



ARCTIC SECURITY BRIEFING PAPERS

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Nuclear Submarines in the Arctic: Limiting Strategic Anti-Submarine Warfare

The Arctic is the primary home of Russia's nuclear ballistic missile submarine force. That fleet, like its American counterpart, is being "modernized," the subs are patrolling more often, and, inevitably, American attack submarines are paying increasing attention. Four decades ago, in a climate of intense Cold War confrontation and nuclear dangers, when American and Soviet ballistic missile submarines and the attack subs that trailed them roamed the oceans, strategists, peace researchers, and some military planners grew intensely worried about the strategic instability wrought by such dangerous cat and mouse maneuvers. That in turn led to innovative proposals for anti-submarine-warfare-free zones as one way of easing tensions and, especially, as a means of reducing the risks that mishaps, miscalculations, or miscommunications would escalate out of control. The Arctic figured prominently in those proposals – the essential elements of which continue to have merit and, unfortunately, relevance.

Despite today's obvious NATO-Russia tensions, the Arctic, where NATO states and Russia are both a prominent presence, remains a region of relative geopolitical calm with all sides still credibly denying the presence of active military threats and insisting that regional conflicts will be resolved through cooperation and international law. It's a welcome and genuine regional reality, one that seems deeply incongruous with the concentration in the Arctic of submarines bearing nuclear-armed intercontinental-range ballistic missiles, along with attack submarines meant to either protect or threaten them.

For now at least, the absence of state-to-state and Arctic-specific military threats is not a case of wishful thinking. It is the considered judgement of both the Kremlin and the current US Government. While Russian Arctic security policies emphasize the refurbishment of its northern military and a growing role for it in protecting national interests in the region, those policies are also replete with commitments to maintaining stability and military cooperation toward that end.¹ American authorities also continue to affirm the absence of Arctic-specific military threats. The US Government Accountability Office (GAO) has just reviewed the Pentagon's assessment of the Arctic threat level, and both have concluded that the threat "remains low" and that the US Department of Defense has the capabilities that are required to carry out the current Arctic Strategy.² That strategy, established in 2016, is to pursue "two overarching objectives: to (1) ensure security, support safety, and promote defense cooperation and (2) prepare to respond to a wide range of challenges and contingencies to maintain stability in the region." Those two objectives are made realistic, says the GAO, by the "low level of military threat in the Arctic" and by "the stated commitment of the Arctic nations to work within a common framework of diplomatic engagement."³

Sea-based nuclear weapons in the Arctic are strategic – which is to say, they are meant to influence, not regional defence dynamics or territorial ambitions, but the global postures and deterrence strategies of the United States and Russia.

1. Nuclear-armed submarines in the Arctic^{4 and 5}

Russia now operates up to 12 submarines whose sole mission is to carry intercontinental nuclear-armed ballistic missiles (such subs are designated SSBNs). Three of these are the new “Borei” ballistic missile subs. Each Borei SSBN can carry 16 Bulava sea-launched ballistic missiles (SLBM), each armed with up to six nuclear warheads. And each Borei has six tubes for launching heavy weight torpedoes. The Russian SSBN fleet also includes six Delta VI subs, also with a capacity for 16 missiles, each carrying up to four warheads, plus four tubes each for heavy weight torpedoes. The remaining three boats in the current SSBN fleet are Delta III subs with a capacity for up to 16 missiles (up to three warheads each) and four tubes each for heavy weight torpedoes plus two tubes for light weight torpedoes. None of the torpedoes is nuclear-armed, while the fleet’s ballistic missiles have the combined capacity to launch 768 warheads, although only some of the subs are normally on patrol, and not all missiles will be armed to their full capacity of warheads. The US Congressional Research Service estimates that Russia currently has about 640 sea-launched warheads available for deployment.⁶ At least seven of the Russian SSBNs are assumed to be deployed with the Northern fleet and based on the Arctic’s Kola Peninsula.

