is surveillance, tracking, categorizing objects in space, surveillance of Norwegian interest areas in the north, and collecting research and development information.<sup>13</sup> This cooperation and joint

effort is an excellent example of how Norway, a relatively small military space nation, can contribute in the space domain to the benefit of all NATO nations. Norway's geographic position and relatively mild climate make the operation possible within the Arctic region. With the Arctic becoming the new area of competition and congestion, Norway's significance as an Arctic space nation has increased.<sup>14</sup> As with SDA, communication is an essential field of cooperation.

### ***Communication***

Secure and reliable communication in the Arctic is vital for any operation, whether it is military, civilian, or commercial. Communication between units operating in the Arctic area and back to the command structure is essential for command and control. A modern military like the US and Norwegian armed forces needs both broadband network and voice capabilities. In a remote area like the Arctic, where "fiber optic infrastructure is scarce or nonexistent," communication via satellites is the only viable solution.<sup>15</sup> An increased presence from the United States and a sustained presence from Norwegian forces, all with the same communication, command, and control demands, make satellite communication a perfect example of another area of needed cooperation—both between nations and among government and civilian actors.

The existing satellite communication service in the Arctic is mostly geostationary Earth orbit (GEO) services, which all have a limited coverage above 75°–80° north.<sup>16</sup> Fixed users may have broadband service up to 80° north, but the very-small-aperture terminals only cover up to 75° north.<sup>17</sup> Iridium NEXT's low Earth orbit (LEO) system is the only mobile satellite service (MSS) provider with proper coverage in the polar region.<sup>18</sup> Like Kepler and Argos, a few other companies provide LEO connectivity but not near-real-time broadband service.<sup>19</sup> Communications in the Arctic area need significant improvement to meet the increased requirements for allies' and partners' military presence there.

Planned cooperation between the United States and Norway is already underway regarding communications enhancement. It involves government and commercial companies and combines international, cross-sector, and dual-use collaboration. Inmarsat will deliver the satellites, with two satellites in highly elliptical north–south orbits (HEO). These two HEO satellites will become the world's first mobile broadband satellites dedicated to the Arctic and will work in conjunction with Inmarsat's 13 GEO satellites, providing continuous high-speed mobile broadband coverage above 65° north.<sup>20</sup> The Norwegian Defense Department will share the cost with the US Air Force and Inmarsat.<sup>21</sup> The scheduled launch is later this year.<sup>22</sup> It will be made available for merchant fleets, fishing vessels, and other commercial actors and provide tactical and strategic communi-

cation for government customers.<sup>23</sup> The satellite will improve broadband coverage for US and Norwegian military forces in the area but may not deliver a satisfactory amount of data transfer in the event of a conflict.

Norway's ambition of being independent regarding critical services for security issues, combined with Oslo's high emphasis on international and bilateral agreements, shows the desire for government- or allied-controlled assets. Even though Inmarsat is a UK-based company, future commercial sales or changes in the company structures might threaten the Norwegian military forces' access to the service or negate the possibility of using it for secure and classified communications. China and Russia are investing in and buying European companies; the latest example is a Russian-controlled company attempting to buy a Norwegian Rolls Royce engine maker.<sup>24</sup> The Norwegian government has temporarily stopped the sale due to security issues.<sup>25</sup> To depend solely on a commercial actor reduces the service's reliability in times of crisis. Therefore, increased governmental cooperation is necessary.

There is a need for a dual, government-controlled and operated tactical, operational, and strategic initiative to cover the US and Norway's increased demand for high-speed communications in the Arctic. The planned ViaSat Link 16-capable LEO satellite is an example of a system that could be under US and Norwegian government control.<sup>26</sup> Bringing Link 16 capabilities from a line-of-sight to a beyond-line-of-sight system would improve the situational awareness (SA) for all across the tactical, operational, and strategic levels of conflict.<sup>27</sup> As an Arctic nation, Norway should invest in this satellite constellation to ensure a speedy development to achieve timely and secure communications in the Arctic for all Norwegian and allied forces. Norway is well-positioned for cooperation regarding up and downlink through already established capabilities and can bring this capability into the cooperative effort. Intelligence, surveillance, and reconnaissance (ISR) are other areas of cooperation that should be emphasized and increased.

### ***Intelligence, Surveillance, and Reconnaissance***

Space plays a vital part in building any usable SA in the Arctic region through ISR operations. Due to the Arctic's properties as large, dark, cold, remote, and known for its harsh weather, conducting ISR operations from space is the preferred and most often the only viable solution. As stated in Norway's space strategy, environmental surveillance is a key element in the strategy. Understanding what, how, and when the Arctic environment will change will be essential to avoiding potential conflict. Dual-use assets for environmental surveillance have a military potential as well.

