Special Edition

Policy Brief

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April 2021

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NORAD Renewal: Strategic Shifts, Technological progress, and Political Constraints

Defence & Security Foresight Group

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This briefing note will explore what the changing Integrated Air and Missile Defence (IAMD) challenge and the allied response to that change means for Canada, strategically (e.g. in terms of implications for deterrence), operationally (e.g. in terms of NORAD and domestic defence requirements), and in terms of public support (e.g. for ballistic missile defence, the CAF role in defence of critical infrastructure, etc.).

Changing Political Scenarios

Increasing Tensions between China, Russia and Canada's Allies.

The past decade has seen a movement towards greater multipolarity, with the rise of China as a major economic, political and military power, as well as Russia reasserting itself more directly both within its immediate surroundings as well as globally, such as in Syria, Libya and even in the United States during the 2016 election. In the military domain, Moscow has launched a major effort to modernize its military capabilities, particularly those with strategic dimensions. The scale of these developments is significant and should be viewed as the pacing threat for planning purposes. This paper will therefore focus largely on Russia's potential challenges towards Canadian and North American security.

The COVID pandemic has further exacerbated these dynamics. China has thus far weathered the pandemic well, while the US and Russia have encountered significant difficulties in bringing the virus under control and limiting its economic damage. In the same period, the Western Alliance has seen significant discord, both within individual states, as well as the security architecture as a whole. The rise of illiberalism among key European allies, such as Italy, Poland and Hungary, significantly complicates Canada's ability to utilize these frameworks for collective action.

While the Biden administration has made it a priority to rebuild the US-led alliance structure, it is predicated on a shared responsibility when it comes to international security. Thus, the US desire for greater burden-sharing from its allies will continue under the current administration.[1] This will likely manifest itself in the renewal of the North Warning System and encompass a number of issues, including ballistic missile defence (BMD).

The precise nature of Russian nuclear weapons strategy has become a matter of significant academic debate over the past several years, particularly surrounding the "escalate to deescalate" paradigm. Whether or not Russia intends to "win" a nuclear conflict, or try to prevent it from escalating by a declaratory use of a atomic weapon, is somewhat immaterial. In either case, Russian development of new systems may be to ensure the potency of its nuclear deterrent in response to Western superiority in conventional and nuclear dimensions. These programs likely anticipate the technological improvement of US offensive and defensive strategic systems over the coming decade, and are

1 Lloyd Austin III, Anthony Blinken "Opinion: America's partnerships are 'force multipliers' in the world" Washington Post March 14th 2021 https://www.washingtonpost.com/opinions/2021/03/14/americas-partnerships-are-force-multipliers-world/

intended keep a credible option available.

Weaknesses of existing arms control regimes.

Several arms control regimes have either had key parties withdraw from them (Conventional Forces Europe, Anti-Ballistic Missile, and Intermediate Nuclear Forces treaties) or are under significant stress (New START, Missile Technology Control Regime, and Open Skies Treaty). They illustrate a breakdown in norms surrounding arms control, their limitations with regards to new and emerging technologies, and growing mistrust among their signatories.

While the New START treaty was recently renewed for another five years, significant challenges remain, such as its relevance to a new class of hypersonic weapons, like the Avangard hypersonic vehicle, which is nominally mounted on a modified RS-18A intercontinental ballistic missile (ICBM). The modernization of Russia's strategic nuclear forces from 2008 to 2020 largely followed the limits imposed by arms control regimes about a decade ago.[2]

The diminution of these treaties has in some ways spurred an arms race in certain areas. Several authors have suggested that the end of the ABM treaty and the development of multiple operational systems such as Terminal High Altitude Area Defense (THAAD) and Ground-Based Midcourse Defense (GMD), may have spurred Russia to develop its new strategic systems.[3] Moscow has routinely cited the theoretical potential of US BMD as a justification for their modernization efforts (despite the impracticality of these interceptors to seriously harm Russia's deterrent capability).[4] These systems deployment, particularly the European Phased Adaptive Approach, had previously led them to warn that they would withdraw from the INF Treaty. This may have become motivation for their alleged violation of the treaty by developing the SSC-8 ground-launched cruise missile.

