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Open Skies in the Arctic: Challenges and Opportunities

EURO-ATLANTIC SECURITY REPORT

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May 2021

The European Leadership Network (ELN) is an independent, non-partisan, pan-European network of nearly 300 past, present and future European leaders working to provide practical real-world solutions to political and security challenges.

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Acknowledgements

This chapter was originally published by the North American and Arctic Defence and Security Network (NAADSN) on 26 March 2021, accessible at https://www.naadsn.ca/wp-content/uploads/2021/04/Depledge-Lackenbauer-On-Thin-Ice-final-upload.pdf. The authors are grateful to the editors of *On Thin Ice? Perspectives on Arctic Security* for the permission to republish the report with minor updates.

Published by the European Leadership Network, May 2021

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Introduction

A security dilemma is developing in the Arctic.[1] Both Russia and NATO member states are increasing their military presence and activities in the region, and threat perceptions on both sides are intensifying. Although there are various frameworks for regional and sub-regional cooperation – most notably the Arctic Council – none of them address military security issues. In addition, since 2014, important platforms for security cooperation, such as the Arctic Security Forces Roundtable and the Arctic Chiefs of Defence Staff meetings, have been suspended or held without Russian participation. **At the moment, there is no Arctic forum in which hard security issues could be discussed that also includes Russia.**

In the absence of military cooperation and dialogue, this re-emerging strategic rivalry presents the risk of military escalation stemming from the miscalculation and misinterpretation of intentions. During the Cold War, the Soviet Union and the U.S. addressed this potential danger in the form of bilateral agreements such as the Hot Line Agreement (1963), the Incidents at Sea Agreement (INCSEA, 1972), and the Agreement on the Prevention of Dangerous Military Activities (DMA, 1989).[2] After the signing of the 1975 Helsinki Accords, members of both NATO and the Warsaw Treaty Organization followed suit by developing first arms control and confidence- and security-building measures (CSBMs) that culminated with the signing of the Treaty on Conventional Armed Forces in Europe (CFE, 1990),[3] the Vienna Document (VD, 1990),[4] and the Treaty on Open Skies (OST, 1992).

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In terms of Arctic security, the Treaty on Open Skies holds much promise. Its area of application currently covers the entire sovereign territories, including "islands, and internal and territorial waters,"[5] of 33 states in Europe and North America. Membership includes all of the Arctic states, namely Canada, Denmark, Finland, Iceland, Norway, Russia, and Sweden, with the exception of the U.S., which left the Treaty on 22 November 2020. The Treaty allows members to conduct joint, short-notice, unarmed observation flights over each other's territory to collect imagery on military forces and activities as well as industrial sites.

At present, the fate of the Open Skies Treaty is uncertain. Following the U.S. exit from the Treaty, on 15 January 2021 the Russian Foreign Ministry announced that it

would initiate domestic procedures for withdrawal as well, which will likely conclude in the beginning of June,[6] but indicated that this decision could be reversed if the U.S. signals its willingness to rejoin. This paper demonstrates the continued relevance of the Open Skies regime for Arctic security. It first outlines challenges that the Open Skies regime faces for conducting Arctic overflights, and then looks at opportunities it presents for enhanced cooperative security. **Even if the Treaty falls apart, cooperative aerial observation in a different format has an important and useful role to play in mitigating military security risks and, potentially, addressing environmental challenges in the region**.

Arctic security and Open Skies practice

The Arctic has been at the centre of discussions about Open Skies since its first inception in the mid-1950s.[7] First envisioned as an instrument to illustrate the possibility of verifying a future disarmament agreement, the focus shifted, from spring 1957 onwards, towards the prevention of (nuclear) surprise attack. To this end, the U.S. proposed the Arctic as a suitable territory to test cooperative aerial observation, and negotiations about the idea continued for several years in the United Nations. Ultimately, the Soviet Union declined the offer, in part to uphold military secrecy.[8]

The shooting down of U-2 pilot Gary Powers in May 1960 over Yekaterinburg (then Sverdlovsk) put an end to ideas about cooperative aerial observation. The parallel development of ballistic missiles as delivery vehicles for nuclear warheads reduced the warning time to minutes, which changed the overall military and political rationale. Although both the U.S. and the Soviet Union continued to rely on aerial reconnaissance and surveillance, aircraft lost their use in addressing the problem of surprise attack. Instead, from the early 1960s onwards, time-sensitive reconnaissance and most other forms of imagery intelligence gathering became the domain of satellites.[9]

