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The U.S. Must Respond to North Korea's Emerging Submarine-Launched Ballistic Missile Program

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KEY TAKEAWAYS

The DPRK has clearly made progress on its ballistic missile submarine and sea-launched ballistic missile programs, potentially expanding its nuclear capability.

North Korea's expansion of its nuclear force from a land-based monad to a land-based and sea-based dyad will increase the danger to U.S. and allied interests.

The U.S. should work with allies to bolster deterrence, improve anti-submarine warfare capabilities and missile defenses, and counter DPRK proliferation efforts.

The Democratic People's Republic of Korea (DPRK or North Korea) is in the midst of developing programs for both submarine-launched ballistic missiles (SLBMs) and ballistic missile submarines (SSBs), potentially expanding the credibility, flexibility, and survivability of its current land-based nuclear force. Expansion of the DPRK's nuclear force from a land-based monad to a land-based and sea-based dyad could increase the danger to the U.S. homeland and deployed American military forces in the Pacific in addition to threatening our Asian allies in Japan and the Republic of Korea (ROK or South Korea).

The deepening and diversification of the DPRK's nuclear arsenal from a monad to a dyad would increase the overall military threat from North Korea and could complicate U.S. and allied policymaking, strategic deterrence, and ongoing diplomatic efforts

to denuclearize the Korean Peninsula. Development and possible operational deployment of the SLBMs aboard conventionally powered SSBs would also expand the intelligence, military operational, missile defense, and anti-submarine warfare (ASW) requirements of the United States and its Japanese and South Korean allies.

In July, North Korean leader Kim Jong Un said in a speech that "[w]e have become able to reliably defend ourselves against any form of high-intensity pressure and military threat by imperialist reactionaries and other hostile forces" and that "[t]hanks to our reliable and effective self-defense nuclear deterrence, the word 'war' would no longer exist on this land, and the security and future of our state will be guaranteed forever."[1] In January, Kim had proclaimed that North Korea will "shift to a shocking actual action to make [the U.S.] pay for the pains sustained by our people," warning that "the world will witness a new strategic weapon to be possessed by the DPRK in the near future."[2]

Then, on September 5, it was reported North Korea may reveal a new strategic weapon system, including a novel SLBM, at a military parade or conduct an SLBM test on or around October 10 in commemoration of the 75th anniversary of the founding of the Korea Workers' Party, one of North Korea's most notable holidays.[3] Accordingly, in response to North Korea's emerging SLBM and SSB programs, the United States should:

- In conjunction with its Japanese and ROK allies, bolster political and military deterrence and capabilities in the Pacific to deter, dissuade, and if necessary destroy the North Korean nuclear threat against the United States, Japan, and South Korea;

- Alongside enhanced deterrence and economic sanctions enforcement, keep the door open to nuclear negotiations with the DPRK with a view to bringing enduring peace and security to the Korean Peninsula;

- Concurrently work to improve American, Japanese, and South Korean anti-submarine warfare capabilities and missile defenses to undermine the emerging North Korean SLBM threat; and

- Guard against the potential proliferation of North Korean SSB and SLBM weapons and technology beyond the Korean Peninsula, especially to Iran.

The Submarine-Launched Ballistic Missile

The first SLBM dates back to the early 1960s and the U.S. Navy's Polaris program. Today, although it can be launched from the surface, for purposes of stealth, an SLBM is usually launched from a submerged, underway submarine.

Firing an SLBM from a submerged submarine differs from a land-based ballistic missile launch. Generally, an SLBM is propelled from the submarine's launch tube using an explosive charge that creates a "steam cannon." The steam overpressure drives the missile from the launch tube toward the water's surface. Once the missile breaches the water's surface, the SLBM's rocket motor engages, pushing the missile into its boost stage. After a period of upward flight, the SLBM's guidance system operates to send the missile toward its intended target.[4]

SLBMs and Nuclear Strategy

Like other strategic weapons, SLBMs can play an important role in nuclear plans, policy, and strategy. For instance, because of their potential retaliatory value, these missiles can be used to dissuade or deter enemy attacks. An SLBM can also grant an actor a punitive, preemptive, or preventive first-strike capability to delay or deny an opponent's attack.