Furthermore, The US has started work on the development of long-range precision fire weapons that were previously banned under the INF Treaty. The Russians have already moved to start adapting existing sea-based missile and rocket systems to fill in the gap of capabilities that vacating the INF Treaty created.[5] These considerations seem to have affected non-signatories to these agreements. China has started an expansion of its strategic nuclear forces in the past few years, likely as a response to the West's buildups of their offensive and defensive capabilities that could impact the value of their nuclear deterrent.[6]

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2 Michael Krepon Escalating to Deescalate Arms Control Wonk Blog February 18th 2018 https://www.armscontrolwonk.com/archive/1204755/escalating-to-de-escalate/

3. Pavel Podvig Russia's Current Nuclear Modernization and Arms Control, Journal for Peace and Nuclear Disarmament, Vol 1: No.2 2018

4. REYKJAVIK AND ARMS CONTROL IN U.S.-SOVIET/RUSSIAN RELATIONS The Brookings Institute October 4th 2016. https://www.brookings.edu/wp-content/uploads/2016/10/20161004_reykjavik_transcript.pdf

5. John Bodner "Russia bids farewell to INF Treaty with fresh nuclear development plans" Defense News. February 6th 2019. Website Address: https://www.defensenews.com/smr/nuclear-arsenal/2019/02/06/russia-bids-farewell-to-inf-treaty-with-fresh-nuclear-development-plans/

6. Hans Kristensen "China's New DF-26 Missile Shows Up At Base In Eastern China" Federation of American Scientists. February 24th 2021. Website Addresshttps://fas.org/blogs/security/2021/02/plarf-jilantai-expansion/

In their totality, these developments mean there will likely be an increasing number of long-range systems capable of hitting North America from bases in Russia, China and elsewhere.

Political views in Canada

As a broad issue, domestic security tends to rank very high among the Canadian public's priorities. However, issues surrounding the strategic elements of domestic security rarely register on the public's consciousness.

Arguably the last instance occurred with the North Korean missile crisis in 2017, when the US intentions with respect to the protection of Canada were questioned.[7] Polling at that time by Angus Reid suggested that 44 percent of Canadian respondents thought the government should remain out of the American BMD system. However, the same survey suggested that the public's attention to the issue was likely heavily influenced by media coverage of the immediate crisis at hand. Furthermore, views on BMD participation in this instance were likely influenced by Canadians' very low opinion of then US President Donald Trump.[8] At the same time, expert opinions within Canada on the topic is much more heavily in favour of joining BMD.[9]

This suggests that support for joining BMD and renewing the North Warning System may be easier than public opinion polls suggest. Politically however, the picture is mixed: with the Conservative Party for, the New Democrats against and the Liberal party largely non-committal.[10]

Changing technical and operational environment.

Emerging Strategic weapons

Canada and its allies face a number of adversaries who are modernizing their strategic weapon delivery capabilities. The most significant actor within this space is Russia, which has a number of new systems under development. Other states - including China, the Democratic People's Republic of Korea, and Iran - are

also increasing and modernizing their strategic arsenals.[11]
Although these other states present a serious and credible threat, their strategic weapon delivery systems are fewer in number and less complex than the Russian Federation's capabilities.

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7. Leslie Young U.S. won't defend Canada during North Korean missile attack, official says Global News. September 14th 2007. Website Address: https://globalnews.ca/news/3744028/north-korea-missile-threat-canada-us-defence/

8 Robert Benzie Canadians overwhelmingly disapprove of Donald Trump, poll says. The Star. June 21st 2018 Website address. https://www.thestar.com/news/canada/2018/06/20/canadians-overwhelming-disapprove-of-donald-trump-poll-says.html

9 Jeffery Collins Should Canada Participate in Ballistic Missile Defence? Macdonald Laurier Institute July 9th 2018 https://macdonaldlaurier.ca/files/pdf/MLI_BMD_FinalWeb.pdf