As a result, when President George H. Bush revived Eisenhower's original idea of Open Skies in May 1989 on a multilateral basis, he focused less on intelligence collection and more on politics, arguing that "such unprecedented territorial access would show the world the true meaning of the concept of openness," and could reveal the Soviet Union's commitment to change.[10] In his words, the Treaty's objective was "to enhance mutual understanding and confidence by giving all participants, regardless of size, a direct role in observing military or other activities of concern to them."[11] **Even today, the Open Skies Treaty presents a unique instrument for military-to-military cooperation between states that are often competing in other areas.**[12]

Since the Treaty entered into force in January 2002, its member states have conducted more than 1,500 overflights.[13] The Treaty sets fixed passive quotas, which are the maximum number of flights each state has to allow over its territory. For

example, Russia and Belarus, which form one group under the Treaty, have to allow 42 overflights (like the U.S. before the withdrawal) per year. For the remaining Arctic states, the numbers are much lower (Table 1).

The number of passive overflights corresponds to the maximum number of active flights that a state can conduct, but member states need to find a consensus on the actual distribution of active flights every year. Among the Arctic states, Russia (together with the U.S. until 2020) is the only country that receives more than one or two overflights per year. This fundamental asymmetry reflects both the dominant interest in overflying Russia-Belarus, and the agreement among NATO members not to inspect each other. **In principle, the Treaty would allow a significant increase in the number of overflights, including those over the Arctic.**

The current practice of overflights is strictly regulated by the Treaty and the subsequent decisions of its consultative organ – the Open Skies Consultative Commission (OSCC). States designate points of entry (POEs) to their territory, airfields from which overflights must start and end (sometimes identical with the POEs), as well as airfields for refuelling and overnight stops, where required by a country's size. It is important to note that while POE and refuelling procedures are in place, informal agreements have, from time to time, been brokered between State Parties to enable a particular set of mission objectives on a case-by-case basis.

"In principle, the Treaty would allow a significant increase in the number of overflights, including those over the Arctic."

In most cases, official data about the exact flight routes of Open Skies flights have not been released, making it difficult to provide an exact evaluation of the territorial distribution of previous Arctic overflights. **Available data suggest that flight practice over the Arctic has been somewhat limited, at least in comparison to other regions.** For example, from 2004 to 2014, not one of the ten Russian flights over Canada went over its Arctic territory.[14] Russia has nevertheless made it clear that it wishes to undertake overflights further north in Canada and has requested adjustments to the use of POEs and refuelling airfields to enable such flights for the Tu-154M.[15] Russia is also known to have conducted an inspection flight over Norwegian Arctic territory in the summer of 2014, with a take-off from Bardufoss.[16]

Table 1: Passive Treaty Quotas and the Actual Number of Successful Overflights of Arctic States

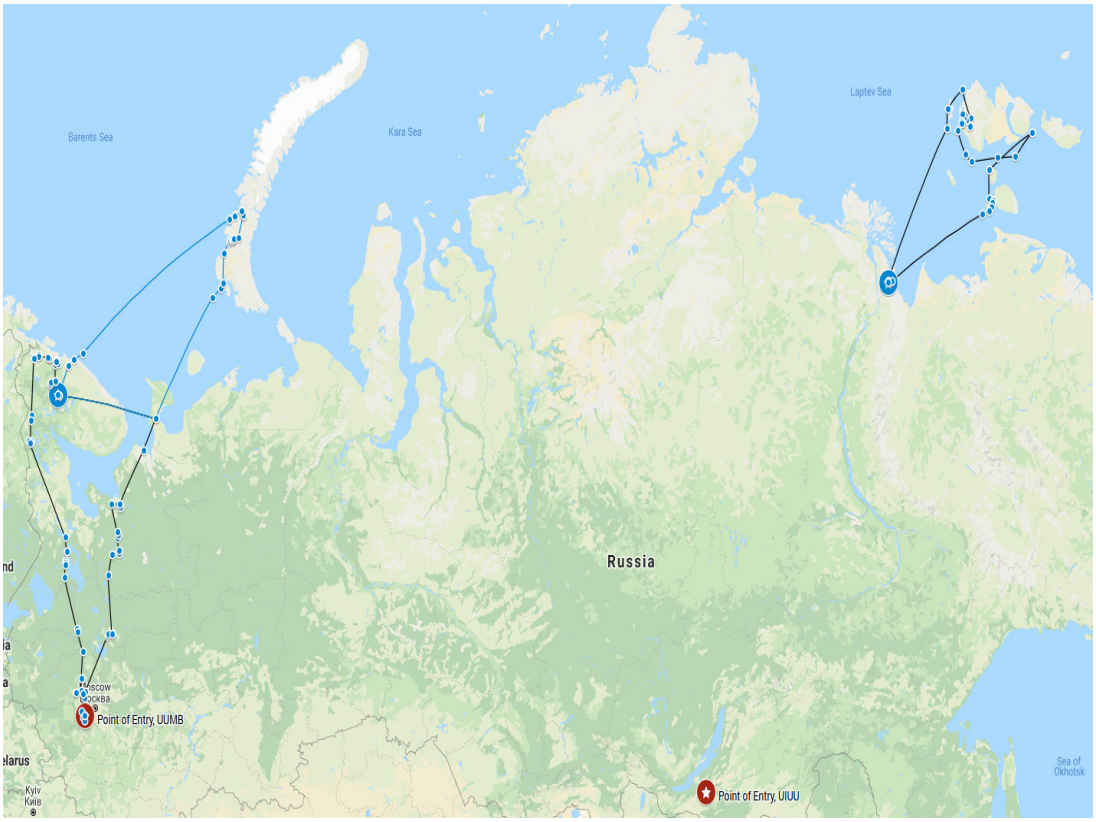
Member State	Passive Flight Quote p.a.	Possible Overflights 2006-2019[17]	Total Over-flights 2006-2019	Overflights by Russia-Belarus 2006-2019
Russia-Belarus	42	546	465	-
U.S.	42	546	77	77
Canada	12	156	15	15
Sweden	7	91	22	16
Norway	7	91	20	20
Denmark	6	78	21	18
Finland	5	65	17	14
Iceland	4	52	0	0