These weapons can give an SLBM-possessing state added political and military leverage in diplomatic negotiations and crisis management. In addition, due to the unique properties of the ocean (e.g., temperature gradients or "thermoclines") and advanced silencing capabilities, capable submarines and commanders can move furtively through the Earth's vast waters, making them harder to detect and track.

With these unique capabilities, SSBs can function as the most survivable nuclear deterrent or strike platform in a nuclear state's arsenal. In general, while the locations of airfields that can support nuclear-capable bombers and intercontinental ballistic missile fields are fixed and locationally well-known, modern, mobile, sea-based (or land-based) ballistic missiles can be difficult to track and target.

In sum, because of its mobility, stealth, and survivability in the world's oceans, the SSB can both provide potent strike and deterrence capabilities to an adversary's armed forces and significantly enhance its government's ability to influence events.

SLBMs, Nuclear Force Structure, and North Korea

Traditionally, nuclear strategists have maintained that to field a credible, flexible, and survivable nuclear deterrent, a nation must possess a

full nuclear triad featuring air-based, sea-based, and land-based nuclear weapons. The preface to the U.S. Department of Defense's *2018 Nuclear Posture Review*, for example, notes that maintaining America's nuclear triad "is the most cost-effective and strategically sound means of ensuring nuclear deterrence."[5]

For smaller and less powerful countries like North Korea, fielding a full nuclear triad may be challenging or impractical for a number of reasons such as technology development and availability, defense capability, or cost. The comparative difference between U.S. and North Korean national security needs also might suggest that a triad may not be necessary for Pyongyang.

With the advent of its SSB/SLBM program, Pyongyang appears to be pursuing a nuclear dyad, adding to its mobile, land-based ballistic missile arsenal, including missiles of various ranges from short-range through intercontinental ballistic missile (ICBM)–range.

A recent confidential United Nations report reflects that, despite the absence of a nuclear ballistic missile test that would provide empirical proof of its capability, North Korea has probably developed a nuclear warhead for its ballistic missile force. According to a news account, "The report by an independent panel of experts monitoring U.N. sanctions said the countries, which it did not identify, believed North Korea's past six nuclear tests had likely helped it develop miniaturized nuclear devices." The U.N. report also reportedly warned that the DPRK "may seek to further develop miniaturization in order to allow incorporation of technological improvements such as penetration aid packages or, potentially, to develop multiple warhead systems."[6]

The United States has held a similar assessment at least since 2015:

> U.S. officials, including four-star commanders, have publicly stated that North Korea can deliver miniaturized nuclear weapons via missiles.... South Korea assessed that North Korea was able to produce nuclear warheads for the Scud and No Dong missiles, which puts U.S. bases in South Korea and Japan under threat. South Korea media reported in 2017 that Seoul had reached that conclusion in 2014, but deliberately downplayed that capability in public.[7]

If these assessments are accurate, such advances may also benefit the SLBM program. As a result, though not a full nuclear triad, adding a mobile, at-sea capability to its mobile, land-based capability—also difficult to detect, track, and destroy itself—could be strategically beneficial for the DPRK in its hostile, contentious relations with the United States, South Korea, and Japan.

MAP 1

Submarine Operating Areas Around the Korean Peninsula

North Korea's efforts to develop an SSB/SLBM program complicates its already hostile relations with the U.S., South Korea, and Japan. Additionally, environmental features of the waters around the Korean Peninsula provide challenges to offensive and defensive sub operations.

SOURCE: Heritage Foundation research.