Norway has a long history of maritime surveillance of the sea in the Norwegian area of interest. Through NorSat-1 and -2, the Norwegian Coastal Administration has been using the automated identification system (AIS) that all ships above 300 gross tons must use since 2010.<sup>28</sup> The new NorSat-3 enhances the AIS surveillance with an experimental navigation radar detector.<sup>29</sup> These are in Sun-synchronous orbits (SSO) and have an additional scientific purpose as solar radiation surveillance and space weather observatories.<sup>30</sup> Therefore, these satellites provide cross-sectorial (commerce and defense sectors) and dual-use (surveillance and scientific) capabilities. The technology and use of these satellites, combined with the coastal radars in Norway, are a vital surveillance resource regarding Russian military activities and testing in the Barents area. Satellites in polar LEO will be useful for tracking ships in Norway's economic exclusive zone and can also detect and track ships operating in the Arctic region.

Norway is also developing new and exciting technological solutions that could improve ISR capabilities, environmentally and military. At the Norwegian University of Science and Technology in Trondheim, a student satellite containing a hyperspectral camera, an intelligent onboard processing computer, and robotics was launched earlier this year.<sup>31</sup> The onboard camera can be slewed and provides images of small areas of interest.<sup>32</sup> Working together with Kongsberg Satellite Services (KSAT) to download images through its ground-based system and short revisit times due to its LEO, the students' satellite can detect algae that are dangerous for salmon farming companies. The satellite information can then be transferred to unmanned vehicles able to further investigate the areas of interest.<sup>33</sup> This technology could be developed and prove helpful in detecting substances other than underwater algae, particularly submarines. Norway is in proximity to the Kola Peninsula and Kola Bay, the Russian Northern Fleet's home base.<sup>34</sup> An ISR satellite constellation combined with an unmanned aerial system deploying active sonar and confirming the satellite's finding will increase the US, Norway's, and NATO's SA in the region. As well as environmental surveillance, increased weather surveillance and forecasts are needed.

One key factor for all Arctic entities is the harsh weather conditions that can affect the safety of humans and machines in the area. The US Space Force (USSF) is considering a future investment to "improve weather monitoring in the Arctic."<sup>35</sup> Climate change, not only in the Arctic, requires "more timely and more precise data."<sup>36</sup> Norway's interest in research on environmental changes and improved weather forecasting aligns with the DOD and USSF's need for an updated weather satellite program, especially in the Arctic. Cooperation would benefit both nations in terms of research on new technologies and actual employment of new assets in space. New and improved sensors reduce cost and improve capa-

bilities. Polar weather satellites with an up-down link every 90 minutes via Sval-Sat and distributed via high-speed satellite broadband would make weather data available for many users, including commercial traffic and political decision makers in the United States and Norway.

As the Arctic environment is changing, the region's strategic significance is increasing. Understanding the magnitude and speed of the environmental changes is highly important regarding resource conservation and SA of the strategic changes and the potential therein. According to Spacenews.com, a spokesman in the USSF confirmed that the service "does not operate and is not developing capabilities specifically to monitor climate change."<sup>37</sup> Even though continued work with NASA and the National Oceanic and Atmospheric Administration (NOAA) should be a focus area, a cooperation between the United States and Norway regarding environmental surveillance will benefit their intelligence communities, the research communities, Departments of Commerce and increase security for both nations and their allies and partners. Besides enhanced ISR, the Arctic region needs enhanced accuracy regarding positioning, navigation, and timing.

### ***Positioning, Navigation, and Timing***

Increased activity in the Arctic demands increased military presence, with aviation and naval assets. This increased activity must rely on fully developed and accurate navigation systems to avoid accidents, ensure accurate data for SA, and provide accurate weapons deployment when needed. Due to the high angles from a satellite in a global navigation satellite system (GNSS) such as the Global Positioning System (GPS) or Europe's Galileo GNSS, accuracy in the Arctic is limited, especially in the vertical axis.<sup>38</sup> Moreover, a satellite-based augmentation system (SBAS) has its limitations due to atmospheric and topography challenges.<sup>39</sup>

