



Canadian Defence Policy

Briefing papers by Ernie Regehr, O.C., Senior Fellow in Arctic Security and Defence

July 26, 2021

Canada and the Limits to Missile Defence

Speculation about Canada joining the North American component of the Pentagon's ballistic missile defence (BMD) system of systems makes periodic appearances in Canadian defence discourse – though direct participation has never gained broad political support.¹ Now, with a more “progressive” Democrat back in the White House and NORAD modernization moving up the continental defence agenda, the Canada-and-BMD question could be cued for another round of attention. The context undeniably includes a persistent threat to North America from strategic range, nuclear-armed, missiles, but the American “homeland” missile defence system, due to technical and strategic constraints, offers no defence against the overwhelming majority of missiles aimed at North America.

The American BMD system runs the gamut from localized theatre defence against short-range cruise and ballistic missiles, through to defenses aimed at regional- and then strategic-range threats. Strategic-range ballistic missile threats are the focus of North American homeland missile defence operations, using ground-based interceptor missiles designed to knock out attacking warheads in mid-course in outer space.

The main threat is the Russian arsenal of just over 480 land- and sea-launched intercontinental-range ballistic missiles (ICBMs), collectively carrying just over 2000 warheads, with a maximum of about 1500 warheads actually deployed (to keep the numbers within the limits established by the recently extended US-Russia New START agreement).² China adds roughly another 100 similar missiles collectively armed with about 180 nuclear warheads.³ In addition, both Russia and China are developing hypersonic and new variants of long-range cruise missiles capable of delivering either nuclear or conventional warheads to North America. The Democratic People's Republic of Korea (DPRK or North Korea) is the only other adversary country that has tested intercontinental-range ballistic missiles and is in possession of nuclear warheads. Estimates of its inventory of warheads range from 10 to 60,⁴ but it is still not clear how close it is to being able to mount a warhead on an ICBM and retain sufficient range to reach North America.⁵ That said, it would be prudent to assume it is primarily a matter of time, if Korean Peninsula denuclearization efforts remain stalled. The DPRK might well, in an uncertain future, muster a force of as many as 60 ICBMS, each loaded with a nuclear warhead.

So, all told, some 640 ballistic missiles loaded with more than 1,700 nuclear warheads are potentially aimed at North America. Another 580 warheads on air-launched cruise missiles on bombers, and the emerging inventory of hypersonic missiles and long-range sea-launched cruise missiles, must be added to the missile threat. But the ground-based, mid-course interception defence (GMD) system is aimed only at the DPRK's ballistic missiles (and possible other future small state arsenals) – in other words, less than three percent of the threat is in the GMD sights.

That begs the obvious question: Why is the North American GMD system directed at only a tiny fraction of the missiles pointed at North America? The answer is that there are unavoidable technical and policy limits to strategic missile defence.

Technical constraints on strategic missile defence

The GMD system is by design aimed exclusively at intercontinental-range ballistic missiles (ICBMs), whether launched from land or submarines. It has no capabilities against cruise missiles (air- or sea-launched) or hypersonic missiles. Cruise missiles are aircraft, and the GMD system is designed to intercept warheads in outer space, not in air space. Hypersonic missiles travel at ultra-high velocity at the edge of space, and that, together with their ability to maneuver throughout their flights, means they can evade missile defence tracking systems and GMD interceptors cannot engage them at their relatively low operational altitudes.⁶

The GMD system's design is to intercept nuclear warheads once they have been boosted into space and released by the ICBMs. The interceptor missiles in turn boost and release into space their own "kinetic kill" warheads, which are non-explosive and steered into the paths of oncoming nuclear warheads – to collide with them and thus destroy them in space. The numbers potentially involved, and the presence of decoys alongside actual warheads, make that technically challenging and make comprehensive protection (the only kind that really matters when it comes to nuclear weapons) impossible.

While hitting a bullet with a bullet (as such interceptions are described) has proven possible – a genuinely impressive technical achievement – it is far from feasible to do it every time. The US currently has deployed 44 interceptor missiles (40 in Alaska and four in California), with another 20 interceptors slated for Alaska.⁷ By some estimations, the GMD system would have to plan on launching four interceptor missiles for every oncoming warhead⁸ - in other words, a mass attack of even a couple of dozen warheads, hidden among many more decoys, would readily overwhelm the current GMD system. For that reason, as well as policy reasons that we will come to, the GMD system is focused exclusively on the DPRK.