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North Korean Submarines: A Brief Overview

North Korea has operated a submarine program for nearly five decades. Today, the Korean People's Navy (KPN) submarine fleet is among the largest—though not the most capable—in the world, running alongside the United States and China in numbers.[8]

During the mid-1970s, the DPRK acquired seven diesel-electric *Romeo*-class attack submarines (SS) from China, eventually acquiring the capability to manufacture them domestically.[9] These 1950s-era Soviet boats are considered outdated and acoustically noisy—a significant disadvantage.[10] In the mid-1990s, Pyongyang shifted

production in favor of the slightly more modern *Sang-O*-class coastal submarine (SSC).[11]

U.S. and South Korean defense officials estimate that the KPN's submarine fleet consists of roughly 80 mostly aging submarines, with the main submarine force consisting of about 20 *Romeo*-class and 40 *Sang-O*-class boats as well as 20 *Yugo*-class and *Yono*-class mini-submarines.[12] North Korea may also possess a number of Soviet-era *Golf*-class submarines (SSG) that reportedly were bought for scrap in the 1990s and, although none are believed to be operational at this time, could have provided North Korea with insights into ballistic missile submarines.[13]

According to the 2018 ROK Defense White Paper, KPN submarines are intended mainly for littoral operations and are "designed to disrupt sea lanes, lay mines, attack surface vessels, and assist special operations units' infiltration."[14]

North Korea is also developing conventionally powered ballistic missile submarines.

North Korean Ballistic Missile Submarines

The first indications that Pyongyang was working on an SSB surfaced in 2014. In August of that year, a newspaper report claimed that U.S. intelligence analysts had spotted a missile launch tube on a North Korean submarine, possibly a Chinese *Romeo*-class or Russian *Golf*-class submarine.[15] Shortly thereafter, the South Korean Joint Chiefs of Staff released a statement indicating that it was "analyzing some signs that indicate the possibility of a North Korean submarine equipped with a missile."[16]

These suspicions were confirmed in January 2015 when commercial satellite imagery revealed a seemingly indigenously designed, diesel-electric KPN submarine equipped with one to two missile launch tubes.[17] The North Koreans refer to this new boat as the Gorae (or "whale"). In the U.S. intelligence community, the experimental ballistic missile submarine (SSBA) is referred to as Sinpo-B, likely referring to the Sinpo South Shipyard on North Korea's East Coast where it is was first noted and is now home-ported.[18] As noted, the Gorae/Sinpo-B is considered experimental, and the boat's small size and current missile capability call into question whether Pyongyang intends to use it beyond its use as a test platform and deploy it operationally.[19]

Since 2017, reports have circulated that Pyongyang was also developing a larger SSB as a follow-on to the Gorae, which analysts named the Sinpo-C, located as well at the Sinpo South Shipyard.[20] Instead, in July 2019, while

SOURCE: Office of the Secretary of Defense, "Military and Security Developments Involving the Democratic People's Republic of Korea," https://media.defense.gov/2018/May/22/2001920587/-1/-1/1/REPORT-TO-CONGRESS-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-DEMOCRATIC-PEOPLES-REPUBLIC-OF-KOREA-2017.PDF (accessed September 17, 2020).

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the existence of two distinct SSB projects was not dismissed, a modified diesel-electric *Romeo*-class (Romeo-Mod) attack submarine (SSK) was revealed in a photo involving Kim Jong Un at Sinpo South Shipyard.[21]

This modified version of the Romeo SSK has a few potential advantages over a new Sinpo-C hull. For instance, by passing on a new construction hull in the Sinpo-C and using a tested, existing hull, North Korea could minimize the sea trails required for a new build. In other words, the KPN could focus more on SLBM development and deployment than on the naval engineering and potentially lengthy, challenging sea trials of a newly designed

and constructed hull. The use of an existing but modified Romeo SSK hull would mean that North Korea might be able to create an operational SSB fleet of active boats sooner and less expensively than it could with a new construction hull.[22]

The Romeo-Mod also has increased sail size, which may allow the KPN to have space for up to three missile launch tubes.[23] More missiles means more warheads, which is especially noteworthy if North Korea develops multiple warhead missiles, as some believe it is doing.

