



FROM ICE TO OCEAN: CANADA'S STRATEGY FOR PAN-DOMAIN SUPERIORITY

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JCSP 50

Service Paper

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CANADIAN FORCES COLLEGE - COLLÈGE DES FORCES CANADIENNES

JCSP 50 - PCEMI n° 50
2023 - 2024

Service Paper – Étude militaire

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AIM

1. The aim of this paper is to advocate for the development of a comprehensive series of operations, designed to enhance the Canadian Armed Forces' (CAF) pan-domain warfighting capabilities and strategies through confronting challenging problems throughout our Arctic environment, representative of future Indo-Pacific conflicts. By delving into the shifting dynamics of modern warfare, characterized by adversaries' innovative strategies that challenge traditional military doctrines and operational spaces to include rapid environmental change, this paper will outline a targeted strategy, best operationalized by the Canadian North American Aerospace Defense Command (NORAD) Region (CANR).

2. CANR exists at the unique intersection of homeland defence, allied and partner interoperability, mission set complexity, proven credibility, and environmental dynamism, and as such, would best serve as the steward and enabler for this new strategy. With a goal of bolstering the CAF's and Canada's adaptability, survivability, and operational superiority in the face of multifaceted future conflicts, this proposal will articulate a path forward that not only ensures readiness but also secures a strategic advantage in the increasingly complex global security environment.

INTRODUCTION

3. Canada has traditionally benefitted from the inherent security provided by the protective geography of the nation, keeping the enemy at standoff distances. Recent trends have demonstrated, however, that "threats, such as global terrorism and those in the cyber domain, transcend national borders. These trends undermine the traditional security once provided by Canada's geography."¹ It is now more important than ever for the CAF to demonstrate a credible strategy for working across all domains, in any environment. This is more than just a lofty concept; it is an imperative to innovate faster than our adversaries, to credibly defend our homeland, as well as interests abroad, regardless of the operating environment. Further, climate change continues to demonstrate consequences that have yet to be understood, let alone mitigated. The CAF's operating environment has become quite complex, and must be well-estimated in order to achieve operational superiority. Canada's most recent defence policy, Strong, Secure, Engaged, stated that in order to succeed in a complex security environment, the CAF must "develop sophisticated awareness of its operating environment to better predict and respond to crises."²

4. The recently released Pan-Domain Force Employment Concept (PFEC) recognized that "the CAF is currently configured to counter overt military actions in the traditional domains of land, sea, and air by recognizable force elements of an adversary's armed forces."³ PFEC recognizes that our adversaries have proved quite capable in integrating their various tools of national power, and employing them in manners that are both relevant and damaging. The CAF's

¹ Canada. Department of National Defence, 'Strong, Secure, Engaged' (Department of National Defence, 2017), 14.

² Ibid, 14

³ Canada. Department of National Defence, 'Pan-Domain Force Employment Concept.' (2023), 9.

ability to counter, and prevail, depends on Canada's ability to think across all domains, through a holistic appreciation of the operating environment, synchronizing the employment of all levers of power.

DISCUSSION

THE ARCTIC AND INDO-PACIFIC

5. Canada's Arctic is home to many daunting environmental factors. A vast expanse of territory with little infrastructure; a wide variety of cultures with heterogeneous bases of population; an emerging Northwest Passage through which maritime activity will increase; large reserves of natural resources ripe with potential for future development; a quickly changing physical environment, prone to increasing patterns of natural disasters.⁴ Canada's Arctic, in totality, should be seen as a vastly complicated operating environment wherein traditional security paradigms require reimagining with a focus on a theatre-specific solution.