This satellite image of the Fort Greely, Alaska missile defence base shows three fields of ground-based missile interceptor silos (accommodating a total of 40 operational interceptors), with a fourth missile field under construction (upper right). That will bring the strategic missile defence system to 60 Alaskan interceptors plus four in California. (Image by SecureWatch/Maxar Technologies)

And just how effective would the GMD system likely be against North Korea – that less-than-three-percent of the total missile threat? The official answer in the most recent US *Missile Defense Review* is that while there is a demonstrated *capability* to intercept an oncoming warhead in space, the GMD system’s “demonstrated *capacity* to intercept” (emphasis added) is limited to a small number of missiles equipped with “simple countermeasures.”⁹ The distinction between “capability” and “capacity” is important. There is a “capability” to hit a bullet with a bullet in space, to intercept a nuclear warhead traversing through space by launching another warhead (this one inert) into its path to collide with and destroy the nuclear warhead. But “capacity” essentially refers to the extent to which this can be successfully done as a military mission. While testing confirms that the Pentagon has the capability to intercept warheads, there are nevertheless serious limits to its capacity to reliably intercept warheads under real-world conditions, especially when countermeasures could not be counted on to be “simple.” And in a July 2020 report, the US Government Accountability Office adds a further technical caveat – namely, that the system will not be able to mount an effective defence against even the DPRK’s emerging capacity without an entirely new interceptor and kinetic kill vehicle.

Overall, official descriptions of the GMD system’s capacity remain decidedly tepid, and that in turn has missile defence planners promoting the idea of adding layers of defence, such as adapting regionally focused Aegis ship-based interceptors for the protection of North America. The Aegis system uses the Standard Missile-3 (SM-3), an intermediate-range three-stage missile that launches its warhead, a non-explosive “kinetic kill” vehicle, into space where it is designed to collide with and destroy oncoming warheads. It has been tested once against the kind of intercontinental ballistic missiles that threaten North America (in this case, the scenario was of a lone missile attack by a “rogue state” on Hawaii),¹⁰ but the SM-3 interceptor’s shorter range, compared to that of the GMD interceptors, means that the SM-3 would have to intercept a warhead from an intercontinental missile in the latter phase of its space flight. To do that the ship launching the interceptor would have to be correctly positioned within range of the oncoming warhead near the American coast – as one commentator has noted, it would have to be in the right place at the right time, the kind of good fortune that could hardly be counted on. And whatever protection it could offer would be for only parts of the continent (not exactly a point defence system but covering a more confined area than is the objective of continental ballistic missile defence). In other words, the SM-3 is still judged to be of limited utility in any homeland defence role.¹¹

Canada’s next generation surface combat vessels will include the SM-2 missile for theatre defence – ensuring the Canadian navy’s “ability to operate alongside US and Allied naval forces against the full spectrum of naval threats.”¹² The SM-2 carries an explosive warhead and is designed to attack oncoming shorter-range cruise and ballistic missiles in the atmosphere, and that puts a focus on participating in expeditionary operations (typically US-led) and theatre missile defence. But the current equipment plans have also generated speculation that the system might become a backdoor for Canadian entry into North American missile defence. The ships are slated to be fitted with the AN/Spy 7 radar system now under development for shipboard deployment (the radar’s land-based variant’s long-range discrimination capability is said to be “clearly designed for ballistic missile defence”).¹³ In addition the vertical launch system on the new ships could be adapted to handle SM-3 missiles – thus raising the question of whether Canada might at some future date upgrade to SM-3 missiles in the interests of supporting an additional layer of North American missile defence.¹⁴ The limited number of Canadian ships with that potential capability, the key positioning needed for late phase ICBM interceptions, and the limited area that could be covered even if a ship happened to be in the right place at the right time, all suggest the system would, even if everything worked as advertised, contribute little to continental defence.

North American missile defence will continue to rely on the GMD system and intercepting volley attacks of dozens of warheads will remain beyond its capacity for the foreseeable future. Two retired American Generals, writing in *Defense News* and relying on Rand Corporation estimates, argue that before the end of this decade the DPRK could have in excess of 200 nuclear warheads and several dozen ICBMs to deliver them to North American targets.¹⁵ Even at its planned 64 interceptors, critics argue, the GMD system would be nowhere near

to meeting such a potential threat. In other words, even defending against the three percent of missiles aimed at North America will remain a daunting challenge.

While the moral imperative to protect the American population continues to lead the rhetorical case for GMD, the less than clarion assurances of the GMD system's effectiveness against even the limited North Korean threat were on display in testimony before the US Senate Strategic Forces Subcommittee in June 2021. The committee was told by Robert F. Soofer, a former Trump Administration Department of Defense official and former staff member of the Strategic Forces Subcommittee, that the GMD's 64 interceptors with a new kill vehicle "may be sufficient to stay ahead of the threat" (emphasis added), and then pointedly added that the Pentagon strategy to make up for GMD limitations would be to launch pre-emptive attacks on North Korea: "We would hope to also eliminate a number of the North Korean ICBMs on the ground, easing the burden on GMD," with the expert adding parenthetically that this would itself be a challenge – namely, "the prospects of defeating mobile missiles prior to launch remains a daunting challenge."¹⁶ The Congressional Research Service adds the further caveat that, "although the GMD system is praised by senior military leaders and is generally viewed in successful terms, it does have a somewhat mixed flight test record."¹⁷