While the Romeo-Mod boat may provide more missile tubes, however, the submarine likely will still have engineering and other performance issues in comparison to those of more modern militaries. For instance, unlike nuclear-powered submarines, which can remain submerged for long periods of time, diesel-electric boats run on batteries when submerged, which allows these boats to run relatively quietly. But to charge their batteries, diesel-electric submarines must operate their diesel engines, which requires access to air, requiring them to surface (or use a snorkel)—an evolution that leaves diesel boats more vulnerable to detection.[24]

There are also operating range limitations. According to one analysis:

> Given the Gorae's reliance on diesel-electric engines and lack of an air-independent propulsion (AIP) system, the submarine can only remain submerged for a few days. This limits the Gorae to an effective range of an estimated 1,500 nautical miles, holding South Korean and Japanese targets at risk but precluding its ability to attack U.S. mainland targets.[25]

Of course, the Romeo-Mods, if introduced into service, could have improved engineering plants, which might allow North Korean submarine deployments into the Pacific as crews gain experience at sea, resulting in a threat to targets at greater distances.

Pyongyang's SLBMs

In 2016, several decades after the United States had launched Polaris, North Korea conducted its first successful test of an SLBM. Pyongyang named its program Pukguksong (or "Polaris") in a possible reference to America's groundbreaking SLBM program.

While public accounts vary with respect to the actual missile launch platforms used for the test—whether from a submerged test launch barge or from a submarine—the DPRK has seemingly launched at least one version of its two SLBMs from a submarine. According to the U.S. Defense

Intelligence Agency (DIA), "Following a successful flight test of its SLBM from a submerged submarine in September 2016, and a second successful launch in May 2017, Kim approved deployment of the land-based variant [of the missile]."[26]

An open-source assessment further indicates that in 2016, North Korea did successfully launch a Pukguksong-1 (or KN-11), a two-stage, solid-fueled SLBM, from the KPN's Gorae SSBA, which sat "submerged off the port city of Sinpo."[27] Shot on a lofted trajectory, the SLBM flew for roughly 500 kilometers (km), entering Japan's air defense identification zone (ADIZ) before splashing into the Sea of Japan.[28] If fired on a standard ballistic missile trajectory, the maximum range of the Pukguksong-1 appears to be around 1,000 km.[29] At this expected range, a North Korean SSB armed with a KN-11 could strike all of South Korea and most of Japan while sitting in port at Sinpo or even just offshore in more secure DPRK territorial waters.

Evidence of a second, more advanced North Korean SLBM variant emerged in August 2017. An image from one of Kim Jong Un's public visits featured an operational diagram for a new SLBM: the Pukguksong-3 (or KN-26).[30]

Three years later, in 2019, Pyongyang successfully tested the Pukguksong-3, likely from a submerged barge, off the coast from Wonsan.[31] Like the KN-11, the KN-26 is a two-stage, solid-fueled SLBM.[32] In the longest North Korean SLBM test to date, the Pukguksong-3 flew on a lofted trajectory, climbing to 950 km above the Earth's surface and traveling 450 km before splashing into the sea within Japan's Exclusive Economic Zone (EEZ).[33] If fired on a standard missile trajectory for distance, the missile would have traveled some 2,000 km.[34] At this range, a North Korean submarine could strike the entirety of South Korea and Japan without leaving Sinpo port. To achieve this increase in range, the missile "may incorporate an advanced lightweight airframe built out of composite materials."[35]

However, at this point, while U.S. forces stationed or deployed in Northeast Asia are in harm's way, Pyongyang cannot seemingly strike Guam, Hawaii, or Alaska with a KN-26 SLBM unless an SSB were to deploy outside local waters into the greater Pacific Ocean.[36] The obvious next step for the North Korean SLBM program would be for the KPN to test fire a KN-26 from an SSB, possibly a Romeo-Mod when available. In addition to solving technical issues, there very likely are international political decisions and calculations involved in undertaking such a test launch.