Source: Own compilation based on Alexander Graef and Moritz Kütt, "Visualizing the Open Skies Treaty," 27 April 2020, https://openskies.flights/.

Of the 28 successful Canadian flights from 2003 to 2016 over Russia-Belarus, for which data are available, only five crossed the Arctic Circle.[18] In these five cases, observations have focused on three areas: the Kola Peninsula, Novaya Zemlya, and the New Siberian Islands. For example, in August 2009 and July 2016, the Royal Canadian Air Force (RCAF) conducted joint flights (one with Norway, the other with the U.S.) from the military airport in Tiksi, which Russia had designated as an Open Skies airfield, to the Lyakhovsky Islands. Future overflights of Tiksi can help Arctic states better understand how the ongoing upgrading of air and naval facilities fits into Russia's Arctic strategy and the opening up of the Northern Sea Route (NSR).[19]

Similarly, in April 2009, August 2011, and June 2013, Canadian flights went over the Kola Peninsula, which remains the home base of Russia's strategic sea-based nuclear forces. These flights usually start at the Kubinka airfield near Moscow as the POE and take an intermediate stop at the OST refueling airfield Olenya about 90 km from Murmansk, which serves as a forward deployment field for Russia's Long-Range Aviation.

Figure 1: Canadian Open Skies observation flights over Russia, August 2011 and July 2016



Source: Map data ©2021 Google, own illustration based on OS/CA/11/0040/F14/O and OS/CA/16/0049/F14/O, see fn. 18.

Opportunities

Military confidence and transparency

During Open Skies overflights, representatives of both the observing and the observed states are present in the observation aircraft. As such, military officers from different states, particularly NATO member states and Russia, exchange information and engage with each other on a regular basis. Foreign delegations are frequently invited to join excursions or learn more about the culture of the host state. For example, during the first Russian observation flight over Canada in September 2004, the RCAF organized a bus sightseeing tour of Ottawa, a walking tour downtown, and a guided tour of the Canadian Aviation Museum.[20] Visits to Niagara Falls, which is located in the proximity of Canada's Open Skies POE, have proven very popular too.[21] **Neither drones nor satellites can replace this direct interaction between state parties.**

What is more, the observed states always receive certified first copies of all imagery

that has been acquired during overflights, and all Open Skies member states can purchase additional copies at the cost of production. This level of transparency and cooperation is unique, and it allows small and even middle-sized states access to data that they would otherwise have no hope of acquiring. Given the end of on-site inspections in Russia within the context of the Intermediate-Range Nuclear Forces (INF) and CFE Treaties, the Open Skies Treaty constitutes a valuable instrument for military-to-military engagement, and has special relevance for Russia-West relations.