Missile interceptor is lowered into its missile silo at Fort Greely, Alaska (photo: US Army-some rights reserved)

The shortcomings of GMD are confirmed by that plan to "ease the burden" on it by incorporating a pre-emption strategy into missile defence. Pre-emption, by cyber means or offensive forces, referred to as "left of launch" operations, is a key feature of missile defence generally. The regional Aegis shipboard system, focused on protecting US military sites worldwide, also includes "attack operations to destroy offensive missiles prior to launch."¹⁸ North America's heightened focus on threats of conventionally armed Russian and Chinese cruise and hypersonic missile systems, against which GMD has no capability and which are considered not to be amenable to nuclear deterrence, has spawned the SHIELD (Strategic Homeland Integrated Ecosystem for Layered Defense) strategy¹⁹ – a key feature of which is, again, to launch pre-emptive attacks on cruise missile platforms (aircraft and ships) to destroy the "archer" before its "arrows" can be launched.

Pre-emption to destroy missile before they can be fired remains a tempting strategy because, as analysts point out, offense is always bound to trump defence – that is, it will remain easier and less expensive for even small operators like the DPRK to add new attack missiles at a faster rate than the US can muster interception defences.²⁰ In other words, technology imposes hard limitations on GMD capacity, and attempts to overcome those shortcomings inflict increasing instability on the strategic environment, requiring, in turn, policy constraints.

Policy constraints on strategic missile defence

Congressional enthusiasm for further expanding the GMD system beyond 64 interceptors knows few limits, and seemingly no limits among Republicans. In a June 2021 letter, Congressional Republicans urged the Pentagon to “keep pace” with adversary missile capacity,²¹ but keeping pace even with the DPRK’s potential offensive arsenal represents a major challenge – not only for technical reasons, but for strategic reasons.

The US GMD system would clearly be expandable to keep numerical pace with any DPRK threat, though without ever guaranteeing comprehensive protection against nuclear attack, but the more GMD interceptors the US deploys, the greater would be Russian and Chinese wariness. And that wariness inclines them toward expanding their arsenals, or, in the case of Russia and the numerical limits currently imposed on its offensive forces by the New START agreement, it would be a matter, as it has already confirmed, of avoiding further arms control limits on its ICBM/SLBM²² arsenals. Analysts like John Tierney, the former Congressman who once oversaw elements of the ballistic missile defence program, and Samuel M. Hickey, of the Center for Arms Control and Non-Proliferation, warn that in the long run “...efforts to stay ahead of rogue-state threats are pushing the technological envelope toward capabilities that, if ever perfected, might threaten Moscow or Beijing’s confidence in their nuclear deterrents.”²³

For Russia and China, the possibility of an upgraded GMD system raises another worry – namely, of the United States pursuing a first strike option. With enough additional interceptors, the Pentagon could theoretically at least persuade itself that a major pre-emptive attack on Russian and/or Chinese nuclear forces could destroy enough of their retaliatory capacity to keep it to levels that the enhanced GMD system could absorb. In a crisis, that could drive Russian and Chinese strategists into a “use ‘em or lose ‘em” calculation – and thus lead them to “use ‘em” in an attempt to pre-empt the feared American pre-emption. A severe crisis in which the Americans on one side and the Russians and Chinese on the other side all assumed that the advantage would go to the side willing to shoot first would be the very definition of strategic instability. These are, by any rational accounting, macabre calculations, but strategic instability incentivizes risky options, or, as the Carnegie Endowment’s more measured language puts it, strategic missile defenses risk crises being “prone to instability and deliberate escalation.”²⁴

The destabilizing effects of strategic defence systems have long been recognized and led in 1972 to the Anti-Ballistic Missile (ABM) Treaty, through which the US and the Soviet Union banned the pursuit of comprehensive strategic missile defence. The American withdrawal from that treaty in 2002 came in the wake of the Reagan Strategic Defense Initiative, which, though never a realistic possibility, proffered a tempting and persistent vision of technological immunity to nuclear attack. The enduring American dream of destined pre-eminence and self-made invulnerability remains the foundational fantasy of homeland missile defence – the irony being that the more immunity to attack is pursued, the less secure the homeland becomes.

