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AIR AND SPACE POWER IN THE ARCTIC

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JCSP 47

Service Paper

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PCEMI 47

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CANADIAN FORCES COLLEGE - COLLÈGE DES FORCES CANADIENNES

JCSP 47 - PCEMI 47
2020 - 2021

SERVICE PAPER – ÉTUDE MILITAIRE

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Word Count: 2,760

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AIR AND SPACE POWER IN THE ARCTIC

AIM

1. The Aim of this service paper is to evaluate how the Royal Canadian Air Force (RCAF) can support the Royal Canadian Navy (RCN) in the Canadian Arctic. There will be a consideration of the RCN's missions and responsibilities in the region. There will also be an analysis of the probable threats that the RCN will encounter. This assessment will enable an evaluation of RCAF capabilities that can best support the RCN. This paper will suggest that RCAF space assets, augmented by air power, are capable of supporting numerous types of maritime operations, and aid in providing Intelligence, Surveillance, and Reconnaissance (ISR) data in the Arctic region.

INTRODUCTION

2. Global warming is rapidly changing the environment in Canada's Arctic. The Northwest Passage (NWP) is open for large parts of the year. These open waters create a trade route that didn't exist previously, and could shorten transport distances by thousands of kilometers, potentially saving significant resources.¹ As well, the internal waters in the Canadian Archipelago are part of Canada's Exclusive Economic Zone (EEZ), where Canada is responsible to maintain control and security in the area. With the Canadian Arctic becoming accessible, there is an increased interest in the development of the region. The RCN will be receiving 5-6 Arctic Operations Patrol Ships (AOPS),² with one expecting to enter service in 2021.³ With a new fleet entering the RCN inventory, it is important that the RCAF have an understanding on how it can support the RCN in the Canadian Arctic.

BACKGROUND

3. Before determining which RCAF's capabilities can best support the RCN's maritime mission in the Arctic, there are two questions that should be answered. Namely what is the RCN's mission in the Arctic? Also, what is the threat in the Arctic area? With an understanding of these two questions, it will be much easier to understand how the RCAF can support the RCN in the Arctic.

4. Canada's Defence Policy offers insight on how the RCN will be expected to employ its AOPS. The policy highlights that the AOPS will, "provide armed, sea-borne surveillance of Canadian waters, including in the Arctic."⁴ As well, the RCN, "will

¹ P. Whitney Lackenbauer, Adam Lajeunesse, James Manicom et al, China's Arctic ambitions and what they mean for Canada, Beyond Boundaries: Canadian Defence and Strategic Studies Series. Iss. 8. University of Calgary Press. Calgary. 2018. 74.

² *Strong Secure Engaged: Canada's Defence Policy*. Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence, 2017.35.

³ [Navy News | First Arctic and Offshore Patrol Ship delivered \(forces.gc.ca\)](https://forces.gc.ca/en/navy-news/navy-news-1st-arctic-and-offshore-patrol-ship-delivered)

⁴ *Strong Secure Engaged: Canada's Defence Policy*. Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence, 2017.35.

enforce sovereignty, cooperating with partners, at home and abroad, and will provide the Government of Canada with awareness of activities in Canada's waters."⁵ The RCN is therefore tasked to provide a sense function in the Arctic region with domain awareness, while maintaining Canada's sovereignty.

5. Before moving on to how the RCN translates Government policy to RCN direction, a holistic review of the threats in the Arctic region would be beneficial (please figure 1.1 below). In reviewing the nations that share the circumpolar region (USA, Canada, Denmark, Iceland, Norway, Sweden, Finland and Russia),⁶ Russia at first glance appears to be the likeliest threat to Canada. It continues to challenge US hegemony globally and, through the use of its bomber fleet, frequently tests North American Aerospace Defense (NORAD) response procedures. In the maritime domain, the Russians have approximately 41 submarines positioned in the North, and 35 surface ships.⁷

Figure 1.1



6. However, Russia and Canada share a common interest in the Arctic. Russia believes the Northern Sea Route (NSR) to be internal waters, similar to how Canada views the NWP. The USA argues that the NSR and NWP are not internal waters, but