6. The Indo-Pacific region, characterized by its dynamic geopolitical landscape, expanding economic potential, and critical maritime trade routes, holds paramount significance for Canada, not only in fostering economic growth through enhanced trade relations but also in reinforcing global security architectures and asserting Canada's commitment to the rules-based international order amid escalating regional tensions and strategic rivalries. The Indo-Pacific region has been identified as a key priority area for Canada's future, "encompassing over 40 economies, over four billion people and \$47.19 trillion in economic activity."⁵ Additionally, "every issue that matters to Canadians—including our national security, economic prosperity, respect for international law, democratic values, protecting our environment—will be shaped by the relationships Canada has with Indo-Pacific countries."⁶

7. Canada's Arctic and the Indo-Pacific regions, despite their distinct geographical and climatic differences, present analogous strategic challenges that underscore their importance as similar operating environments for modern militaries. Both regions are characterized by vast expanses that are crucial for global security and economic prosperity, yet they are also arenas of complex geopolitical tensions and environmental changes. The Arctic requires a reevaluation of traditional security standards, focusing on theatre-specific solutions that can address the unique blend of environmental, cultural, and strategic factors at play. Similarly, the Indo-Pacific's dynamic geopolitical landscape, marked by critical maritime routes, burgeoning economic potential, and a complex web of regional tensions, demands a multifaceted approach that can navigate the intricacies of power dynamics, economic interests, and the enforcement of international norms. Both regions require a military readiness that is not only adaptable to rapidly changing conditions but also attuned to the nuances of international law, environmental stewardship, and the maintenance of global peace and stability.

⁴ Emmaline Hill, Marc LaNore, and Simon Véronneau, 'Northern Sea Route: An Overview of Transportation Risks, Safety, and Security', *Journal of Transportation Security* 8, no. 3–4 (2015): 69–70, <https://doi.org/10.1007/s12198-015-0158-6>.

⁵ Global Affairs Canada, 'Canada's Indo-Pacific Strategy.', 1.

⁶ *Ibid*, 1.

NOBLE DEFENDER

8. The NORAD *Noble Defender* series is a recurring air defence operation that integrates and demonstrates the bi-national command's readiness across key domains, and ability to conduct follow-on operations.⁷ The *Noble Defender* operations serve as viable demonstrations of NORAD's commitment to campaigning across its area of operation. CANR has been a key leader of the *Noble Defender* series, sponsoring a number of operations across Canada's territory, including into the high Arctic. CANR's *Noble Defender* operations have helped inform ongoing decisions on expanding northern infrastructure.

9. As this operational series is mature, and seen to be credible by our allies, partners, and adversaries (confirmed via classified means not suitable for this paper), *Noble Defender* should serve as the basis for episodic branches and sequels focused on a number of new endeavors. These could include: cyber, electronic warfare and space effects (denied communications, spoofed command and control, degraded navigation and timing), long-range reconnaissance integration with the Canadian rangers, disaster response scenarios (mass casualty events in the Northwest Passage, climate change, fresh water emergencies, mass migration) in concert with Territorial and neighboring authorities, as well as counter-sabotage and special warfare protection of key infrastructure (Canadian Forces Station Alert, northern radars, airports, logistics depots). Admittedly, CANR's mission set is bounded as providing "aerospace surveillance, identification, control and warning for the defence of Canada and North America."⁸ Regardless, CANR has a proven success in conceiving innovative *Noble Defender* operations centered on operational excellence; it is this existing trust and credibility that should be harnessed with parallel or serialized operations, under the existing best practices of *Noble Defender* to include robust command and control, detailed operational planning, and learning and reporting mechanism to further emerging capability development.

10. *Noble Defender* operations of the past few years have already helped to inform United States (US) Air Force Agile Combat Employment practices.⁹ Additionally, such operations have helped US Transportation Command with developing options for sustaining operations in austere environments.¹⁰ In both cases, the US commands explicitly developed their adaptive strategies in the domestic theatre with hopes of informing their eventual Indo-Pacific strategies. Leveraging the intricate operational insights that could be gained from expanded CANR-sponsored *Noble Defender* operations would serve the dual purpose of strengthening our capabilities at home

⁷ John Ingle, 'US, Canadian Forces Sharpen Abilities in Austere Alaskan Region', *NORAD Public Affairs*, accessed 26 January 2024, <https://www.af.mil/News/Article-Display/Article/3531507/us-canadian-forces-sharpen-abilities-in-austere-alaskan-region/>.

⁸ NORAD, 'Canadian NORAD Region Factsheet', 2 August 2023, <https://www.norad.mil/Newsroom/Fact-Sheets/Article-View/Article/578776/canadian-norad-region/>.