In 2010 the destabilizing impact of strategic missile defence was again formally recognized when New START was signed. A preambular paragraph of the Treaty recognizes the relationship between offensive and defensive strategic nuclear weapons, and allows that “current strategic defensive arms do not undermine the viability and effectiveness of the strategic offensive arms of the Parties.”²⁵ But Russia, in an accompanying statement, insisted that a further “build-up in the missile defense system capabilities of the United States of America such that it would give rise to a threat to the strategic nuclear force potential of the Russian Federation,” would constitute the kind of extraordinary event that could trigger, as the Treaty allows in Article IV, Russia’s withdrawal.²⁶

The US has thus been at pains to insist that the North American GMD homeland strategic ballistic missile defence system is designed, as repeated in the 2019 Missile Defense Review, “to defend against the existing and potential ICBM threat from rogue states such as the DPRK and Iran.” But it is not quite that straightforward. The same sentence adds that “in the event of conflict, [the U.S.] would defend, to the extent feasible, against a ballistic missile attack upon the U.S. homeland from any source.”²⁷ In other words, in contradicting the first part of the sentence, the Pentagon declared that the system is in fact intended to intercept Russian and Chinese strategic missiles. And President Trump further undermined the rogue-state-only pledge when he introduced *Missile Defense Review 2019*, by claiming: “Our goal is simple: to ensure that we can detect and destroy any missile launched against the United States — anywhere, anytime, anyplace.”²⁸ That is certainly not the formally stated goal, nor is it anywhere near to being within the system’s capacity, but the statement could only serve to make the Russians and Chinese even more suspicious than they already were.

The American claims of limited defence focused on the DPRK were further questioned when the Pentagon tested the Aegis missile defence interceptor, the SM-3 missile, fired from an American destroyer to intercept an intercontinental-range ballistic missile launched from the Kwajalein Atoll in the Pacific Ocean. Russia has concluded that if the Aegis system can be added to the GMD system to intercept ICBMs, the Russian deterrent could be in jeopardy. The SM-3 test against an ICBM, a Russian spokesperson said, “directly confirms the falsity of American assurances that the US global missile defense system is not directed against Russia.”²⁹ Expert testimony in Congress argued the SM-3 will not undermine strategic stability, but only because of its current inadequacies: “the limited number of SM-3 IIA missiles over the next five years, as well as the interceptors inherent technological limitations against complex Russian and Chinese missiles.”³⁰

A June 2021 letter by 63 national security leaders³¹ argues that “ever since President Bush withdrew the United States from the ABM Treaty in 2002, the GMD system has proceeded in a rushed, chaotic and ultimately counter-productive manner that has resulted in a failed test record, wasted billions of dollars, and accelerated an arms race with Russia and China, leading both adversaries to expand their offensive nuclear weapons programs to counter U.S. missile defenses.”³²

Confirming the reference to an accelerated arms race, the Kremlin is now acting on its “threat to build more and newer nuclear weapons as protection against the event, however unlikely, that the United States fields a missile defense system that could neutralize Russia’s nuclear arsenal.”³³ It is doing this by developing, and prominently announcing, systems like long-range cruise missiles, and nuclear powered cruise missiles, and hypersonic missiles, that are specifically designed to evade strategic missile defences. The Chinese are taking similar steps. A refusal to impose reliable limits on strategic ballistic missile defence will continue to impose heightening strategic instability on an already fragile planet.

Strategic defence or prevention?

The pursuit of effective defence against strategic missiles has been a failure – “chaotic and ultimately counter-productive” is how former US Defense Secretary William Perry and his colleagues put it.³⁴ There is no defence, and that leaves prevention as the *de facto* objective when it comes to facing the strategic nuclear missile threat. Following the devastation of World War II and the nuclear bombings of Hiroshima and Nagasaki, Bernard Brodie, the famed American strategist, concluded that “thus far the chief purpose of our military establishment has been to win wars. From now on its chief purpose must be to avert them.”³⁵ Twenty years later, Ronald Reagan and Mikhail Gorbachev famously concluded together that a nuclear war can never be won and must never be fought.³⁶ A year later, Gorbachev went further in his “new thinking” to also conclude that “the prevention of war, not victory in war,” must now become the overriding goal of military forces.³⁷ And now, to their credit, Joseph Biden and Vladimir Putin have jointly repeated the Reagan/Gorbachev principle.³⁸ In fact, prevention rather than defence has been the essential North American approach since the latter 1950s –

definitely since Sputnik, despite NORAD's air defence mandate against Soviet bombers and some high profile strategic defence ambitions.

Prevention is of course prominently linked to deterrence, so it's not a surprise to see GMD enthusiasts trying to define homeland missile defence as bolstering deterrence.³⁹ According to the Commander of US Strategic Command, "a robust and credible layered missile defense system paired with our conventional and nuclear force capabilities provide the ability to deter strategic attacks, deny benefits, and impose costs against any potential adversary."⁴⁰ However, that is clearly not the definition of deterrence followed by the Pentagon in the context of Russian and Chinese missile threats – the response to 97 percent of the current strategic missile threat being deterrence for which missile defence is explicitly not "paired with...the ability to deter strategic attacks." Deterrence, in the Russian and Chinese cases, means threatened retaliation is aimed at dissuading them from attacking in the first place, and GMD is specifically abjured. Given the reliance on threatened retaliation to manage the Russian and Chinese threats, there is no credible reason why the DPRK would not be deterred in the same way. The DPRK is unlikely to be blind to the reality that, were it to launch a nuclear attack on North America, large or small and whether or not that attack was intercepted, it would be met by immediate regime destruction and wide-spread devastation (whether by nuclear or conventional attack). There is no persuasive evidence why 97 percent of the threat is restrained by deterrence, while the less than three percent held by the DPRK is not.