⁵*Ibid.*

⁶ Arctic Council - The Arctic Council (arctic-council.org)

⁷ Jørgen Staun, *A Two-Faced Russia? Civilian Interests and Great Power Politics in the High North*. Springer Nature. Switzerland. 2020. P 23.

rather international straits.⁸ Therefore Russia's military buildup in the Arctic is not surprising, as it looks to protect the NSR as sovereign territory, and deter aggression from both the United States (US) and NATO.⁹ Russia and Canada have also made similar arguments via the UN regarding the NSR and NWP being internal waters.¹⁰ Russian militarization of their Arctic region is worrisome, and Russia could very well pose a maritime threat to Canada in the future. However, currently Russia does not appear to be a direct threat to Canada in the Arctic.¹¹

7. With the Arctic Ocean potentially ice free in the 2030s,¹² the more likely threat to Canada is through foreign commercial exploitation. Many countries, including China,¹³ have a reputation of illegal fishing, which could become a problem in the Canadian Arctic or just outside Canada's EEZ. The RCN is familiar with this type of security challenge, and is capable of responding proactively. In 1995, off the coast of Newfoundland and in support to the department of fisheries and Oceans, the RCN boarded a Spanish trawler suspected of depleting Canada's already vulnerable fishing stocks.¹⁴ Though the RCN's actions caused an international incident,¹⁵ it showcased both the RCN's professionalism and Canada's resolve in responding to this type of disputes. As Canada's has the world's 5th largest Exclusive Economic Zone and the largest coastline,¹⁶ the RCN must be prepared to support law enforcement agencies in response to unregulated resource exploitation, as well as providing domain awareness.

8. The RCN is well aware that the most likely threat in the Arctic will come from foreign actors seeking to exploit Canada's resources. As such, in its forward looking doctrinal document, *Leadmark 2050*, the RCN provides an analysis of expected future operations in the Arctic. This document highlights that, "strategic cooperation is likely to remain in the interests of the members of the Arctic Council for some time to come."¹⁷ It also highlights that the RCN's "constabulary role will continue to increase in importance in the coming decades, as climate change gradually opens the Arctic to commercially viable transit and destination shipping."¹⁸ The RCN's vision for Arctic operations was considered thoroughly in designing the AOPS, which is only equipped with a 25 mm gun.

⁸ Jørgen Staun, *A Two-Faced Russia? Civilian Interests and Great Power Politics in the High North*. Springer Nature. Switzerland. 2020. P 23.

⁹ [Threat of military conflict in the Arctic is 'relatively low,' says top Russian diplomat – Eye on the Arctic \(rcinet.ca\)](#)

¹⁰ Andrey A. Todorov. *The Russia-USA legal dispute over the straits of the Northern Sea Route and similar case of the Northwest Passage*. Northern Arctic Federal University, 2017.

¹¹ Gabriel Hanselbacher. *Canada's Security Challenge and the NWP*. Canadian Forces College. Toronto. 2020. 10.

¹² *Snow, Water, Ice and Permafrost. Summary for Policy-makers*. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. 2017 3.

¹³ [The deadly secret of China's illegal fishing armada: It's killing impoverished North Korean squid fishermen \(nbcnews.com\)](#)

¹⁴ Canada. Department of National Defence. *Canada in a New Maritime World: Leadmark 2050*. Ottawa: Commander, Royal Canadian Navy, 2016. 15.

¹⁵ *Ibid.*

¹⁶ *Ibid.*, 1.

¹⁷ *Ibid.*, 10.

¹⁸ Canada. Department of National Defence. *Canada in a New Maritime World: Leadmark 2050*. Ottawa: Commander, Royal Canadian Navy, 2016. 10.