> **"In the European Arctic, which currently sees the most military activity in the region, the Treaty can also contribute to greater predictability and a better understanding of the military individual Arctic states."**

In the European Arctic, which currently sees the most military activity in the region, the Treaty can also contribute to greater predictability and a better understanding of the military intentions of individual Arctic states. More specifically, Open Skies assets can be effective in monitoring the construction of new Arctic military bases, including airfields, naval facilities, radar and testing sites, or missile storage facilities. In addition to known sites of military interest, Open Skies aircraft could also monitor the overall infrastructure development of the Arctic – including the construction of industrial facilities, deep-water ports, and border and coast guard stations – which is progressing at an accelerating speed in anticipation of increased commercial shipping through the NSR.

Aerial observation and the polar satellite gap

Although Open Skies and satellite imagery are often pitted against each other,[22] they are, in practice, complementary. Open Skies platforms offer several advantages. They are more flexible than orbit satellite installations, which have longer response times and are harder to manoeuvre to areas of interest. Aircraft can fly below cloud formations when and where needed. The full sensor set ensures all-weather, day-and-night observation capability, as well as broad-area and same-day coverage.[23] Its ability to operate at oblique angles and low altitudes, coupled with tailored sensor options and imaging strategies, can provide a more enhanced imaging quality.[24] A Canadian Open Skies mission report from January 2016 clearly emphasizes this point, stating that "although sensor resolution is limited to 30 centimetres […] the aircraft fly at low altitudes and are capable of collecting images unavailable through other means."[25] In contrast to commercial sources, which can be digitally manipulated, Open Skies prevents photo tampering. There is a verifiable chain of custody of images, which provides assurance of their accuracy.[26] Moreover, since Open Skies assets can make a number of passes over the same target from different angles, they allow the 'synoptic

layering' of various imagery samples that together create a highly detailed product.

Another advantage is that **the Treaty levels the intelligence playing field by making the data collected on overflights available to all state parties.**[27] While the U.S. has its own space surveillance network (to which Canada contributes) and is able to monitor the Arctic, **not all Arctic states possess overhead reconnaissance platforms or the ability to operate them.** The Russian constellation of imagery satellites, for example, is far more limited in comparison to the U.S. – hence the relative importance placed upon Open Skies capability, as reflected in Russia's investment in the Tu-214ON and new digital systems.

Lastly, most commercial earth observation satellites do not focus on the polar regions as their primary area of interest. Another issue pertains to the imminent gap in polar satellite altimetry capabilities for measuring ice-sheet and sea-ice thickness change.[28] Of the seven satellite altimeters in orbit today, only two reach polar latitudes. Both will likely reach their end of life before replacements are available, which will reduce our capacity to assess and improve climate model projections for two to five years.[29] Airborne systems – such as ice-resistant drones or Open Skies assets equipped with the necessary lasers – or under-ice hyper-spectral imaging systems could mitigate this gap and serve as a bridging capability.

Environmental monitoring and assessment

As illustrated above, aerial observation and measurements can provide benefits that go beyond arms control verification and military-to-military trust and confidence-building. The Open Skies Treaty can also play a role in environmental monitoring and assessment in the Arctic. The region has been warming twice as fast as the rest of the planet. Melting ice sheets affect sea level rise, ocean circulation, and weather patterns. Last year alone, we witnessed unprecedented heatwaves and wildfires across Siberia, a powerful ice storm in Russia's Far East (which left over 100,000 residents without water, electricity, or heat), and a disastrous oil spill near the industrial city of Norilsk, believed to have been linked to permafrost thaw.[30]

In principle, Open Skies assets can be effective in monitoring ice melt and water supply, wildfires and deforestation, severe weather events (such as cyclones and hurricanes), heavy precipitation and flooding (both coastal and interior), and environmental contamination, such as oil spills, industrial emissions, and nuclear accidents.[31] Airborne sensors can also monitor evidence of human displacement linked to natural disasters and the impacts of climate change. Open Skies data can then support disaster relief, search and rescue, border security, or oil spill extent mapping. For example, Open Skies imagery was used in support of disaster relief in the aftermath of Hurricane Katrina (2005) and the Haiti earthquake (2010), as well as to

map the extent of an oil spill in the Gulf of Mexico in 2010.[32] The U.S. government also considered deploying Open Skies assets as part of its Continental Air Reconnaissance for Damage Assessment (CARDA) missions. In the future, Open Skies aircraft and sensors could be used to support international environmental agreements, which require satellite or airborne monitoring and verification.[33]

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Currently, Open Skies operations remain within the purview of Ministries of Defence, while Open Skies diplomacy falls under the responsibility of Ministries of Foreign Affairs. Although other government departments, like Ministries of Environment or Departments of Fisheries and Oceans, are generally aware of Open Skies mission activity, the environmental monitoring aspect of the Treaty is not well known. "The use of Open Skies to cooperatively monitor the health of the environment," as Peter Jones argues, "would be a sea-change in the way people have conceived of these flights to this point and could bring entirely new groups of users into the Open Skies process."[34] In fact, nothing in the Treaty precludes other state agencies from submitting their input or a request to Ministries of Defence to include a particular object or area of interest in mission profiles.