Deterrence is obviously a perilous and inhuman strategy, given the known cataclysmic consequences of failure, and while that is the planet's current lot, prevention is much more than, and must ultimately supplant, nuclear deterrence. Prevention involves measures for risk reduction, like reduced levels of alert for deployed nuclear forces (de-alerting has been a serious arms control proposal for a long time, with both Barack Obama and George W. Bush administrations considering it⁴¹). In the Cold War, the management of strategic relations through diplomacy, the adoption of confidence building measures like the Open Skies Treaty (which no longer includes the US or Russia), and arms control were all ingredients of a prevention strategy.

Clear and binding limits on strategic missile defence must now also become an ongoing part of the prevention strategy. Tierney and Hickey argue that to restore some trust in their bilateral relationship, "Russia and the United States should commit to publicly explaining the role of missile defenses in their nuclear deterrent strategy, emphasizing that their missile defense systems do not target the other."⁴² This would also be an appropriate context within which to revisit the NATO 2010 commitment to explore European BMD cooperation with Russia. NATO said at the time: "We will actively seek cooperation on missile defence with Russia and other Euro-Atlantic partners."⁴³ Indeed, the U.S. National Academy of Sciences and the Russian Academy of Sciences recently published a joint report⁴⁴ on the technical feasibility of ballistic missile defense cooperation. The report refers to shared interests in mitigating the threats and consequences of "limited missile attacks from third countries *without undermining the strategic balance that the two governments maintain to ensure stability*"⁴⁵ (emphasis added). This study is focused on European missile defence, but similar conditions and arguments can be made for Eurasian and North American missile defence cooperation.

The international community has assembled a well-established nuclear disarmament, risk reduction, and nuclear war prevention agenda that is reflected in consensus documents from the 2000 and 2010 Review Conferences of the Treaty on the Non-Proliferation of Nuclear Weapons.⁴⁶ The challenge is not knowing what to do in pursuit of prevention, but the will to do it.

Canada and GMD

“Defence against help” continues to be a prominent theme in Canadian defence policy discourse.⁴⁷ It is the idea that, because US security is inextricably linked to the security and territory of its northern neighbour, it behooves Canada to be sufficiently attentive to its own defence to ward off US military help that could be proffered without Canadian consent, should Washington perceive serious vulnerabilities owing to what it might decide is neglect on its northern flank. Because of that North American security interdependence, Canada seeks ongoing assurances of American defence support, but on Canadian terms and not simply as the US sees fit⁴⁸ – and with due respect for Canadian sovereignty. For that reason, Canada prefers to see American defence support packaged in formalized defence cooperation arrangements, like the two preeminent defence cooperation institutions, Permanent Joint Board on Defence and NORAD.

Ultimately, the question of American defence support – whether the US will come to the defence of Canada when Canada is threatened – is settled by NATO’s Article 5 commitment, not by bilateral missile defence arrangements. That NATO commitment says, “an armed attack against one or more [NATO members] in Europe or North America shall be considered an attack against them all,” and that, consequently, each NATO member “will assist the Party or Parties so attacked by taking...*such action as it deems necessary*” (emphasis added).⁴⁹ This commitment is not contingent on any endorsement of or participation in each other’s particular weapons systems or strategies. In NATO, as well as in NORAD, each partner country by definition brings to the collective defence capacities and assets as “it sees fit,” and takes actions “it deems necessary.” The US brings GMD to North American defence – the actual utility of which obviously continues to be much debated – and will involve it in support of its NATO ally “as it deems necessary,” not as Canada deems necessary. And should GMD ever acquire the capacity to reliably intercept limited attacks, without undermining strategic stability, it would still be Washington’s prerogative to bring, or not bring, that capacity to collective defence efforts in support of its NATO partners.

Even if Canada were to in some way “join” GMD, the US would clearly still be in charge and making the research and development, deployment, and operational decisions. The entire US BMD system of systems, not just GMD, continues to evolve as technology changes, as political guidance changes, as spending priorities change. The influence of a Canadian partner over any of those changes or decisions would necessarily be modest. Realistically, Canada could not become an equal partner in GMD, and joining would be entering a surfeit of uncertainties: unpredictable technologies, contested testing results, uncertain performance expectations, funding vagaries, negotiations on limits – and over none of these issues could Canada have consequential influence.

And the questions would keep coming. Would Canada want to be partnered to a system headed for the weaponization of space? Would Canada want to be a partner in a defence system that depends on pre-emptive attacks? Would Canadian officials and politicians really want to be asked to explain every time a test misfires whether Canada still has confidence in the system? Does Canada agree with, and would it actively lobby for, strict limits on GMD deployments in the interests of advancing arms control objectives with Russia and China? Would Canada revive and push forward possibilities for international East-West cooperation, rather than unilaterally assumed prerogatives, on missile defenses against small state or accidental launch threats?