The Russian SSBN modernization program is intended to increase the Borei fleet to eight submarines by the mid-2020s, replacing the Delta VI and III subs, thus reducing the overall SSBN force, Hans Kristensen and Robert S. Norris of the authoritative *Nuclear Notebook* note that the future Russian SSBN fleet of exclusively Borei subs will be capable of carrying more warheads than does the current fleet, thus heightening the target value of each SSBN.⁷ More warheads on fewer subs is a destabilizing development inasmuch as the pre-emptive disabling of these second-strike deterrent forces may be viewed as more feasible, and hence more tempting. Largely for that reason, it is anticipated that the Kremlin will order another four of the Borei subs, for a fleet of 12 to be equally divided between the Pacific and the Arctic.

The US has 14 nuclear ballistic missile submarines (SSBNs),⁸ each capable of carrying 24 inter-continental range ballistic missiles (the Trident II D5), but now, modified to comply with the New START Treaty, they carry 20 missiles each. Normally, two of these boats are in overhaul and not considered operational – so the usual count is 12 operational American SSBNs, carrying up to 240 missiles (even though not all 12 are always on patrol, and those on patrol do not necessarily carry the full complement of 20 missiles). Each missile is capable of being armed with eight nuclear warheads, but the average payload is said to be four to five warheads, leading to the current *Nuclear Notebook* count of 1,090 warheads on 12 deployed SSBNs. Each sub also has four tubes for launching heavy weight torpedoes. Eight to 10 subs are at sea at any given time, four or five of which are considered to be on “hard alert,” with another four or five capable of being brought to alert status within hours or days. American SSBNs do not patrol in the Arctic.

US nuclear “modernization” of the SSBN fleet includes the upgrading of current missiles with new guidance systems to enhance targeting. The more consequential “modernization” has the Pentagon planning to replace the existing subs with 12 new nuclear weapons submarines and the Congressional Budget Office estimates that development and capital acquisition costs will be in excess of \$80 billion in today’s dollars (or about \$7 billion each),⁹ and that does not include maintenance and operating costs or the cost of their nuclear weapons. Even the Navy is worried that things are getting out of hand, with the SSBNs robbing it of the funds it needs to pay for all the other ships it has planned. So the Navy has come up with a novel solution – create a special and separate “National Sea-Based Deterrence Fund” so that the Navy’s regular budget won’t have to cover the SSBNs.¹⁰

It's worth noting that China is also acquiring a significant fleet, possibly five, of nuclear-powered ballistic missile submarines (SSBNs).¹¹ According to the *Bulletin of the Atomic Scientists*, each of these is designed to carry up to 12 intercontinental ballistic missiles with one nuclear warhead each. The missiles are thought to have a range of 7,000 to 7,400 kms, which means that from patrols in waters near China, the missiles could reach Alaska and Hawaii, but not the continental US. It's not clear whether the Chinese have sent their SSBN on any patrols with nuclear weapons on board. The current Jin-class SSBN is said to be "very noisy," and analysts assume that China will go on to develop a next generation SSBN.¹²

2. The attack submarines that trail the nuclear-armed subs

Attack submarines do not currently carry nuclear weapons. Ever since the US/Soviet 1991 Presidential Nuclear Initiatives,¹³ American and Russian attack submarines have not carried tactical nuclear weapons (the strategic nuclear weapons are deployed on the SSBNs). Current attack submarines on both sides are capable of carrying tactical range cruise missiles with nuclear or conventional warheads, and the current assumption is that only conventionally armed cruise missiles are now deployed. They have conventional weapons designed to attack other submarines, including SSBNs, as well as surface ships. Stealth in attack submarines is achieved by minimizing noise to avoid detection. Virtually all attack submarines are capable of operating under ice.

Russia currently operates¹⁴ 49 attack submarines, 26 of which are nuclear-powered of various classes and equipped with heavy weight torpedoes and anti-ship and anti-submarine missiles, and can be fitted with land attack cruise missiles. The rest are 23 diesel-electric attack submarines (SSNs) with similar armaments. The diesel-electric subs are regarded as among the world's quietest subs. The US currently operates¹⁵ 54 nuclear powered attack submarines,¹⁶ all are armed with heavy weight torpedoes, and most also have tactical range land attack cruise missiles – all with conventional, or non-nuclear, warheads. About 60 percent of American attack submarines operate in the Pacific and 40 percent in the Atlantic, with regular forays into the Arctic.