This gun would be of minimal use in a military on military conflict, and was designed to support its constabulary role.¹⁹ The AOPS is designed as a means to “help build the nation”²⁰ and aid in the “peaceful development of Canada’s High North.”²¹

9. The RCN therefore has a two prong approach to the Arctic. There is a typical military component, where the RCN will continue to “monitor and respond to events, with responsibilities ranging from assuring the safety of mariners and responding to environmental disasters to confronting incursions against Canada’s sovereignty.”²² The second part of the RCN mandate is to help protect and develop the Canadian Arctic responsibly. As such the RCN’s additional mandate,

will include supporting the charting of still largely unknown Arctic waters for the safety of ocean shipping; contributing to ocean science, to improve Canada’s understanding of fragile but changing Arctic ecosystems; supporting our federal partners to manage and protect Canada’s Arctic resources; and supporting the Canadian Coast Guard’s annual resupply of isolated coastal communities.²³

10. With an understanding how the RCN envisions maritime Arctic operations, it is now possible to evaluate how the RCAF can provide support.

DISCUSSION

11. One of the greatest methods that the RCAF can contribute to maritime domain awareness is through the use of its space assets. Space is the ultimate high ground, underlining a key tenet of air power, elevation.²⁴ With the use of space assets, the impermanent²⁵ nature of air power can also be reinforced with the persistent presence of satellite constellations, at extreme elevations. The Radarsat Constellation Mission (RCM) provides such a capability.

12. Launched in June of 2019, the RCM is a three satellite constellation that has numerous capabilities that supports maritime operations.²⁶ Each satellite has a multi-band synthetic aperture radar capable of determining wind speeds in the Arctic Ocean.²⁷ This capability aids real time operations, as well as contributing to ocean science. The RCM also maps ice flows in the Arctic,²⁸ enabling the development of highly accurate charts, thereby supporting the RCN, the Canadian Coast Guard (CCG) and vessels conducting

¹⁹ [RCN_AOPS_FactSheet-8x11-Eng \(forces.gc.ca\)](#)

²⁰ Canada. Department of National Defence. *Canada in a New Maritime World: Leadmark 2050*. Ottawa: Commander, Royal Canadian Navy, 2016. 14.

²¹ *Ibid.*

²² Canada. Department of National Defence. *Canada in a New Maritime World: Leadmark 2050*. Ottawa: Commander, Royal Canadian Navy, 2016. 14.

²³ *Ibid.*

²⁴ [*B-GA-400-000/FP-001, Royal Canadian Air Force Doctrine \(forces.gc.ca\)](#) (3-2)

²⁵ *Ibid.*

²⁶ [Frequently asked questions - RADARSAT Constellation Mission \(RCM\) - Canada.ca \(asc-csa.gc.ca\)](#)

²⁷ [Using satellites to protect and navigate Canada's waters - Canada.ca \(asc-csa.gc.ca\)](#)

²⁸ [RADARSAT data to serve Canadians - Canada.ca \(asc-csa.gc.ca\)](#)

destination shipping in the Arctic. These RCM capabilities contribute to the RCN's mandate of aiding in the development of the Arctic.

13. The RCM is also equipped with an Automatic Identification System (AIS).²⁹ This system is a transponder that sends positional and sailing plan information. AIS transponders are mandatory for all passenger vessels, and all shipping vessels greater than 300 tonnes.³⁰ The AIS, paired with the synthetic aperture radar on the RCM, provides a maritime surveillance capability, similar to how the North Warning System (NWS) uses primary and secondary radar to detect aircraft for NORAD. This implies that with the RCM, there is a capability to determine if there are ships in the Canadian EEZ that are not in the location that their AIS is reporting them to be. The RCM can also determine if vessels are contravening their sailing plan, which is similar to a flight plan, and is required to be submitted prior to entering Canadian waters.³¹ Finally, RCM can detect ships that are not "squawking" or have their AIS turned off, and acting as "dark ships."³² The RCM provides the RCN with actionable intelligence, and augments the situational awareness of the maritime domain. This type of data will be key in limiting foreign commercial exploitation of Canada's resources.

14. The RCM does come with limitations. The update rate or revisit time of a selected area is slow in comparison to other radars. It provides an update of the Arctic region approximately four times per day, in an ideal scenario.³³ Therefore once the RCM receives the AIS and Radar data, it takes approximately 30 minutes to download the information through the ground control station.³⁴ However, to get an update of this specific location will take, at a minimum, 6 hours. To extrapolate the location of where a vessel of interest (VOI) will be in six hours, is difficult to predict, as there are many directions and actions the VOI could take. As well with the AOPS only moving at approximately 17kts in ideal open water conditions,³⁵ any VOI intercept will likely require higher fidelity cueing. Fortunately, the RCAF is well poised to provide additional ISR data for the RCN.