Challenges

Aircraft and airfield constraints

The availability of aircraft and suitable aerodromes is among the most significant constraints on conducting Open Skies overflights in the Arctic.[35] **Arctic territories are vast and sparsely populated, and the number of (refuelling) airfields is limited.** Some of the airfields are further constrained in terms of runway lengths and the servicing that is available at a given site. Flying over remote Arctic areas thus carries additional risks of the aircraft becoming stranded.[36]

In some cases, state parties also need to travel enormous distances from the points of entry to designated regional airfields, which increases both the time necessary to conduct missions and their costs. The Treaty governs the maximum flight distances (MFDs) and durations of observation flights allowed from a designated Open Skies airfield, which, in turn, affect the possibility of conducting Arctic overflights.[37] For instance, in the case of Russia and Canada, the MFDs vary between 5,000 and 7,200 km,[38] whereas for Norway, Sweden, and Finland, they are below 2,000 km. The

exception is Denmark, with a limit of less than 1,000 km for the mainland and more than 5,000 km for flights over Greenland. For the Open Skies regime to be effective and worthwhile in the Arctic, and for the overflights to be able to monitor larger parts of the Arctic region, treaty members will need to make more airfields available for refuelling and consider extending the allowed flight distances.

As regards the availability of Open Skies aircraft, only Russia and Canada operate long-range aircraft capable of flying up to 5,000 km and more.[39] Canada relies on the airframe of the Lockheed C-130 Hercules. Russia uses the An-30 aircraft for flights in Europe and conducts its long-range overflights with either the Tu-154M or, from 2019, the Tu-214OS aircraft. In addition, Sweden operates the Saab 340 with a flight range of up to 2,500 km, which is frequently leased to other state parties, including Norway, Denmark, and Finland. This practice points to a possible area of future cooperation. The new German Airbus A319, which has a range of over 6,000 km and is expected to become available in 2022, could also be used for Open Skies missions in the Arctic. The pooling of resources, for example by acquiring a common Open Skies platform (even one specifically attuned to the Arctic conditions), would reduce costs and enable all Arctic states to participate more fully in aerial observation.

Sensor limitations

The Open Skies Treaty currently allows four different sensors: panchromatic (black-and-white) optical panoramic and framing cameras with a ground resolution of 30 cm; video cameras with a ground resolution of 30 cm; infrared line scanning devices with a ground resolution of 50 cm; and (active) synthetic aperture radars (SAR) with a ground resolution of 300 cm.[40] In practice, however, only optical and video cameras are in use, since the remaining sensor types have not yet been certified by member states.[41] **While there exist sensor satellites that exceed Open Skies imagery resolution specifications, 30 cm/pixel nevertheless constitutes a significant capability.** This resolution makes it possible to recognize and collect basic information on major military equipment – that is, to distinguish a tank from a truck – as well as to monitor civilian and military infrastructure, such as roads, airports, railway lines, and industrial plants. It is, however, insufficient to provide detailed technical intelligence or details about items such as electronic equipment.[42]

Over the last decade, member states have started to introduce digital cameras. After a lengthy certification process, Russia was the first party to introduce a digital monochromatic RGB camera. The new German Open Skies aircraft mentioned above will also be equipped with digital cameras. Given the end of production lines for wet film cameras, the remaining member states operating Open Skies aircraft will likely follow suit.

Although near-infrared sensors can already measure vegetation indices, using the Open Skies regime for environmental monitoring will necessitate the introduction of entirely new, non-imaging sensor types, which could, for example, detect atmospheric pollution or radioactivity. While these capabilities might become essential in the Arctic for environmental protection, the monitoring of compliance with international environmental agreements, and in case of emergencies, the procedures for their introduction and the political ramifications are still unclear.[43]

"Using the Open Skies regime for environmental monitoring will necessitate the introduction of entirely new, non-imaging sensor types, which could, for example, detect atmospheric pollution or radioactivity."