One solution is to launch SBAS satellites in polar highly elliptical orbits or LEOs.<sup>40</sup> Another possible solution would be to develop a medium Earth orbit constellation.<sup>41</sup> A dual-use system where future communications satellites used as SBAS assets represents the third option. Accurate and secure navigation and timing will be just as significant in the Arctic region as in the more populated areas between 65° south and 65° north as the number of cruise ships, commercial carriers, fishing vessels, dynamic oil rigs, and other commercial users increases. Therefore, it is not only in the USSF's, DOD's, and the Norwegian Armed Forces' interests to enhance positioning, navigation, and timing (PNT) in the area but also for the US Department of Commerce and the Norwegian Department of Commerce and Fisheries, as well as both nations' Coast Guards and their Departments of Justice. The development of new technologies to enhance the accuracy of PNT in the region is, there-

fore, one important area of future cooperation for the United States and Norway. Another important line of effort for both nations is launch capability.

### ***Launch Capability***

Available and credible launch capability is one of Norway's national focus areas, and the same focus is found in the US space policy. In 2021, the Norwegian government approved the building of a new spaceport on Andøya island, as a launch site for small satellites to polar orbit.<sup>42</sup> The launch capability will be up to 1.5 metric tons to polar LEO or SSO, initially using launch vehicles from Rocket Factory and Isar Aerospace.<sup>43</sup> Inclination will be 87.4 to 108 degrees, and the remote area of Andøya provides for significant impact and dispersion areas in the Norwegian Sea.<sup>44</sup> The Norwegian government owns a significant stake in the company, and it will be under governmental control in case of conflict. The launch capability will provide Norway with its sought-after capability and potentially provide allies, both bilateral and in NATO, with launch capability in the Arctic region. The Andøya spaceport will supplement existing launch capabilities available to the US government. As well as upstream space operations in the form of launch capabilities, Norway can also provide downstream capabilities worldwide.

With Norway's geographic placement and relatively mild climate compared to other nations at this latitude, building and operating ground radars for SDA in the polar region is easier and friendlier to human existence than in Alaska, Canada, or Greenland. The world's largest ground station is SvalSat, operated by the Norwegian company KSAT.<sup>45</sup> The ground station is located on Svalbard, an island to the north of the Norwegian mainland, and "is ideally situated at a high enough latitude to see every polar-orbiting satellite from all 14 daily transits."<sup>46</sup> The Norwegian government owns 50 percent of KSAT through Space Norway; therefore, the company represents a reliable asset in times of conflict. KSAT also has a total of 25 ground stations on the Norwegian mainland and many other countries. Its global network, combined with high focus on cybersecurity, makes global downloading of payload and uploading software for satellite management possible from the company's offices in Tromsø, a city in northern Norway.<sup>47</sup> Stronger military cooperation with the civilian side of the operation, as described in the Norwegian government's space strategy, will further improve data and cybersecurity to a military-grade system.

### ***Education, Research, and Development***

Norway has a long history as a space nation. Kristian Birkeland, a Norwegian scientist, completed his famous Terrella-experiment in 1896, where he made arti-

ficial Northern Lights, known as the Aurora Borealis. That was the beginning of modern space operations in Norway.<sup>48</sup> The Andøya Rocket Range launched its first scientific rocket in 1962 and has launched more than a thousand rockets since then. Norway has several institutions for space-related education, from satellite technology to space physics. The Norwegian Military Research Institute (*Forsvarets Forsknings Institutt*, FFI), has, in cooperation with the University in Oslo (UiO), developed the Rimfax radar, currently operating on the Mars rover, *Perseverance*.<sup>49</sup> Norway is a member of the European Space Agency, and the Norwegian space industry consists of around 40 companies.<sup>50</sup> Several Norwegian companies have further developed and adapted technology used to support offshore oil extraction and in medical science to space application, and Norwegian technology and knowledge of space and space operations are world-class.<sup>51</sup> Space is also an area of heightened interest in the *Norwegian National Strategy*.

### **Suggested Combined Arctic Space Strategy**

A combined Arctic space strategy aiming to increase security in the Arctic should focus on three main lines of effort. The first line of effort is closing the Arctic infrastructure gap. Allied stakeholders need to recognize and understand the increased strategic significance of the Arctic region. Due to its remoteness and harsh conditions, it is vital to realize the importance of space operations to provide the needed command, control, communication, intelligence, surveillance, and reconnaissance (C3ISR) in the Arctic to achieve security for both nation's interests. According to the US Chief of Space Operations, Gen John Raymond, USSF, the *Department of the Air Force Arctic Strategy* is "an important strategy for space."<sup>52</sup> In an interview in *SpaceNews*, General Raymond confirmed that the Arctic was key terrain for the United States.<sup>53</sup> As we have seen in most US and Norwegian strategy documents, and as several space and military experts keep arguing, there is a need for cooperation among Arctic partners to increase vigilance in this increasingly vital region.<sup>54</sup> Therefore, an Arctic space strategy must continue on this track. Cooperation among allied armed forces should increase to ensure cost-sharing and shared benefits from education, research, development, and geographic position to close the gap in necessary infrastructure in the region.