In 2015 an American Seawolf variant of attack submarine (these are said to be quieter and faster than the other attack subs, but they also proved much more expensive, and thus production ended in the 1990s after only three were built) spent two months submerged under the Arctic ice,¹⁷ and in 2013 another Seawolf travelled from Washington State on the American west coast to Norway via the Arctic Ocean.¹⁸ Included in the total inventory of attack subs are 12 newer versions, the Virginia-Class, of which more are being built. They also engage in intelligence gathering and can also carry "unmanned undersea vehicles." Another four Ohio-class, or SSBN ballistic missile submarines, have been converted to attack submarines (SSGNs) carrying conventionally armed land-attack cruise missiles. The Pentagon is planning to maintain 4,000 conventionally-armed sea-launched cruise missiles (and these, of course, are in addition to air-launched cruise missiles).¹⁹

Tracking or chasing SSBNs on patrol is a dangerous but growing focus of attack submarines. A March 2018 Pentagon report, "Commander's Intent for the United States Submarine Force," describes "the main role" of US attack submarines as being to "hold the adversary's strategic assets at risk from the undersea," notably including SSBNs on patrol²⁰ - and those strategic anti-submarine warfare (ASW) patrols include the Arctic.

In other words, the US defines strategic anti-submarine warfare as a priority, the further development of which is taken to be an integral part of its nuclear force's modernization program. The Pentagon's 2018 strategy refers to "developing options to counter competitors' coercive strategies"²¹ – including sea-based nuclear forces.

Arctic Patrols

Every two years the US Navy conducts an Ice Exercise (ICEX) in the Arctic as part of the U.S. Navy Submarine Arctic Warfare program sponsored by the Chief of Naval Operations, Undersea Warfare Division. This biennial Arctic submarine exercise goes back to the 1940s. In addition to these staged exercises, US attack submarines regularly patrol under the Arctic ice, sometimes surfacing near the North Pole,²² and this combination of formal exercises and routine patrols is the primary means by which the attack submarine fleet “develops and hones its Arctic operational and warfighting skills.”²³

In the 2016 ICEX exercise, a five-week event designed specifically to assess the operational readiness of the submarine force, as well as support research for the Navy’s Arctic Submarine Laboratory,²⁴ two Los Angeles class attack submarines participated in the Arctic operations. The United Kingdom also let it be known in 2016 that it was also resuming Arctic patrols.²⁵ In 2018, ICEX involved two attack subs (Connecticut and Hartford) and the under-ice firing of Mk-48 torpedoes that carried sensors to gather data on their performance in Arctic conditions. The British Navy sent its HMS Trenchant attack submarine. The training operations took place in March in the Beaufort Sea.²⁶ The three submarines conducted joint operations in the Beaufort Sea from March 7-21, and then rendezvoused and surfaced at the North Pole on March 27, 2018. Collectively, the three subs carried out 20 through-ice surfacings.²⁷

The Hartford’s Commander characterized the point of the training to keep from “falling behind” Russian submarine development. And the squadron commander told reporters that “in every case [the Russians] are trying to get faster and better at what they do and integrating technology into their platforms. It’s really sent them on a ramp to where if we don’t continue to do the same, we’ll find ourselves in a place of falling behind.”²⁸

Canadian forces participated in ICEX 2018, but Canada’s diesel-powered submarines were not involved.²⁹ Historically, Canada has participated in tactical and some strategic anti-submarine warfare (ASW) operations. According to the Canadian Naval Review, Canada traditionally contributed primarily to protecting sea lanes of communication from Soviet attack subs. Strategic planning in the Cold War was in part premised on the possibility of a long war in Europe, for which allies would depend on reinforcements from North America. Strategic ASW against Soviet SSBNs was of less direct concern “the Soviet Union soon had intercontinental sea-launched missiles that could hit targets from submarines based in its home waters.” That tactical/strategic distinction in ASW was an important one, according to the Naval Review account, but Canada actually developed doubts about the utility of both. Analysts increasingly assumed that any European war would go nuclear early on, rendering conventional reinforcement of Western Europe unlikely and ASW protecting sea-lanes irrelevant.³⁰