MAP 3

North Korea's Submarine-Launched Ballistic Missiles

North Korea is expanding its military might by developing SLBMs and SSBs. The SLBMs currently have ranges between 1,000 and 2,000 kilometers, which means they can reach targets from friendly waters, including U.S. forces deployed to South Korea and Japan.

SOURCE: Heritage Foundation research.

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Political and Military Risks and Challenges

At this point, the DPRK SSB/SLBM program is not deemed to be operational, and North Korean SSBs are not on operational patrol in the Sea of Japan, Yellow Sea, or beyond. Test flights of the SLBMs indicate that they currently represent a potential regional, not global, threat. Moreover, there are still many unanswered questions. For instance:

- What are the plans for the SSB or SLBM programs?
- How many boats might comprise the SSB fleet?
- Will the SLBM program attempt to achieve ICBM-range capable of striking the U.S. homeland?
- What affect will the programs have on DPRK nuclear plans and policy?
- Will the SLBMs be conventionally armed, nuclear-armed, or both?
- Might the North Koreans receive international assistance that may accelerate or improve the submarine and missile programs?
- What about nuclear command and control for North Korea's SSBs?

The answers to these questions—and others—will drive U.S. and allied political and military policies.

Whatever the answers to these questions are, however, the benefits that will almost certainly accrue to Pyongyang from its successful development and likely eventual deployment of an SSB program and a likely nuclear-armed SLBM will complicate dealing with the rogue state.

Like its ascension into the once-exclusive nuclear weapons club in 2006, the SSB/SLBM program, if successful, will again elevate North Korea into a small group of countries with SLBM capability, providing domestic and international notoriety to the regime. At home, despite the prevalence of economic privation and political repression and punishing international economic sanctions, the regime will use its technological achievement to try to generate pride in the Kim family's dynastic rule and the North Korean Juche ideology of self-reliance.

The deployment of and threat from an SLBM-armed SSB can be expected to raise the DPRK's political influence and leverage in the international system, especially in the region, enhancing the prospects of regime survival—Pyongyang's top priority. Consequently, North Korea will be able to exert its interests more fully with both friend and foe.

It will also likely increase the confidence of the young North Korean leader both at home and abroad, complicating efforts to engage Pyongyang, especially in any attempts to negotiate the denuclearization of the Korean Peninsula. The addition of a sea-based nuclear force will give Pyongyang additional clout at any nuclear talks and raise the expected costs of reaching any enduring arms control agreement—something that already has proved very difficult.

Concerns about weapons proliferation also exist. North Korea's quiet but ongoing relationship with Iran is a prime example, especially given the interest that both countries have shown in submarines and missiles.[37]

Of course, should North Korea succeed in operationalizing its nuclear dyad, the results will diversify and complicate the DPRK's military threat to its enemies and potential adversaries, including the United States, South Korea, and Japan. At current range capabilities, whether conventionally armed or nuclear-armed, from in port or friendly waters, these SLBMs pose a threat to tens of thousands of U.S. forces forward-deployed to Japan and South Korea.

In 2017, as evidence of the DPRK's possible hostile intentions, North Korea test launched ballistic missiles into the Sea of Japan, possibly simulating an attack on U.S. forces in Japan.[38] An increase in the SLBM's range or the deployment range of SSBs beyond home waters would increase the threat beyond Northeast Asia to include Guam, Hawaii, and Alaska. An SLBM with ICBM range would threaten the continental United States.

To counter the threat that this program presents once it becomes fully operational, the United States and its allies will have to adjust their intelligence coverage, missile defense capabilities, and anti-submarine warfare duties, among other things. Although likely much less prodigious, these adjustments will place additional burdens on U.S. military resources in the Indo-Pacific that must also contend with China's burgeoning military power, including its notable submarine and ballistic missile forces.

U.S. and Allied Countering Capabilities

While the advanced militaries of the United States and its Japanese and ROK allies are well positioned to address the emerging North Korean SSB and SLBM threats, there will be ongoing challenges once these threats become operational.