Aside from the questions, some things that can be said with a measure of certainty. GMD will not in any foreseeable future be able to provide comprehensive or even credible protection from nuclear attack (a 90 percent success rate against conventional attacks is extraordinarily effective, but a 90 percent success rate against nuclear attacks is cataclysmically disastrous). A particularly problematic certainty is that GMD is already complicating nuclear arms control and disarmament and risk reduction efforts. The ongoing pursuit of strategic missile defence improvements that the Pentagon promises portends chronic strategic destabilization and

escalating tensions. When proponents argue that GMD is not actually inimical to arms control, it is a claim based entirely on the current deliberate US policy against aiming it at Russia or China.⁵⁰ But the issue is whether Russia and China assume they can rely on that restraint to continue, or will they conclude that they need to prepare for a possible accelerated deployment of interceptors to the point where they could be seen as trying to threaten second strike deterrent forces?

Both the uncertainties and the certainties of GMD should be enough for Canada to maintain its decades-long wariness of strategic missile defence. GMD will in fact never be a substitute for prevention. Protecting North America from nuclear attack depends entirely on there not being a nuclear attack. The Canadian imperative is to focus its political/diplomatic energies on pursuing, in the company of like-minded states, the arms control/disarmament and prevention strategies on which Canadian and global security really do depend.

End Notes

¹ A review of Canadian attitudes towards ballistic missile defence and related defence issues is available in: Justin Massie, Jean-Christophe Boucher, Stéphane Roussel, “Back to the Future? Missile Defence as a Political Landmine,” in *Shielding North America: Canada’s Role in NORAD Modernization*, edited by Nancy Teeple and Ryan Dean, NAADSN Engage Series, 2021. <https://www.naadsn.ca/wp-content/uploads/2021/03/NAADSN-engage4-NORAD-NT-RD-upload.pdf>

² Hans M. Kristensen and Matt Korda, “Russian nuclear forces, 2021,” *Nuclear Notebook, Bulletin of the Atomic Scientists*, 2021, Vol. 77, No. 2, 90-108. <https://www.tandfonline.com/doi/pdf/10.1080/00963402.2021.1885869?needAccess=true>

³ Hans M. Kristensen and Matt Korda, “Chinese nuclear forces, 2020,” *Nuclear Notebook, Bulletin of the Atomic Scientists*, 2020, Vol. 76, No. 6, 443-457. <https://www.tandfonline.com/doi/pdf/10.1080/00963402.2020.1846432?needAccess=true>

⁴ Hans M. Kristensen & Robert S. Norris, “North Korean nuclear capabilities, 2018,” *Bulletin of the Atomic Scientists*, 74:1, 41-51. <https://www.tandfonline.com/doi/pdf/10.1080/00963402.2017.1413062?needAccess=true>

⁵ A recent report on “DPRK Strategic Capabilities” echoes this caution, indicating that estimates of the nuclear materials available to the DPRK suggest it could have enough to have built up to 47 nuclear warheads and expressed doubt about its current ability to sufficiently miniaturize warheads to mount them on their existing missiles.

DPRK Strategic Capabilities and Security on the Korean Peninsula: Looking Ahead, A joint study by the Center for Energy and Security Studies (CENESS) of Russia and the International Institute for Strategic Studies (IISS), of the United Kingdom, 14 July 2021. <https://www.iiss.org/blogs/research-paper/2021/07/dprk-strategic-capabilities-security-korean-peninsula>

⁶ “Hypersonic Missile Defense: Issues for Congress,” Congressional Research Service, *In Focus*, 13 January 2021. <https://crsreports.congress.gov>

“Hypersonic Weapon Basics,” Missile Defense Advocacy Alliance, 30 May 2018. <https://missiledefenseadvocacy.org/missile-threat-and-proliferation/missile-basics/hypersonic-missiles/#:~:text=Hypersonic%20weapons%20are%20specifically%20designed%20for%20increased%20survivability,nucl ear%20payloads%20at%20ultra-high%20velocities%20over%20long%20ranges.>

⁷ “Defense Primer: Ballistic Missile Defense,” Congressional Research Service, *In Focus*, 29 December 2020. <https://crsreports.congress.gov>

⁸ Anik Panda, “Missile Defense Strategy, Policies, and Programs in Review of the Defense Authorization Request,” *Carnegie Endowment for International Peace*, 09 June 2021. <https://carnegieendowment.org>

⁹ United States Department of Defense, *Missile Defense Review*, 2019.

https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR_Executive%20Summary.pdf#:~:text=This%202019%20Missile%20Defense%20Review%20%28MDR%29%20is%20consistent,the%20considerable%20uncertainties%20about%20the%20future%20threat%20environment.

¹⁰ Rich Abott, "MDA Planning Second Test of SM-3 IIA Against ICBM Target," *Defense Daily*, 17 May 2021.