15. Two key characteristics of air power, reach and speed,³⁶ complements the latent update rate of the RCM, and the relative slow speed of the AOPS. When the AOPS is equipped with a cyclone maritime helicopter, the use of RCM positional data on vessels can provide a cueing mechanism, allowing a cyclone to launch and locate the VOI. The cyclone has a range of 400 nautical miles (740 Km) and a speed of 155kts (287 Km/hr),³⁷ which allows it to quickly locate and track the movement of any VOI in range. As well, with its optical sensors, the cyclone can provide additional information on the VOI, which it can forward to other law enforcement agencies like the RCMP and the CCG,

²⁹Using satellites to protect and navigate Canada's waters - Canada.ca (asc-csa.gc.ca)

³⁰ AIS transponders (imo.org)

³¹ NORDREG now Mandatory Within the Northwest Passage - Transport - Canada (mondaq.com)

³² RADARSAT data to serve Canadians - Canada.ca (asc-csa.gc.ca)

³³ Frequently asked questions - RADARSAT Constellation Mission (RCM) - Canada.ca (asc-csa.gc.ca)

³⁴ *Ibid.*

³⁵ Arctic/Offshore Patrol Ships - Canada.ca

³⁶ *B-GA-400-000/FP-001, Royal Canadian Air Force Doctrine (forces.gc.ca) (3-2)

³⁷ CH-148 Cyclone | Aircraft | Royal Canadian Air Force (forces.gc.ca)

showcasing a WOG approach to providing security in the Arctic. However, in the event that either the AOPS didn't sail with the cyclone, or the VOI is out of range of the cyclone, a CP140 Aurora can be employed to great effect.

16. The CP140 has a range of 4100Nm (7400Km) and a speed of 417 kts (750 Km/hr).³⁸ It has enough range to be able to launch from its home base to conduct a maritime intercept in the Arctic. The CP140 is familiar with conducting Arctic operations in this manner, and did so in August 2020 during Op Nanook,³⁹ where a CP140 flew out of 14 Wing. A CP140 can also be moved further north, which would allow it greater loiter time in the Arctic where it could further amplify information on a VOI. The CP140 can provide high fidelity full motion video of the VOI. This information, paired with RCM and cyclone ISR data can allow the RCN, the CCG and the RCMP to place themselves in the path of a VOI, facilitating an intercept. ISR data that space and air platforms provide will aid in legal prosecution, if required. The RCAF is capable of directly supporting the RCN's security mandate in the Arctic region.

17. A key limitation to using air platforms in the arctic, however, is the lack of Beyond Line Of Sight (BLOS) satellite communications (SATCOM). Currently, Canada does not have a dedicated Satellite Communication (SATCOM) system in the Arctic. This has been a recognized issue for decades and is a key problem for NORAD Arctic operations. It is also a problem for air assets working with the RCN, as it creates a necessary tether of the aircraft to the fleet, as operating in the Arctic is fraught with safety concerns. This is unfortunate as the CP140 is fitted with a robust SATCOM system, which can be leveraged to provide multiple types of data.⁴⁰ However, the footprint of SATCOM constellations does not cover the Canadian Arctic area. Therefore, a CP140 has better communications connectivity over Libya or Afghanistan, than it does over Canada's Arctic. Canada's defence policy recognizes there is a need for SATCOM in the Arctic.⁴¹ The Enhanced Satellite Communications Project – Polar (ESCP-P) will hopefully resolve the lack of BLOS communications in the Arctic, and is slated to be operational by 2029.⁴² With this capability, the RCAF will be able to further support the RCN's mandate in the maritime arctic domain.

CONCLUSION

18. The Canadian Arctic is immense and requires a WOG approach to ensure security and to enable development. When considering key characteristics that air and space

³⁸ [CP-140 Aurora | Aircraft | Royal Canadian Air Force \(forces.gc.ca\)](#)

³⁹ [News Article | Op Nanook: Working with our Arctic Partners \(forces.gc.ca\)](#)

⁴⁰ G A Watson, *Evolving Joint Operations: Fusion Of The Cp140m Aurora Capabilities With Human Intelligence And Influence Activities*. Canadian Forces College. 2015. 49.