For example, American, South Korean, and Japanese ASW and missile defense assets appear to be well-equipped to detect, track, and engage North Korea's outdated SSBs and new medium-range SLBMs. These three nations have conducted bilateral and multilateral ASW exercises in the Pacific such as Sea Dragon 2020 as well as bilateral and multilateral missile defense exercises over the years.[39] In reality, however, the operational challenges to the U.S., Japanese, and ROK armed forces will arguably come more in terms of military capacity than in terms of military capability when viewed in the context of the current situation in the Western Pacific area of operations.

Let us first examine capabilities.

The United States boasts the world's most capable undersea warfare (USW) force because of the advanced capabilities of its *Los Angeles*–class, *Seawolf*-class, and *Virginia*-class nuclear-powered fast attack submarines (SSNs). *Arleigh Burke*–class destroyers also possess significant surface ASW capabilities while augmented from the air by shipborne MH-60R Seahawk helicopters and land-based P-8A Poseidon maritime patrol aircraft.

In addition, the U.S. Navy's Military Sealift Command employs five T-AGOS ocean surveillance ships that employ the Surveillance Towed Array Sensor System (SURTASS)—a sensor system that can gather undersea acoustical surveillance data, including data on submarines.[40]

In terms of missile defense, the United States has the Patriot PAC-3 system and Terminal High Altitude Area Defense (THAAD) system in South Korea, TPY-2 radars and PAC-3 systems in Japan, sea-based X-band radars in the Pacific, *Aegis*-class destroyers, and overhead systems to detect missile launches. This suite of weapons and sensors provides the United States with a number of options along the kill chain, from targeting the launch platform to conducting missile intercept after launch for defending against the North Korean SSB/SLBM program, which also threatens U.S. allies in South Korea and Japan.

Despite additional investments in recent years, the anti-submarine warfare forces of the ROK Navy (ROKN) have reportedly lagged behind those of the United States and Japan, arguably because of an understandable focus on the significant threat from the Korean People's Army. With the advent of the SSB/SLBM threat, however, Seoul seems to be paying closer attention to the potential submarine and ballistic missile threat developing from its rival and is planning to bolster the ROKN's ASW capabilities.[41] In 2019, for instance, the ROK was authorized to purchase the MH-60R Seahawk multi-mission helicopters.[42] The ROKN will also acquire P-8A Poseidon ASW aircraft.[43] Also in 2019, South Korea unveiled an ASW unmanned underwater vehicle to hunt for enemy submarines.[44]

In recent years, South Korea has invested heavily in missile and air defense systems. Seoul has several systems, including Aegis-equipped KDX-III destroyers and Patriot PAC-3 missile batteries, and has allowed the deployment of a U.S. THAAD system to the ROK.[45]

Japan is a frequent target of threats from Pyongyang and also faces significant danger from North Korea's SLBM program based on current ranges. In recent years, a number of North Korean missiles have either flown over the island or landed nearby in acts of intimidation.[46]

Fortunately, the Japanese Maritime Self Defense Force (JMSDF) has invested heavily in USW and ASW assets, which are now among the most capable in the region, to protect the island nation and its maritime approaches.[47] The JMSDF now operates nearly 20 diesel-electric attack submarines (SSK).[48] In addition, it operates ASW-capable destroyers, frigates, helicopter destroyers, and ocean surveillance ships and flies SH-60K helicopters and P-3C and P-1 maritime patrol aircraft.[49]

Japan is also one of America's strongest missile defense partners. Despite its recent regrettable decision to forgo the Aegis Ashore missile defense system, Japan has a multi-layered ballistic missile defense system that includes Aegis destroyers with ballistic missile defense capabilities, Patriot PAC-3 batteries, and supporting warning radars.[50]

Despite these capabilities, however, challenges persist, especially in terms of resource capacity.

China's People's Liberation Army (PLA) is conducting a significant expansion of its military assets and power, including in the maritime domain. Additional Chinese naval platforms that include attack submarines and an at-sea fleet ballistic missile submarine nuclear deterrent could arguably stretch existing and planned American and allied ASW capacities.