Sovereignty of contested spaces

Another issue pertains to the observation of sensitive areas and contested spaces.[44] Even though the Arctic features various disputed maritime claims, the most contentious legal debates surround the statuses of the Northwest Passage (NWP) across the Canadian Arctic Archipelago and the Northeast Passage – also known as the NSR – along Siberia's northern coast (see Figure 2). Canada and Russia claim these as internal waters, which the U.S. disputes. The Open Skies regime only applies to the land, islands, and internal and territorial waters, over which a State Party exercises sovereignty.[45] Even though the Exclusive Economic Zones (EEZs) and international waters of the Arctic Ocean are not explicitly included in the Treaty provisions, such overflights are allowed under international law.

Overflights of the NWP and the NSR, which have both been subject to increased traffic and activity in recent years, would be of relevance to State Parties to the Treaty on Open Skies, particularly those who are members to the Arctic Council and whose economic and shipping interests are at stake. While technically possible, such overflights have not previously taken place for political and diplomatic reasons. **Getting Russian permission to overfly the disputed waters of the NSR would recognize Russian sovereignty over the territory.** The same holds true for Open Skies overflights of the NWP.

To overcome this challenge, a specialized regime might be required. One possible solution would be to reach an agreement in the OSCC that flights over such "contested spaces" would be undertaken under the aegis of the Conflict Prevention Centre of the Organization for Security and Co-operation in Europe (OSCE), using the aircraft of an agreed "neutral" third party.[46] The key would be explicit impartiality and

an agreement that these flights would not constitute a recognition of any one side's sovereignty over the contested area.[47]

Figure 2: Illustration of the Northwest and Northeast Passages in the Arctic.

Source: Authors' illustration, map adapted from Wikimedia Commons: Arctic Ocean Location.

Conclusion

Increasing military activity in the Arctic continues to elevate the risk of a misunderstanding and unintended escalation. In the absence of a proper institutional mechanism through which Arctic states could address their military security concerns, measures of transparency and openness can calm emerging tensions, prevent dangerous misperceptions, and, ultimately, avoid the emergence of a security dilemma. **With increased transparency, Arctic states can replace unwarranted fears and worst-case assumptions with facts that are collected collaboratively.**

In this regard, the Treaty on Open Skies holds much potential to build confidence and trust in the region. It covers most of the Arctic region and – prior to the U.S. withdrawal from the agreement – comprised all Arctic states. The Treaty not only contributes to greater military transparency, predictability, and a better understanding of the military intentions of individual Arctic states, but it also has the potential to play an important role in the monitoring and protection of the Arctic environment.

Despite the Treaty's clear added value for cooperative security in the Arctic, flight practice over the region has been rather limited to date, at least in comparison to other regions. First, the lack of publicly available data impedes the exact evaluation of the Open Skies flight practice over the Arctic. Second, the Open Skies regime currently faces several constraints on conducting Arctic overflights that need to be addressed. These include the availability of airfields and aircraft capable of Arctic overflights, limitations on overflight distances and approved sensors, and the inability to overfly the disputed waters of the NSR and the NWP without recognizing either side's sovereignty over these contested areas. For the Open Skies regime to be effective and worthwhile in the Arctic, and for overflights to be able to monitor larger parts of the region, Treaty members would need to agree to expand the use of the OST, including in the area of environmental monitoring and air sampling. This would also require the adjustment of flight and distance rules to encourage more Arctic overflights.[48]

Although the U.S. withdrawal poses a fundamental challenge to the future of the Open Skies regime, it also presents an opportunity. The Treaty framework has changed very little since it was signed in 1992, despite more than 180 technical decisions having been taken by the OSCC.[49] **The current political standoff can be used by members to rethink, modify, and update the Treaty or even to establish a new framework for the Arctic and other world regions.** This would not only provide additional incentives for other states to join the Treaty and, more generally, to participate in cooperative aerial monitoring efforts, but could also make the Treaty more adept at addressing current security challenges, including those that are emerging in the Arctic. In doing so, **the Open Skies Treaty would help to integrate the Arctic more thoroughly into the existing framework of European regional security.**

Endnotes

1 See, for example, Kristian Åtland, "Interstate Relations in the Arctic: An Emerging Security Dilemma?" Comparative Strategy 33:2, April 2014.

2 'Report on Arctic Policy' (Washington, DC: International Security Advisory Board (ISAB), 21 September 2016), https://2009-2017.state.gov/documents/organization/262585.pdf.

3 The CFE Treaty combines disarmament with comprehensive information exchange and an intrusive on-site inspections regime.