10 MARCO VIGLIOTTI "Conservatives, NDP call on Liberal government to match rhetoric with action on NORAD cooperation" The Hill Times NOVEMBER 27, 2017 https://www.hilltimes.com/2017/11/27/conservatives-ndp-call-liberal-government-match-rhetoric-action-norad-cooperation/126680

11. Jill Hruby RUSSIA'S NEW NUCLEAR WEAPON DELIVERY SYSTEMS: An Open-Source Technical Review
Nuclear Threat Initiative. 2019 https://media.nti.org/pdfs/NTI-Hruby_FINAL.PDF

Technologically, hypersonic weapon systems present a growing threat towards North American security. They confer a number advantages to their users, such as a reduced probability of detection, and the difficulty in countering these weapons with existing air defence capabilities due to their speed and in-flight maneuvering capability. At the time of writing this publication, there is only a single operationally deployed hypersonic weapon, the Russian Avangard - a boost-glide weapon that is mounted on an ICBM. China has also developed a similar hypersonic glide vehicle for its DF-17 ballistic missile.[12] At this time, its primary application is on theatre-level missiles, though this does not preclude their later retrofit to intercontinental systems.

A key aspect of Russian modernization efforts is the Russian RS-38 Sarmat, a new heavy ICBM that will replace the existing R-36M Satan, and provide greater survivability and flexibility. This includes heavier payload that allow for additional penetration aids and the ability to undertake different trajectories that can avoid the existing array of continental North American defences.[13]

Furthermore, Moscow has unveiled a number of new weapons systems designed to enhance the flexibility of Russian strategic forces. The air-launched, hypersonic Kh-47M2 Kinzal ballistic missile for example, is being fielded that provide new attack options to degrade continental defence systems, such as radar, C2 nodes or BMD sites.[14] One significant growth area has been in the development and fielding of sea-launched cruise missiles. The Russian Federation has also deployed new variants of the 3M-54 Kalibr, with land attack capabilities demonstrated at increasingly long-ranges. These capabilities are relatively inexpensive, able to be mounted on most major sea and subsurface platforms and launched at long stand-off distances, as well as being extremely challenging to detect when flying at low altitude. They can easily overwhelm existing NORAD defence capabilities and strike targets all across the North America - launching from areas where radar detection is relatively weak.

In addition to these long-range cruise missiles, the Russian Federation is also developing a shorter-range (Sub 1000nm) hypersonic missile, the 3M22 Zircon. This weapon is expected to be initially deployed on Kirov-class battle cruisers, but will likely be deployed on a wide variety of platforms in coming years, including long-range bombers and nuclear cruise missile submarines. Like the Kinzal, it also seems to be focused on attacking key nodes within Western allied states and disrupt their defences, which could increase the overall effectiveness of other, less survivable systems, like the Kalibr SLCMs discussed above.[15]

The Russian Federation has also taken steps to improve their long-range aviation forces in the past decade. Existing platforms such as the Tu-160 and Tu-95 have undertaken very long-distance flights

12 Missile Defense Project, "DF-17," Missile Threat, Center for Strategic and International Studies, February 19, 2020, https://missilethreat.csis.org/missile/df-17/.

13. Jill Hruby RUSSIA'S NEW NUCLEAR WEAPON DELIVERY SYSTEMS: An Open-Source Technical Review Nuclear Threat Initiative. 2019 https://media.nti.org/pdfs/NTI-Hruby_FINAL.PDF

14 Sergey Sukhankin "The 'Military Pillar' of Russia's Arctic Policy" Eurasia Daily Monitor, Vol.17, No. 33. March 16 2018 https://jamestown.org/program/the-military-pillar-of-russias-arctic-policy/

15Jill Hruby RUSSIA'S NEW NUCLEAR WEAPON DELIVERY SYSTEMS: An Open-Source Technical Review Nuclear Threat Initiative. 2019 https://media.nti.org/pdfs/NTI-Hruby_FINAL.PDF

around North American airspace, often with support of escorting fighters and tankers.[16] Furthermore, these platforms have been used in combat operations against Syrian rebel positions using long-range cruise missiles – demonstrating their combat capability in a real-world environment.[17] Of particular concern is Russian employment of the KH-101/102 long-range cruise missile, which has significant low observable features incorporated into its design.[18] In a strategic context, they provide another significant challenge to North American warning systems and will require significant investment in resources to ensure they can be detected.