<https://www.defensedaily.com/mda-planning-second-test-sm-3-ii-a-icbm-target/missile-defense/>

¹¹ The Arms Control Association of Washington quotes a Government Accountability Office assessment of the test, saying it "was not an operational test...and it was executed under highly favorable conditions." The ACA report also quotes the Director of the Missile Defense Agency as suggesting that the layered homeland defense approach "may no longer be as high of a priority for the agency." Kingston Reif, "Trump-Era missile Defense Spending Continues," *Arms Control Today*, July/August 2021. <https://www.armscontrol.org>

¹² "Canada - Standard Missile 2 (SM-2) Block IIIC Missiles," Defense Security Cooperation Agency, *News Release*, 5 November 2021. <http://www.dsca.mil>

¹³ "The Canadian Surface Combatant: A Backdoor to Ballistic Missile Defence?" *Canadian Naval Review*, 17 May 2020.

<https://www.navalreview.ca/2020/05/the-canadian-surface-combatant-a-backdoor-to-ballistic-missile-defence/>

¹⁴ Michael Byers, "Canada has done a complete about-face on ballistic missile defence," *the Globe and Mail*, 28 June 2021.

<https://www.theglobeandmail.com>

¹⁵ Maj. Gen. Punch Moulton (Ret.) and Maj. Gen. Francis Mahon (Ret.), "Robust, credible and layered missile defense is the foundation of deterrence," *DefenseNews*, 16 June 2021. [Robust, credible and layered missile defense is the foundation of deterrence \(defensenews.com\)](https://www.defensenews.com)

¹⁶ Robert M. Soofer, Prepared Remarks to the Strategic Forces Subcommittee of the Senate Armed Services Committee, June 9, 2021 (Dr. Soofer is an associate of the Center for Strategic and International Studies, adjunct professor at Georgetown University's Security Studies Program, and served as Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy in the Trump Administration).

¹⁷ "Defense Primer: Ballistic Missile Defense," Congressional Research Service, 29 December 2020.

<https://crsreports.congress.gov>

¹⁸ Robert M. Soofer, 9 June 2021.

¹⁹ Terrance J. O'Shaughnessy and Peter M. Fesler, "Hardening the SHIELD: A Credible Deterrent and Capable Defense of North America," Canada Institute of the Wilson Center, Washington, D.C., September 2020.

<https://www.wilsoncenter.org/publication/hardening-shield-credible-deterrent-capable-defense-north-america>

²⁰ John Tierney and Joe Cirincione, "How Biden Can Leverage Missile Defense in His Summit with Putin," *Defense One*, 15 June 2021.

<https://www.defenseone.com/ideas/2021/06/how-biden-can-leverage-missile-defense-his-summit-putin/174715/>

²¹ Republican House Armed Services Members write to Appropriators Requesting Robust Missile Defense Funding," 11 June 2021.

<https://brooks.house.gov/media-center/>

²² ICBM/SLBM (intercontinental ballistic missiles/sea-launched intercontinental ballistic missiles).

²³ John Tierney and Samuel M. Hickey, "Missile Defense Is Not a Substitute for Arms Control," *War on the Rocks*, 25 May 2021.

<https://warontherocks.com/2021/05/missile-defense-is-not-a-substitute-for-arms-control/>

²⁴ Ankit Panda, Missile Defense Strategic, Policies, and Programs in Review of the Defense Authorization Request,” Testimony: Senate Armed Services Committee, Subcommittee on Strategic Forces, 09 June 2021. Carnegie Endowment for International Peace. <https://carnegieendowment.org/2021/06/09/missile-defense-strategy-policies-and-programs-in-review-of-defense-authorization-request-pub-84737>

²⁵ Official Text of New START Treaty: Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, 08 April 2010. <https://2009-2017.state.gov/documents/organization/140035.pdf>

²⁶ New START Treaty and the Statement of the Russian Federation Concerning Missile Defense. https://media.nti.org/documents/new_start_russian_statement_on_missile_defense.pdf

²⁷ United States Department of Defense, *Missile Defense Review, 2019*. https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR_Executive%20Summary.pdf#:~:text=This%202019%20Missile%20Defense%20Review%20%28MDR%29%20is%20consistent,the%20considerable%20uncertainties%20about%20the%20future%20threat%20environment.

²⁸ Remarks by President Trump and Vice President Pence Announcing the Missile Defense Review, 17 January 2019. <https://trumpwhitehouse.archives.gov/briefings-statements/remarks-president-trump-vice-president-pence-announcing-missile-defense-review/>

²⁹ Tom O’Connor “Russia Says US Missile Defense Test Proves It Lied About Global Missile Shield,” *Newsweek*, 19 November 2020. <https://www.newsweek.com/russia-us-missile-test-lied-global-shield-1548803>

³⁰ Robert M. Soofer, 9 June 2021.