Dual-use assets reduce government spending, and profitable commercial companies increase the economic power of the nation. Commercial companies like SpaceX conduct technological developments to make space operations less expensive, better quality, and more readily available. The drawback of the commercial space industry is the lack of governmental control during a conflict. Therefore, allied governments need to deal exclusively with companies from the involved nations and insist on transparent contracts and ownership control. The many case

studies that show the malign influence of China's Belt and Road Initiative and Russian corporations' predatory buy-ups of European companies emphasize this point. Space capabilities controlled by companies from an adversary nation are no good in case of conflict.

Norway's geographic position in the Arctic—with less harsh conditions than Canada, Alaska, or Greenland—makes the nation the clear choice for allied cooperation. The geographic position also makes Norway very dependent on the Arctic region and, therefore, equally interested in Arctic security as the great powers engage in strategic competition. As a small nation with limited resources available for a considerable and credible conventional force, Norway should continue its strategy of allied contributions. C3ISR space assets are a sought-after capacity for NATO, especially in the Arctic area, where Russia and China are increasing their presence. Therefore, Norway must continue to focus on technological development within space, cyber, and artificial intelligence. Continued closing of the infrastructure gap can, and should, be done in cooperation and conjunction with Norway's allies and partners.

The second line of effort is improved SDA in the polar area. Space as the solution for the US and Norwegian Arctic challenges is not exclusive to these nations. China and Russia have shown military and commercial interest in the region, and both nations have increased their space capabilities in polar orbits. Increased SDA is therefore equally important. Since Chinese and Russian intentions in the Arctic are unknown, their intentions in space in the polar region are an area of concern for the United States, Norway, and NATO allies. Therefore, a robust and dependable SDA system in the polar region must be another critical area of cooperation. The nations' strategy documents regarding the domain and the region should emphasize this. Nevertheless, the most important field of cooperation does not lie in the technical solutions and assets but instead with the exchange and increase of knowledge and shared usage of existing and future capabilities.

Thus, the third line of effort is education and liaisons. A strong, valuable, and lasting cooperation among nations rests on a shared understanding of the necessity, gains, and importance of the topics in question. Since most US and Norwegian policy and strategy documents recognize the importance of space and the Arctic, cooperation between the two nations is, as the documents already declare, wanted and necessary. This cooperation must start with a shared understanding of the necessary knowledge to operate in the region and in the domain. Being an Arctic nation, Norway brings Arctic expertise, while the United States, being the most prominent space nation, brings space-related knowledge to the partnership. Therefore, the most significant cooperation between the nations should be sharing knowledge through education, liaisons, research, and development.

## Conclusion

The Arctic is an unforgiving area to operate for humans. Building infrastructure and settlements to increase security using conventional forces and assets is cost and resource prohibitive. Despite the costs, the increasing strategic significance of the Arctic calls for increased efforts by Norway, the United States, and their allies to bolster security in the High North. Allied cooperation and cost-sharing in the space domain is an obvious solution. Nations with similar interests in the region share many of the same areas of concern—communication, navigation, surveillance, and reliable launch capacity—thus, cooperation is already taking place. Nevertheless, increased cooperation among allied nations is necessary, and a combined Arctic space strategy will increase the security outcomes of such collaboration.

A combined Arctic space strategy should focus on three main lines of effort. The first is to close the Arctic infrastructure gap. Cooperation regarding the increased need for C3ISR, improved PNT, and environmental surveillance are crucial for decision making. Military intelligence and commercial surveillance will increase security and improve communications possibilities for emergency communication and coordination of emergency and disaster management. The second effort is to improve SDA in the polar region. Understanding and tracking how China and Russia are using space through polar orbits and SSO is essential for the security of allied space capabilities and our understanding of Beijing's and Moscow's intentions in the region. The third effort, and the most important, is education and liaisons among partners. The exchange of knowledge regarding the Arctic and space requires minimal economic investment and will increase allied and partnered nations forces' understanding. A higher focus on knowledge exchange and strategy development is a very low-cost enhancement of allied nations' cooperation and is essential to building further collaboration based on a steady foundation. ★

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## Notes

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