Beyond these near-term capability improvements, the Russian Federation has also announced the development of several exotic systems, including a nuclear-powered cruise missile and long-range nuclear torpedo. Both systems seem to be in their early development and may be several decades away from service, if ever.

On the whole, none of these systems provide a major breakdown in strategic stability between the United States and the Russian Federation. The former retains a powerful nuclear triad and multiple redundant options for first and second strikes, which allows for the maintenance of nuclear deterrence between the two states. Left unchecked, however, the Russian systems may erode the present balance of power and create significant vulnerabilities, giving the Kremlin the ability to project escalation dominance in a major conflict with the United States.

Cyber Warfare

Cyber warfare provides an immediate and broad complicating factor for all discussions on the threat to continental security. This has led to a growing debate about the strategic utility of offensive cyber operations. As several analysts have pointed out, these capabilities could be considered a strategic weapon with strategic effects, with the ability to bypass traditional defences to attack critical pieces of civilian or military infrastructure.[19] Operationally, NORAD and NORTHCOM have acknowledged this reality and been long involved in the early warning of potential cyber-attacks.[20] More pertinent to the research question, however, these capabilities also can be employed to directly attack, degrade or disrupt parts of NORAD's nuclear C3 (command, control, communications) system.[21] The Russian Federation has shown willingness
to identify and assiduously exploit cybersecurity breaches on a number of occasions – like the recent Solar Winds cyber-attack.

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16. Jennifer-Leigh Oprihory "F-22s Intercept Russian Bomber Formations Near Alaska on Same Morning" Air Force Magazine June 10th 2020 https://www.airforcemag.com/f-22s-intercept-russian-bomber-formations-near-alaska-in-a-single-morning/

17. Missile Defense Project "Russia Fires Kh-101 Cruise Missiles into Syria" CSIS Missile Project July 16th 2017 https://missilethreat.csis.org/russia-fires-kh-101-cruise-missiles-syria/

18 Missile Defense Project, "Kh-101 / Kh-102," Missile Threat, Center for Strategic and International Studies, October 26, 2017 https://missilethreat.csis.org/missile/kh-101-kh-102/

19 Herbert Lin and Amy Zegart (eds.) "Bytes, Bombs, and Spies: The Strategic Dimensions of Offensive Cyber Operations" Brookings Institute Press 2019

20 Randall DeGering "What is NORAD's Role in Military Cyber Attack Warning?" Homeland Security Affairs May 2016 https://www.hsaj.org/articles/10648

21 Erik Gartzke Jon Lindsay Thermonuclear cyberwar Journal of Cybersecurity, Vol. 3, Issue 1, March 2017, https://academic.oup.com/cybersecurity/article/3/1/37/2996537

Allied responses in this area are hampered by a number of issues, such as uncertain attribution of attacks, difficulty identifying vulnerabilities, and the need to develop better approaches on cyber security and responses to cyber-attacks. Aspects of these systems are under constant attack by outside actors, which may or may not be sponsored by Moscow. Yet developing an effective response is vital. Recent research into the field shows that these dynamics may have the potential to alter crisis decision-making seriously, therefore, a robust response to a cyber-attack is required along with contingency plans should such an attack be successful.

Proliferation of Space Based Systems.

The proliferation of satellite launch options, such as SpaceX, has significantly lowered the cost per launch, creating entire constellation of satellites that can vastly increase surveillance capabilities over the entire earth's surface. Space-X's Starlink program offers a useful example of the potential of this area. In under two years, the company has been able to launch over 1300 satellites into low Earth orbit. During 2021, it has been able to undertake a launch every eight days.[22] This is a fairly impressive effort, but access will only improve as more companies enter into the launch market.

The potential of large satellite constellations also offers the ability to strengthen nuclear C3 systems, by providing a highly redundant communication network that cannot be easily degraded by physical or electronic attack. Furthermore, low-cost launch opportunities may enable on-demand systems that can be launched as required. This can increase situational awareness during a crisis and provide high levels of redundancy if opponents decide to attack or degrade space-based assets.