China's more assertive foreign policy in East Asia, backed by an increasingly powerful and capable PLA, only exacerbates the potential challenges posed by an emerging North Korean SSB/SLBM program. The increased operational tempo of the Russian Pacific Fleet, especially in the Arctic, also should not be overlooked.[51]

For these reasons, the United States and its allies will likely struggleto prioritize responding adequately to the emerging KPN submarine threat, especially if North Korea introduces a significant number of SSBs into service. Then there are other sheer numbers of KPN submarines. For instance, in August 2015, in a seeming submarine dispersal exercise, "50 North Korean submarines—70 percent of the fleet—left port and disappeared despite allied monitoring efforts."[52]

"Flooding the zone" with lower-value submarines and creating additional acoustic noise using submarines and other maritime traffic could make it hard to find, detect, and engage the high-value North Korean SSB when at sea. According to one analyst's assessment, "Low steady-state force densities—10 submarines and 12–15 maritime patrol aircraft deployed across the entire Indo-Asia-Pacific region—illustrate the USW capacity challenge that the United States faces."[53]

In addition, the waters around the Korean Peninsula can provide unique ASW challenges. To the east, the Sea of Japan goes deep; to the south, there

are scattered small and large islands; to the west, the Yellow Sea is largely shallow with significant tides and dense with noisy maritime traffic, allowing a boat to hide acoustically.[54] In 2010, a North Korean submarine attacked and sank the *Cheonan,* a South Korean *Pohang*-class naval corvette, in South Korean waters in the Yellow Sea.

Missile defense issues exist as well. South Korea's *Aegis*-class destroyers are not equipped for a ballistic missile defense mission with SM-2 interceptors,[55] and the one U.S. THAAD system in the ROK is oriented north toward the North Korean border and does not cover the entire country, leaving the country's eastern and western seaward flanks exposed to an SSB deployed there.[56]

There also are challenges on the North Korean side. For instance, due to expected crew rest and submarine maintenance issues, North Korea would have to possess and deploy more than one SSB to be able to create and maintain a credible seaborne nuclear threat.

According to one analyst, "North Korea will also need to build at least three, if not four or five submarines to ensure a constant at-sea presence for the second leg of its strategic arsenal...."[57] That will take time and resources, but it would also be an indicator of Pyongyang's intent. A smaller complement of SSBs could mean that the submarines are meant for prestige purposes and diplomatic clout. On the other hand, a larger contingent of North Korean SSBs would signal a more serious conventional or strategic threat and significantly more political and military leverage in Pyongyang's relations with the United States, Japan, and the ROK.

What the U.S. Should Do

Accordingly, in order to deal with the evolving North Korean SSB and SLBM threat, the United States should:

- **In conjunction with allies, bolster political and military deterrence and capabilities in the Pacific to deter, dissuade, and if necessary destroy the North Korean nuclear threat to the United States, Japan, and South Korea.** The significant security challenges in East Asia today include but are not limited to China. Although China's military buildup is of tremendous importance, the threat emanating from North Korea is perhaps most likely to reach the crisis stage.

  To ensure that Pyongyang is deterred from starting or provoking a war in Northeast Asia, both on and off the Korean Peninsula, proactive

steps must be taken in Washington, Tokyo, and Seoul. These steps include strong declaratory policy; political and military signaling, including military exercises and demonstrations of force; and force structure adjustments as recommended in The Heritage Foundation's latest edition of the *Index of U.S. Military Strength*. In addition, these states should look to enhance deterrence through demonstrations of bilateral alliance political solidarity, U.S. expressions of reassurance to threatened allies, increased forward military presence, improving bilateral and multilateral U.S.–Japan–ROK and Japan–ROK information sharing, and bolstering missile defenses and ASW capabilities to address the emerging SSB threat.