4 The Vienna Document is a politically binding agreement that concerns the exchange and verification of military information, including the locations and composition of deployed forces, defence budgets, notification of exercises, and observation of certain military activities. The VD has been revised four times – most recently in 2011.

5 Treaty on Open Skies, Art. II, https://www.osce.org/files/f/documents/1/5/14127.pdf.

6 On 11 May 2021, President Putin submitted the withdrawal bill to the State Duma which the latter approved on 19 May 2021. The upper house of the Russian parliament, the Federation Council, is expected to vote on the bill on 2 June 2021.

7 See, for example, Trevor Lloyd, "Open Skies in the Arctic?" International Journal 14:1, 1959, pp. 42-49.

8 Ibid.

9 Jane Boulden, "Open Skies: The 1955 Proposal and its Current Revival," Dalhousie Law Journal 13:2, 1990, p. 630.

10 George H.W. Bush, Commencement Address at Texas A&M University, 12 May 1989, https://millercenter.org/the-presidency/presidential-speeches/may-12-1989-commencement-address-texas-am-university.

11 George H.W. Bush, Public Papers of the Presidents of the United States: 1992-1993, p. 1346. For background on the negotiation of the Treaty see: P. Jones, Open Skies: Confidence-building, Transparency and the End of the Cold War (Palo Alto: Stanford University Press, 2014); J. Tucker, "Negotiating Open Skies: A Diplomatic History," in M. Krepon and A. Smithson (eds.), Open Skies, Arms Control and Cooperative Security (New York: St. Martin's Press, 1992); and P. Dunay, M. Krasznai, H. Spitzer, R. Wiemker, and W. Wynne, Open Skies: A Cooperative Approach to Military Transparency and Confidence Building (Geneva: UNIDIR, 2004).

12 For most states without reconnaissance satellites, Open Skies overflights provide otherwise unavailable data. Even the US and Russia consider the information collected during overflights to be a valuable supplement to their national technical means of verification.

13 Alexander Graef and Moritz Kütt, "Visualizing the Open Skies Treaty," 27 April 2020, https://openskies.flights/.

14 The data were provided in response to a request by Steffan Watkins under the Access to Information and Privacy Act in 2020. They cover Open Skies mission reports and detailed flight data for 9 of the 10 Russian flights over Canada from 2004 to 2014, but for just 28 of the 44 successful Canadian overflights over Russia-Belarus between 2003 and 2016. The reason for this omission is arguably related to the more restrictive handling of data in the case of joint flights, including primarily those with Hungary, Norway, and the US. The released data are available here: https://steffanwatkins.medium.com/declassified-open-skies-treaty-mission-reports-show-over-a-decade-of-diplomacy-and-cooperation-655da50227d6.

15 Interview with David S. Higgins, 18 November 2020.

16 Trude Pettersen, "Russian surveillance flight over Norway," 30 July 2014.

17 From 2002 to 2005, member states were obliged to receive only 75% of their passive quota. Full implementation started in 2006. In 2018, member states conducted no regular flights, because they were unable to agree on the distribution of active flight quotas in October 2017 due to a conflict between Georgia and Russia. Hence, the year 2018 has been excluded from the count.

18 Op. cit. fn. 15.

19 Matthew Melino, Heather A. Conley, and Joseph S. Bermudez Jr., "Tiksi Airbase - Many Russian Announcements, Little Equipment," CSIS Briefs, March 2020, https://www.csis.org/analysis/ice-curtain-tiksi-airbase%E2%80%94many-russian-announcements-little-equipment.

20 Operation Passive Skies 01/04, After Action Report, p. 3, see fn. 15.

21 Interview with David S. Higgins, 18 November 2020.

22 Open Skies Treaty critics point to the availability of (commercial) satellite imagery as an alternative data source, arguing that it is similar to or even exceeds the quality provided by Open Skies sensors.

23 Open Skies RevCon 2010: Potential Non-Treaty Applications for Open Skies Assets.

24 Satellites that belong to US companies – which dominate the market – are subject to US federal law, which prohibits commercial imagery with a resolution better than 25 cm. As such, the permitted 30 cm resolution of Open Skies cameras is similar to the resolution of the best commercially available satellites, which are few. Sources: Warren Ferster, "U.S. Government Eases Restrictions on DigitalGlobe," SpaceNews, 11 June 2014, https://spacenews.com/40874us-government-eases-restrictions-on-digitalglobe/; VERTIC, "A Primer on the Treaty on Open Skies," Fact Sheet 14, October 2019.