⁹ NORAD, 'NORAD to Conduct Arctic Air Defence Operation Noble Defender', 6 Sep 22, <https://www.norad.mil/Newsroom/Press-Releases/Article/3149548/norad-to-conduct-arctic-air-defence-operation-noble-defender/>.

¹⁰ US Air Force, 'US Air Force Doctrine Note 1-21: Agile Combat Employment' (23 August 2022), https://www.doctrine.af.mil/Portals/61/documents/AFDN_1-21/AFDN%201-21%20ACE.pdf.

while simultaneously informing our capacities for future pan-domain operations in the Indo-Pacific theatre.

THE WAY FORWARD

11. The Arctic and Indo-Pacific theatres both require multilateral collaboration, with inherent geopolitical and environmental complexities. Additionally, both are underpinned by themes of environmental stewardship, sustainable development, and disaster resiliency. At the operational and tactical levels, there are a number of similarities. Both environments require technological ingenuity, to include remote sensing, space-based surveillance, as well as highly localized expert knowledge.¹¹ Situational awareness challenges across Canada's vast expanses of ice are very similar to the notion of maritime domain awareness across the Pacific Ocean. The Arctic is the perfect proving ground for the CAF, through CANR-sponsored operations, to develop and demonstrate the lessons needed in order to succeed in the strategic paradigm shift toward the Indo-Pacific. Lessons learned through Arctic proficiency will ensure Canada's credibility in an already crowded Indo-Pacific theatre.

12. The integration of cutting-edge technologies such as satellite communications, unmanned systems, and artificial intelligence (AI) presents a fundamental shift in military operations. In the Arctic and Indo-Pacific, these technologies offer enhanced situational awareness, operational efficiency, and decision-making speed. Satellite communications can mitigate the challenges of remote operations, providing reliable connectivity in environments where traditional communication infrastructures are absent or vulnerable. Unmanned systems, both aerial and maritime, extend the operational ability to sense, shield, and act, allowing for persistent action without risking personnel in contested or hazardous areas. AI and machine learning algorithms can process vast amounts of data for threat assessment, predictive analytics, and logistics optimization, ensuring that the CAF remains agile and responsive.¹² The strategic implementation of these technologies necessitates a holistic approach, incorporating ethical considerations, interoperability standards, and countermeasures against adversarial AI and electronic warfare capabilities.

13. Climate change acts as a threat multiplier, exacerbating existing security vulnerabilities and creating new challenges. In the Arctic, melting ice caps open new maritime routes and access to resources, leading to increased competition and sovereignty disputes. Similarly, in the Indo-Pacific, rising sea levels threaten low-lying areas with inundation, potentially displacing millions and straining resources. These environmental changes demand a reevaluation of traditional security standards, incorporating environmental stewardship into strategic planning. Military strategies must adapt to address the dual challenges of responding to immediate security threats while also contributing to long-term environmental resilience. This involves not only operational adjustments but also active participation in global climate governance to mitigate the root causes of environmental insecurity.

¹¹ J. L. Forand et al., 'Surveillance of Canada's High Arctic', in *OCEANS 2008* (IEEE, 2008), 1–2, <https://doi.org/10.1109/OCEANS.2008.5151951>.

¹² Bhargavi Janga et al., 'A Review of Practical AI for Remote Sensing in Earth Sciences', *Remote Sensing (Basel, Switzerland)* 15, no. 16 (2023): 2, <https://doi.org/10.3390/rs15164112>.

14. The CAF's capabilities can be leveraged for humanitarian assistance and disaster response (HADR) operations in response to natural disasters, which are increasingly frequent due to climate change. In both the Arctic and the Indo-Pacific, military assets and personnel can provide critical support for search and rescue, medical aid, and logistics, strengthening Canada's role as a responsible international actor. Military involvement in HADR not only saves lives but also builds goodwill and strengthens partnerships, enhancing security through cooperation and trust.

15. As warfare extends into the cyber and space domains, Canada's defense strategy must prioritize the protection of critical infrastructure and assets. Cybersecurity measures are essential to safeguard command and control systems, intelligence operations, and public infrastructure from cyber-attacks.¹³ Space-based assets, including satellites for communication, navigation, and surveillance, are integral to modern military operations, offering capabilities that are particularly valuable in the vast and remote regions of the Arctic and the Indo-Pacific. Developing resilience against anti-satellite weapons, space debris, and cyber threats to space systems is crucial for maintaining operational continuity and strategic advantage.