- **Alongside enhanced deterrence and economic sanctions enforcement, keep the diplomatic door open to nuclear negotiations.** While talks about denuclearizing the Korean Peninsula go back decades with less than optimum results, diplomatic efforts aimed at promoting peace and reconciliation on the Korean Peninsula must still be pursued.

  North Korea's SLBM program should be included in any future nuclear negotiations, assuming that the SLBM is a strategic weapon. North Korea must also pay a price for its brazen disregard of U.N. Security Council resolutions that prohibit the DPRK from conducting launches involving ballistic missile technology. Beyond galvanizing the international community to condemn North Korea for its repeated violations of U.N. sanctions with its missile activity, the United States should also work to more fully enforce its economic sanctions on the DPRK and endeavor to get others to do so as well with the goal of helping to shape DPRK behavior in a positive direction.

- **Work to improve American, Japanese, and South Korean ASW and missile defenses to undermine the emerging North Korean SSB/SLBM threat.** A robust national and allied missile defense capability is critical to protecting the U.S. homeland and our allies from nuclear or conventional missile attack and to support our nuclear and extended deterrence strategies.[58]

  In light of the emerging North Korean SSB/SLBM threat, the Administration and Congress should therefore work together to advance U.S. and allied missile defense systems to defend against a variety

of missile threats, including a sea-based threat from North Korea.[59] While politically challenging, these efforts should include efforts to integrate regional missile defenses with U.S. allies, at a minimum at a bilateral level (e.g., U.S.–ROK) and at ideally at the trilateral level (e.g., U.S.–ROK–Japan). Other measures should involve working to add missile defense–capable missiles such as the SM-3 and SM-6 to in-service and new ROK Navy KDX-III *Aegis*-class destroyers. A reversal in Japan's decision not to deploy the Aegis Ashore system should be encouraged along with other mutually beneficial solutions that address the North Korea challenge. In addition, if the SSB/SLBM is deployed, an additional one to two THAAD systems may be needed to defend South Korea more comprehensively.[60]

Japan, the ROK, and the U.S. should also look to augment ASW cooperation and capabilities, including the deployment of fixed subsurface sensors and the development and deployment of unmanned aerial, surface, and subsurface ASW platforms to improve force resource allocation, alongside a robust exercise program that especially involves ASW operations in the Sea of Japan and Yellow Sea.

- **Guard against North Korean SSB/SLBM weapons and technology proliferation, especially to Iran.** Even though little is publicly known about the depth and breadth of North Korea's and Iran's security relations, it is an accepted fact that at least arms sales have transpired, including in the ballistic missile and submarine fields. It is also alarming that Pyongyang and Tehran see Washington as an adversary and have reason to cooperate at a number of levels against a common enemy.

  The successful development of a North Korean SSB/SLBM program could lead to the transfer of DPRK weapons and technology to Iran, which has shown a strong interest in expanding its missile and naval power to the detriment of U.S. interests in the Middle East. With this high possibility in mind, U.S. counter-proliferation efforts should be redoubled to prevent the transfer of North Korean SSB and SLBM capabilities (among other systems) to Iran. Washington should also work with other like-minded capitals to improve counter-proliferation efforts aimed at Pyongyang and Tehran as well as secure an extension of the arms embargo on Iran under U.N. Security Council Resolution 2231.

Conclusion

North Korea has made recognizable progress on its SSB and SLBM programs. While they are not yet operational, it should be assumed that the research and development continues—even absent recent public tests.

The DPRK is a difficult intelligence target, and while it is important because of the broader North Korean threat, the KPN is probably not the highest priority among the competing operational and analytical intelligence requirements in the Western Pacific. As a result, North Korea's SSB/SLBM program may become operational sooner than the best U.S. and allied intelligence assessments expect, especially if outside assistance is obtained.

With this in mind—and prioritizing current threats such as China's military buildup—now is the time to think about and act on North Korea's SSB/SLBM programs. Nuclear SLBMs deployed aboard North Korean SSBs are likely very much part of our and our allies' national security future.

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