⁴¹ *Strong Secure Engaged: Canada's Defence Policy*. Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence, 2017.35

⁴² Kevin Whale. Director General Space. RCAF Defence Space Program power point, May 2018. Slide 35.

power can provide, such as elevation, reach and speed, the RCAF can significantly contribute to maritime domain and support the RCN's Arctic mission. The use of RCM paired with RCAF air platforms can provide an overview of the Arctic region (via the RCM) with near real time ISR (through the use of the cyclone and CP140), directly supporting both the development and the security of the Canadian Arctic. As well, with a continued growth of Space power, the RCAF will be well placed to continue to support the maritime domain in the future. A key space acquisition which could further support the RCN, is the procurement of an Arctic SATCOM constellation. Arctic SATCOM would enable BLOS operations, allowing the RCAF to maximize the reach characteristic of air power.

RECOMMENDATION

19. Recommend that Canada pursue, with vigour, the procurement of a SATCOM constellation that covers the Arctic region.

BIBLIOGRAPHY

[AIS transponders \(imo.org\)](http://imo.org)

[Arctic Council - The Arctic Council \(arctic-council.org\)](http://arctic-council.org)

[B-GA-400-000/FP-001, Royal Canadian Air Force Doctrine \(forces.gc.ca\)](http://forces.gc.ca)

Burleson, Dusty. *Arctic Situational Awareness: A Multidomain Perspective*. Canadian Forces College. Toronto. 2018.

Canada. Department of National Defence. *Canada in a New Maritime World: Leadmark 2050*. Ottawa: Commander, Royal Canadian Navy, 2016.

Chown, David. *Per Ardua Ad Arcticum? Evaluating Royal Canadian Air Force Support To Arctic Sovereignty*. Canadian Forces College. Toronto. 2018.

Evequoz, Lydia. *Arctic Operations: Facilitating Mobility Through Airfield Development*. Canadian Forces College. Toronto. 2018.

[Frequently asked questions - RADARSAT Constellation Mission \(RCM\) - Canada.ca \(asc-csa.gc.ca\)](http://asc-csa.gc.ca)

Hanselbacher, Gabriel. *Canada's Security Challenge and the NWP*. Canadian Forces College. Toronto. 2020.

Lackenbauer, P. Whitney, Adam Lajeunesse, James Manicom et al, *China's Arctic ambitions and what they mean for Canada, Beyond Boundaries*. Canadian Defence and Strategic Studies Series. Iss. 8. University of Calgary Press. Calgary. 2018.

[Navy News | First Arctic and Offshore Patrol Ship delivered \(forces.gc.ca\)](http://forces.gc.ca)

[RCN_AOPS_FactSheet-8x11-Eng \(forces.gc.ca\)](http://forces.gc.ca)

Staun, Jørgen. *A Two-Faced Russia? Civilian Interests and Great Power Politics in the High North*. Springer Nature. Switzerland. 2020.

Strong Secure Engaged: Canada's Defence Policy. Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence, 2017.

Snow, Water, Ice and Permafrost. Summary for Policy-makers. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. 2017.

Todorov, Andrey A. *The Russia-USA legal dispute over the straits of the Northern Sea Route and similar case of the Northwest Passage*. Northern Arctic Federal University, 2017.

The deadly secret of China's illegal fishing armada: It's killing impoverished North Korean squid fishermen (nbcnews.com)

Threat of military conflict in the Arctic is 'relatively low,' says top Russian diplomat – Eye on the Arctic (rcinet.ca)

Using satellites to protect and navigate Canada's waters - Canada.ca (asc-csa.gc.ca)

Watson, G A. *Evolving Joint Operations: Fusion Of The Cp140m Aurora Capabilities With Human Intelligence And Influence Activities*. Canadian Forces College. 2015. 49.

Whale, Kevin. Director General Space. RCAF Defence Space Program power point, May 2018.