16. The complexity of modern security challenges necessitates a comprehensive approach that transcends traditional military responses. Interagency cooperation within Canada, involving departments such as Global Affairs Canada and Public Safety Canada, ensures a unified approach to national security, combining diplomatic, economic, and informational tools with military capabilities. Internationally, strengthening alliances and partnerships, particularly through forums like NATO and the UN, enhances collective security and burden-sharing. In the Arctic and Indo-Pacific, collaborative security frameworks can address shared challenges such as maritime security, cyber threats, and counter-terrorism, reflecting the interconnected nature of global security.¹⁴

17. CANR routinely interacts with other governmental departments (OGDs), and liaises with provincial and territorial governments as required. It would be of benefit for CANR to have dedicated access to operational planners from Global Affairs Canada, Public Safety Canada, Crown-Indigenous Relations and Northern Affairs Canada, Industry Canada, Canadian Space Agency, as well as Communications Security Establishment Canada in order to inject more robust and realistic challenges into the *Noble Defender* operations, as detailed above. CANR's familiarity with planning and executing complex missions across very long ranges in harsh conditions would serve as a fruitful breeding ground for multidepartment ingenuity, as well as trust and capacity building.

18. As reflected in both PFEC as well as the Indo-Pacific Strategy, success in modern competition or conflict is rooted in multi-dimensional, whole-of-government approaches. Both documents advocate that although the CAF can conduct stand-alone operations, the likelihood of future complex battlespaces is that multi-dimensional approaches will be needed with

¹³ Hussain Ahmad et al., 'A Review on C3I Systems' Security: Vulnerabilities, Attacks, and Countermeasures', *ACM Computing Surveys* 55, no. 9 (2023): 1–3, <https://doi.org/10.1145/3558001>.

¹⁴ P. Whitney Lackenbauer and Alexander Sergunin, 'Canada's and Russia's Security and Defence Strategies in the Arctic: A Comparative Analysis', *Arctic Review on Law and Politics* 13, no. Journal Article (2022): 235–37, <https://doi.org/10.23865/arctic.v13.3243>.

partnerships and collaboration throughout. Of note, the Indo-Pacific Strategy states that “Canada will advance its standing as an Arctic power and uphold our Arctic sovereignty and the rules-based international order in our bilateral and multilateral engagement with Indo-Pacific countries.”¹⁵

CONCLUSION

19. In conclusion, this paper has underscored the imperative for the CAF, through CANR, to evolve its warfighting capabilities and strategies, embracing a comprehensive, pan-domain approach that addresses the multifaceted challenges of modern warfare. It is clear that Canada must prioritize adaptability, interoperability, and strategic foresight to maintain and enhance its global security posture. CANR’s pivotal role in spearheading this strategic shift, as evidenced by the *Noble Defender* series represents a forward-thinking approach to defense and security. Integrating cutting-edge technologies, addressing the exacerbating factors of climate change, and fostering multi-dimensional, whole-of-government approaches are essential steps towards ensuring Canada's readiness and superiority in an increasingly complex global security environment. As the CAF positions itself to meet future challenges, the lessons learned and capabilities developed through these initiatives will not only secure Canada's strategic interests but also contribute to a more stable, secure international order. This paper advocates for a proactive stance, responsive to the evolving nature of threats and opportunities, ensuring that Canada remains a key player on the world stage, credibly capable of defending its sovereignty and contributing to global peace and stability.

RECOMMENDATION

20. It is recommended that Commander CANR:
- a. Direct the immediate integration of pan-domain effects throughout CANR *Noble Defender* operations to develop, test and refine pan-domain strategies and tactics;
 - b. Advocate for expanded OGD participation in *Noble Defender* operations to enhance relationships and develop comprehensive, multidimensional approaches to security; and
 - c. Use *Noble Defender* lessons learned to shape the operational implementation of cutting-edge technologies, such as AI, unmanned systems, and satellite communications to improve situational awareness, operational efficiency, and decision-making speed.

¹⁵ Global Affairs Canada, ‘Canada’s Indo-Pacific Strategy’, 15.

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