³¹ Including: retired Senators and Congress members, retired Generals and Admirals, former senior officials and diplomats from Republican and Democratic Administrations, Academics, and Think Tank experts, plus former Defense Secretary William Perry.

³² “65 National Security Leaders Urge President Biden to Put Missile Defense on the Table,” 03 June 2021. <https://livableworld.org/63-national-security-leaders-urge-president-biden-to-put-missile-defense-on-the-table/>

³³ Tierney and Hickey, 25 May 2021.

³⁴ “65 National Security Leaders Urge President Biden to Put Missile Defense on the Table,” 03 June 2021.

³⁵ Quoted in Graham Allison, “Preventing Nuclear War: Schelling’s Strategies.” *Negotiation Journal*, July 23, 2018. <https://www.belfercenter.org/publication/preventing-nuclear-war-schellings-strategies>

³⁶ Text of the joint U.S.-Soviet summit statement Dec. 7-10, 1987. <https://www.washingtonpost.com/archive/politics/1987/12/11/joint-statement-by-reagan-gorbachev/cd990a8d-87a1-4d74-88f8-704f93c80cd3/>

³⁷ David Holloway, “Gorbachev’s New Thinking,” *Foreign Affairs, America and the World* 1988/89, vol.68 no.1. <https://www.foreignaffairs.com/articles/russia-fsu/1989-02-01/gorbachevs-new-thinking>

³⁸ U.S.-Russia Presidential Joint Statement on Strategic Stability, June 16, 2021. <https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/16/u-s-russia-presidential-joint-statement-on-strategic-stability/>

³⁹ In March 2021 the Washington-based Arms Control Association (ACA) published a revealing account of the missile defence debate in the US Congress. Republicans tend to argue that GMD reinforces deterrence and makes Americans Regehr: Canada and the Limits of Missile Defence

safer, and accuse those in Congress who question missile defence, largely Democrats, of being prepared to leave the American people exposed to attack. Democrats, on the other hand, question the efficacy of GMD for protecting Americans, but tend to focus on the steep costs of missile defence. That leaves the argument that GMD in fact offers little protection for the American population largely unanswered in Congress. That argument is largely left, according to the ACA report, to the “expert academic and nuclear policy community” to make the case that not only is the GMD unable to provide reliable protection, but that it is counter-productive – even if it were to work – and strategically destabilizing, thus rendering Americans less secure.

Leah Matchett, “Debating Missile Defence: Tracking the Congressional Record,” *Arms Control Today*, March 2021. <https://www.armscontrol.org>

⁴⁰ Quoted by Moulton and Mahon, 2021.

⁴¹ “Reframing the Nuclear De-alerting Debate: Towards Maximizing Presidential Decision Time,” December 11, 2013. <https://www.nti.org/analysis/articles/reframing-nuclear-de-alerting-debate-towards-maximizing-presidential-decision-time/>

⁴² Tierney and Hickey, 25 May 2021.

⁴³ “Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organization, Adopted by Heads of State and Government at the NATO Summit in Lisbon, 19-20 November 2010.” https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120214_strategic-concept-2010-eng.pdf

⁴⁴ National Academy of Sciences. 2021. *Regional Ballistic Missile Defense in the Context of Strategic Stability*. Washington, DC: The National Academies Press, 2021. <https://doi.org/10.17226/24964>

⁴⁵ National Academy of Sciences. 2021.

⁴⁶ See the 64-point Action Plan of 2010. https://www.international.gc.ca/world-monde/issues_developpement-enjeux_developpement/peace_security-paix_securite/action_plan-2010-plan_d_action.aspx?lang=eng

⁴⁷ Whitney Lackenbauer, “‘Defence Against Help’: Revisiting a Primary Justification for Canadian Participation in Continental Defence with the United States,” *Journal of Military and Strategic Studies*, Volume 20, Number, February 2021 (Centre for Military, Security and Strategic Studies). [‘Defence Against Help’ Revisiting a Primary Justification for Canadian Participation in Continental Defence with the United States - CIAO \(ciaonet.org\)](https://www.ciaonet.org/Defence-Against-Help-Revisiting-a-Primary-Justification-for-Canadian-Participation-in-Continental-Defence-with-the-United-States)

⁴⁸ Alexander MacDonald, “Is it time for Canada to Revisit Missile Defence Participation?” NAADSN Ideas Series, 08 October 2020. Panel Presentations by Dr. Nancy Teeple, Mr. Ernie Regehr, and Dr. James Fergusson, and moderated by Dr. Andrea Charron. <https://www.naadsn.ca/wp-content/uploads/2020/10/Ideas-Series-Oct.-8-activity-report.pdf>

⁴⁹ NATO Article 5: The North Atlantic Treaty Washington D.C. - 4 April 1949. [NATO - Official text: The North Atlantic Treaty, 04-Apr.-1949](https://www.nato.int/docu/50years/50years.htm)

⁵⁰ Robert M. Soofer, June 9, 2021.