3. ASW and Strategic Destabilization

Strategic anti-submarine warfare (ASW) – i.e. sending attack submarines in pursuit of ballistic missile submarines (SSBNs) – is a classic destabilization scenario. Because deterrence is all about a reliable second-strike or retaliation capacity, effort to render second-strike forces vulnerable inevitably create incentives to expand those retaliatory second-strike forces to overwhelm any threat to them, And, in a crisis, they create incentives for retaliatory forces to launch their weapons early to prevent them from being taken out in an adversary’s pre-emptive attack (the use ‘em or lose ‘em scenario). And in any deep political crisis, the definition of instability, and the epitome of danger, is for both sides to become convinced that initiating nuclear attack would be to their advantage.

In the deadly logic of deterrence, the “virtue” (although it’s a word that ought not to be used in relation to nuclear weapons) of SSBNs has been that they have represented survivable deterrent forces and thus remove incentives for an adversary to introduce nuclear weapons into a conflict, since any first use of nuclear weapons would with certainty face retaliation. So, the only point of attack submarines tracking and targeting an adversary’s SSBNs is to undermine that assured retaliation by threatening a pre-emptive attack – that is, to demonstrate a capacity to destroy an SSBN before it could fire its SLBMs. And if SSBNs were to be rendered genuinely vulnerable to attack submarines, that would generate incentives for the SSBN to fire its missiles early, in the context of a severe crisis, before being attacked.

This danger is growing as both the US and Russia focus on building up their anti-submarine warfare and ballistic missile defence capacities, while also moving to more accurate offensive ballistic missiles. In early November 2018, a US official told a submarine symposium that “the handcuffs are off now” – by which he meant that under a new Administration the Navy is now free to pursue more intensified levels of strategic ASW. He referred to the US as being back “in a great power competition now,” in which no adversary will “get a free ticket.”³¹ A particular initiative involves the development of more lethal torpedoes with which to threaten SSBNs.

That doesn’t mean ASW is easy, or that there are imminent prospects for effective pre-emptive attacks to eliminate an entire fleet of SSBNs. Military planners have assumed that the US would need five attack submarines to track a single adversary SSBN (and even more, once an SSBN gets to an open ocean undetected). But instability is still heightened by the threat of vulnerability and the declared intention to escalate SSBN tracking through training and modernization – meaning that an adversary is led to fear that the theoretical vulnerability of SSBNs could one day become real. Thus, states will be more inclined to add more SSBNs so as to outpace anti-submarine capacity. It’s what is called an arms race.

4. Ending the nuclear cat and mouse maneuvers at sea

Again within the logic of deterrence, it has long been understood that as long as strategic arsenals face-off against each other, sea-based elements of those arsenals are the least vulnerable to pre-emptive and the most survivable second-strike deterrent forces. And as long as SSBNs remain largely invulnerable to pre-emptive attack, they remove any incentive for an adversary to introduce the use of nuclear weapons into a conflict – assuming that retaliation would be certain and devastating. Throughout the Cold War, this was a prominent theme in the arms control community seeking strategic stability – namely, the recognition that as long as a nuclear confrontation exists, stability is reinforced if SSBNs are able to patrol out of reach of an adversary’s ASW forces.

Thus, for example, some arms control analysts advocated for SSBN bastions where ASW forces would, by agreement, not patrol.³² That would be stabilizing in several ways. For example, if Russian SSBNs in their Arctic bastions were reliably free of ASW patrols, they would have no need to head for the open Atlantic and Pacific Oceans, inevitably deploying closer to North American and European coasts. Such deployments would in turn mean reduced warning times and would thus reinforce launch on warning protocols and would further entrench resistance to de-alerting of land ICBMs. Being pressed by attack submarines would also incentivize Russia to put submarines on high alert status and to prepare first-strike, pre-emptive strike, protocols.