Artificial intelligence/networked sensors.

Over the past decade, artificial intelligence (AI) tools have started appearing and that can process very large volume of data and identify useful information from them. In addition, greater networking connectivity, has enabled military formations to draw together disparate data from a wide variety of military and civilian sensor systems (such as satellite constellation discussed above) to significantly improve situational awareness of units. The burgeoning mass of data can then be quickly processed by AI systems, negating the slow and onerous process of humans going through hours of data. Furthermore, AI can detect patterns that may escape normal human perception – such as irregular movements or deviations from standard procedures.

Overall, this offers a countervailing trend against some of the advances in survivability and low observability that new and emerging strategic systems promise to deliver. This process has already started with NORTHCOM testing AI tools related to the US Joint All-Domain Command and Control (JADC2), an emerging technical approach to operations, which undertook automated data processing from linked sensors systems.[23] These efforts will only continue to become more expansive and central for military operations.

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22 Stephan Clarke "SpaceX extends its own rocket reuse record on Starlink launch" Spaceflight Now March 14th 2021 https://spaceflightnow.com/2021/03/14/spacex-extends-its-own-rocket-reuse-record-on-starlink-launch/

23 Theresa Hitchens "Exclusive: NORTHCOM Developing, Testing AI Tools To Implement JADC2" Breaking Defense March 5th 2021. https://breakingdefense.com/2021/03/exclusive-northcom-developing-testing-ai-tools-to-implement-jadc2/

Conclusion and Analysis

It would be an understatement to suggest that the past decade has seen profound geopolitical and technological upheaval with regards to continental defence. The emerging post-COVID era has exacerbated some of these trends.

Moreover, new technologies have altered the context as well. While the precise relevance of some technologies remains uncertain or unpredictable, such as hypersonic weapons, overall there has been a significant increase threat to continental security. The deployment of new long-range cruise missiles and ICBMs has cemented Russia's ability to inflict unimaginable damage to Allied targets in Europe and North America. However, this is not completely due to exotic new delivery systems. Cyber warfare also presents significant new challenges for Canada's defence, by offering adversaries the possibility to disable or disrupt elements of the continental defence system.

It is quite apparent that these challenges require Canada to develop resilience and redundancy in its continental defence systems towards these threats. At very least it requires modernization of its early warning systems in order to detect potential attacks on North America. NORAD and NORTHCOM already have a well-developed cyber defence capability, which will require further development and investment in the future. At the same time, several new technologies offer potential solutions to these issues. Low-cost satellite launch capabilities and satellite constellations offer the possibility of broad real-time surveillance in a way that was technologically infeasible only a decade ago. The effectiveness of surveillance systems has been boosted by two other technical advances. Large high-bandwidth networks are enabling a vast array of sensors to be connected together with very high levels of raw data, and AI systems can process this data and provide unrivalled situational awareness.

While the latter section offers some hope for continental defence, the situation also presents significant challenges for Canada. All of these systems require heavy investment in new and emerging technologies, both on new systems and retrofitting existing technologies. Considering that the North Warning System will require a renewal in the coming decade, it may be an opportune time to undertake modernization.

There are several challenges to this effort. First it confronts a difficult domestic and international economic situation after the pandemic and the extensive stimulus spending. Investing tens of billion dollars in an austere fiscal climate on NORAD may be a difficult sell to the public before an impending federal election. Second, the successful operation of these emerging doctrines, such as the US DOD Joint All-Domain Command and Control (JADC2), requires seamless data environment to operate successfully. Segregating data due to national concerns, such as over participation in BMD, creates needless complexity to this approach.

Continuing the present compromise, first agreed to nearly two decades ago, may undermine Canada's ability to play an equitable role in continental security. Thus, we may have to confront the general reluctance of the Canadian public towards joining BMD efforts. However, considering the current upswing in Canada-U.S. relations under the Biden administration, and high-level support for such an outcome, there may be an opportunity yet to join the initiative.