25 Strategic Joint Staff, Arms Control Verification, "Verification Mission Report Operation Passive Skies 15-2 Russian Federation Mission in Canada, 18-23 December 2015," p. 2, see fn. 15.

26 See for example Dan Lindley, "Cooperative Airborne Monitoring: Opening the Skies to Promote Peace, Protect the Environment, and Cope with Natural Disasters," Contemporary Security Policy 27:2, August 2006; Andreas Persbo and Larry MacFaul, "Closing the sky would lose all the security advantages of keeping it open," European Leadership Network, 14 November 2019, https://www.europeanleadershipnetwork.org/commentary/closing-the-sky-would-lose-all-the-security-advantages-of-keeping-it-open/.

27 Interview with David S. Higgins, 18 November 2020.

28 Jonathan Amos, "Polar scientists wary of impending satellite gap," BBC News, 28 November 2020, https://www.bbc.com/news/science-environment-55109092.

29 "Polar Altimetry Gap Letter of Concern" quoted in Amos, "Polar scientists wary of impending satellite gap."

30 See for example Marc Lanteigne, "The Other Crisis: Present and Future Environmental Strains in the Arctic," Over the Circle, 28 June 2020, https://overthecircle.com/2020/06/28/the-other-crisis-present-and-future-environmental-strains-in-the-arctic/; Sonia Kopelev, "Russia's Environmental Disasters in 2020," The Moscow Times, 29 December 2020, https://www.themoscowtimes.com/2020/12/29/russias-environmental-disasters-in-2020-a72508.

31 Mike Betts and Don Spence, "Potential Non-Treaty Applications for Open Skies Assets," Open Skies Review Conference, 7-9 June 2010, https://www.osce.org/secretariat/68251.

32 Betts and Spence, "Potential Non-Treaty Applications for Open Skies Assets."

33 Lindley, "Cooperative Airborne Monitoring."

34 See Peter Jones, "Making a Better Open Skies Treaty," CNC Occasional Paper #50, 8 February 2021, https://nonproliferation.org/making-a-better-open-skies-treaty/.

35 Interview with David S. Higgins, 18 November 2020.

36 One only needs to recall the 1991 crash of a C-130 Hercules of the Canadian military, which was on a routine supply run to the Alert airstrip in the Canadian Arctic and whose survivors waited for 30 hours to be rescued, to understand such risks. See Clyde H. Farnsworth, "After a Plane Crash, 30 Deadly Hours in the Arctic," 5 November 1991, The New York Times, https://www.nytimes.com/1991/11/05/world/after-a-plane-crash-30-deadly-hours-in-the-arctic.html.

37 Treaty on Open Skies, Annex A, Section III, https://www.osce.org/files/f/documents/1/5/14127.pdf.

38 The exception is the airfield Khrabrovo in the Kaliningrad oblast with an MFD of 500 km.

39 The US used to rely on the Boeing OC-135B.

40 Treaty on Open Skies, Art. IV, Sensors, https://www.osce.org/files/f/documents/1/5/14127.pdf.

41 There have been debates about security concerns should radars and infrared line scanners be introduced in the future, which may also have contributed to the US withdrawal decision. See Anastasiya Ponamareva and Sergey Ponamarev, "Est' li zhizn' posle smerti? Ili sud'ba dogovora otkrytogo neba posle vykhoda iz nego SShA" [Is there life after death? Or the fate of the Treaty on Open Skies after the US withdrawal], Evropeyskaya bezopasnost': sobytiya, otsenki, prognozy 58:74, September 2020, pp. 2-7.

42 See Hartwig Spitzer and Rafael Wiemker, "Image Analysis and data assessment: What can be learnt from Open Skies image data?" in Pal Dunay et al. (eds.), Open Skies. A Cooperative Approach to Military Transparency and Confidence Building (Geneva: UNIDIR, 2004), pp. 104-106.

43 See Hartwig Spitzer, "Prospects for Extensions of the Multilateral Open Skies Treaty," in Pal Dunay et al. (eds.), Open Skies. A Cooperative Approach to Military Transparency and Confidence Building (Geneva: UNIDIR, 2004), pp. 136-138.

44 See Jones, "Making a Better Open Skies Treaty."

45 Treaty on Open Skies, Art. II, https://www.osce.org/files/f/documents/1/5/14127.pdf.

46 Interview with Peter Jones, Associate Professor in the Graduate School of Public and International Affairs at the University of Ottawa, 26 November 2020.

47 Ibid.

48 Ibid.

49 Treaty on Open Skies: OSCC Decisions, https://2009-2017.state.gov/t/avc/cca/os/c26158.htm

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