That begs the question, why, then, would the US consider it to its advantage to step up ASW patrols against Russian SSBNs in the Arctic?

The same question applies to efforts to threaten Chinese SSBNs. Despite current range limitations of its SLBMs, China is attempting to build a bastion for its SSBNs by building artificial islands, deploying underwater sensors, and investing in improved tactical ASW defence capabilities.³³ And according to a new study on the impact of US ASW activity,³⁴ China has called on the US and its allies to refrain from threatening Chinese SSBNs in the interests of strategic stability, inasmuch as threats to the survivability of Chinese SSBN forces undermine stability. The Obama Administration was committed to maintaining strategic stability with China, and while the Trump Administration has not specifically indicated a departure from that posture, a former naval intelligence official recently argued before Congress “that every time a [Chinese] SSBN departs on a strategic nuclear patrol, the [US Navy] must follow closely enough to be ready to sink them if they ever attempt to launch a nuclear tipped ICBM towards our shores.” China’s small nuclear force is by definition a minimum deterrence force, a strictly second-strike force, and it certainly could not credibly launch a disabling first-strike against US forces. So the Pentagon, in tracking Chinese SSBNs, is really seeking the capability, not of preventing a Chinese first-strike, but of nullifying China’s second-strike or deterrent. The implied American concern is that if the Chinese deterrent was left unchallenged, it would “remove the option for the United States to conduct a first-strike against Chinese nuclear forces in a crisis.”³⁵ In other words, American strategic ASW operations against China are about giving the US a nuclear war-fighting option.

Attack submarine no-go zones or SSBN “sanctuaries”

Arms control and risk reduction measures are available to mitigate these destabilizing trends. Mikhail Gorbachev’s 1987 “Murmansk Initiative” proposed limits on Western anti-submarine warfare patrols in Arctic waters that were the traditional operational areas for the Russian Northern and Baltic fleets. Gorbachev envisioned a no-go area for submarine and aerial ASW operations that would extend south of the Arctic Circle, proposing to exclude surface and subsurface military vessels from “mutually agreed-upon zones of international straits and intensive shipping lanes,” with the precise dimension of these no-go areas to be sorted out at a meeting of experts from interested countries.³⁶

The Inuit Circumpolar Council, through its President, Mary Simon, responded positively to Gorbachev’s “zone of peace.” The ICC called on the Arctic to be nuclear-weapons-free and encouraged that major powers to pursue arms control measures that would reduce the arms buildup on the Kola Peninsula. It called on them to examine limits on naval forces and operations in the Arctic with a view to “advancing arms control and the common security of all nations.”³⁷

Before the Gorbachev idea of ASW-free zones had been floated, the Canadian analyst Ron Purver argued in 1983 that although the feasibility of putting limits on ASW activities was declining, it was the early Reagan era, the desirability of such measures was increasing.³⁸ As land-based missiles in fixed locations became more vulnerable to pre-emptive attack, the deployment of sea-based strategic nuclear missiles would, within the deterrence paradigm, be a stabilizing presence as survivable second-strike or retaliatory forces. That in turn meant that, if the rationale for SSBNs was their relative invulnerability, it would be counter-productive to try to render them vulnerable through ASW efforts. Hence, for some analysts at least, the pursuit of measures to limit destabilizing strategic ASW became a prominent arms control and risk reduction objective. Proposals involved agreements to curtail the tracking of SSBNs and the establishment of SSBN sanctuaries or ASW-free zones. Such zones were proposed for the Gulf of Alaska, the Sea of Okhotsk, and the Barents Sea, and as Purver pointed out, these zones were all within what were essentially coastal defence areas and thus capable of being patrolled and protected by their respective defence forces, including tactical ASW forces. There were also proposals for negotiated limits on ASW vehicles, the idea being that if attack subs were kept to no more than two or three times an adversary’s SSBNs, it would be impossible to track all SSBNs simultaneously. For the same reasons, there were also proposals to confine sea-bed detection devices to areas near national waters and coasts.

Russian SSBNs, can now operate largely within their bastions. They can reach all their targets from there, and thus Russian SSBNs have little need to leave their Arctic bastions in order to perform their deterrence role – provided they are not made vulnerable there by aggressive ASW patrols. This point was made by Maj.-Gen. William Seymour, Deputy Commander of the Canadian Joint Operations Command, to the House of Commons Standing Committee on Foreign Affairs:

“[T]his is not the 1960s, 1970s or 1980s, when Russian submarines might be lurking behind every corner. These days, based on technological advances, ...the Russians can launch weapons against North America from their home bastions within their territory or slightly outside. The notion that Russian submarines...would have to travel underneath the ice in Canada's north to do their business is technologically out of date.”³⁹

The Arctic is thus an obvious candidate for becoming an attack submarine exclusion zone, and reciprocity would require that the US designate an ASW-free zone for its SSBNs and that both the US and Russia refrain from deploying SSBNs close to each other's territories. In a 2009 proposal, the Russian and American physicists Anatoli Diakov and Frank von Hippel⁴⁰ called on the two countries to “reduce the launch readiness of their submarine-based ballistic missiles and commit not to deploy ballistic-missile submarines provocatively close to each other's territories. Specifically, the United States could declare that its ballistic missile submarines would not patrol in the North Atlantic, which drastically reduces Russia's warning time, and Russia could declare that the ballistic-missile submarines of its northern fleet would stay in the Arctic and not patrol off the U.S. East Coast as they did, on occasion, during the cold war. Russia could extend this ‘de-alerting’ commitment to its mobile missiles. The United States could increase Russian confidence in the survivability of Russia's ballistic-missile submarines by pledging that it would keep its attack submarines out of Russia's side of Arctic.” Similarly, Russia would also have to respect a stabilizing ASW-free zone in or near US national waters.

The logic of their own deterrence requirements should drive the US and Russia to welcome strategic ASW-free zones – that is, zones in which their own ballistic missile carrying submarines would be free of threats of pre-emptive attacks from anti-submarine warfare subs (aided by ASW aircraft). And, given the prominent presence of Russian SSBN forces in the Eastern Arctic, the Arctic is a logical location for at least a Russian ASW-free zone.

Notes

¹ See the Arctic Institute's four-part series on “Russia's Arctic Strategy.” Part II focuses on the military and security. Pavel Devyatkin, “Russia's Arctic Strategy: Military and Security (Part II),” The Arctic Institute, 13 February 2018. <https://www.thearcticinstitute.org>

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¹³ In separate unilateral statements in September and October 1991, Presidents George H.W. Bush and Mikhail Gorbachev undertook to stop deploying tactical nuclear weapons on surface ships and attack/all-purpose submarines.

¹⁴ *The Military Balance 2018*, International Institute of Strategic Studies. <https://www.iiss.org/publications/the-military-balance/the-military-balance-2018>

¹⁵ The following is taken from the US Department of Defense, Navy, list of currently operational submarines, <http://www.navy.mil/navydata/ships/subs/subs.asp>, and "United States Submarine Capabilities," The Nuclear Threat Initiative, 23 July 2013. <http://www.nti.org>.

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¹⁷ Barbara Starr, "US submarine returns from Arctic mission," CNN, 31 August 2015. <http://www.cnn.com>.

¹⁸ David Axe, "The 'Secret' Submarines the US Navy Doesn't Want to Talk About (And Russia Fears)," The National Interest, n.d. accessed 24 November 2016. <http://nationalinterest.org>.

¹⁹ Steven Pifer, "Nuclear Arms Control Choices for the Next Administration," Brookings Arms Control and Non-Proliferation Series, Paper 13, October 2016.

²⁰ Commander's Intent for the United States Submarine Force and Supporting Organizations, Commander, US Submarine Forces, March 2018. www.public.navy.mil/subfor/hq

²¹ Summary of the 2018 National Defense Strategy, US Department of Defense. <https://dod.defense.gov/Portals/1/.../2018-National-Defense-Strategy-Summary.pdf>

²² Siemon T. Wezeman, "Military Capabilities in the Arctic: A new Cold War in the High North?" SIPRI Background Paper, 2016.

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