The Asan Institute for Policy Studies

Op-ed

North Korea unveils transitional nuclear sub, signaling bid for second-strike

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North Korea has unveiled a nuclear-powered submarine (hereafter nuclear sub). Instead of showing only a portion as in the past, it released images of Kim Jong-un conducting an on-site inspection of a "nuclear-powered strategic guided-missile submarine." In Mar. 2025, North Korea first mentioned building a nuclear sub when it reported Kim Jong-un's on-site guidance at a shipyard, and at the time it exposed only a lower part of the submarine, fueling questions.

North Korea's desire for a nuclear sub

At the 8th Party Congress, North Korea set "possession of nuclear subs and submarine-launched nuclear strategic weapons" as one of its tasks. In a way, it is natural. In the early days of China's nuclear armament, Mao Zedong (毛澤東) said, "Even if it takes ten thousand years, we must develop a nuclear submarine." Facing the nuclear threats of the United States and the Soviet Union, Mao saw the completion of nuclear armament as securing a second strike (retaliatory nuclear attack after suffering an enemy's preemptive nuclear strike) through possession of nuclear subs.

Strategic bombers, ICBMs (intercontinental ballistic missiles), and strategic nuclear subs with SLBMs (submarine-launched ballistic missiles) are called the nuclear triad. During the Cold War, nuclear-armed states sought to secure the nuclear triad by any means. Not only the United States, the Soviet Union, and China, but also the United Kingdom and France, built triad forces. After the Cold War, in the phase of nuclear force reductions, the one capability these countries maintained to the end was none other than strategic nuclear subs and SLBMs. That is how much strategic nuclear subs have been recognized as the "last bastion" of nuclear deterrence.

North Korea's reason for pursuing strategic nuclear subs does not deviate much from this. Ground-based ICBMs can have their locations exposed by satellite and reconnaissance assets, and fixed launchers are vulnerable to the risk of a preemptive strike. Submarines, by contrast, have overwhelming survivability as long as they are not detected. From North Korea's perspective, a nuclear sub is not just a weapon system but is closer to a "last card" that guarantees regime survival.Look at substance, not appearance

However, the claim of "having a nuclear sub" and "actually possessing a strategic nuclear sub that can be operated" are entirely different matters.

Regarding the newly unveiled North Korean submarine, some raise the possibility of a technological link with Russia's Akula class (Project 941; NATO reporting name "Typhoon") strategic nuclear subs. But the level of a strategic nuclear sub cannot be judged by appearance alone. The Typhoon class was the result of the Soviet Union's decades of accumulated experience in nuclear propulsion, quieting design, and long-duration patrol operations at the end of the Cold War. Its design philosophy was to operate covertly for months under ice and reliably guarantee a second strike.

It is difficult to find traces of this design philosophy in North Korea's new submarine. What stands out instead are an excessively inflated upper volume and an abnormally large outer hull. It is more reasonable to interpret this not as the result of a refined integrated design, but as evidence of an approach to somehow mount missiles within limited technological conditions.

A "transitional SSBN" resembling the Hotel class

This is where a historical comparison becomes useful. The Hotel class (Project 658) from the period when the Soviet Union first developed strategic nuclear subs was nominally an "SSBN (nuclear-armed nuclear sub)," but it was far from what we think of as a strategic nuclear sub today. Based on an existing nuclear-powered attack submarine design, the Hotel class was a "transitional experimental" platform that mounted a limited number of SLBMs. The missiles were not fully integrated into the hull, its quieting performance was low, and above all, it lacked the reliability to conduct long-term strategic patrols.

North Korea's new SSBN occupies a very similar position to this Hotel class in both technology and concept. Missile integration is structurally unrefined, leading to an oversized exterior, and its propulsion system also faces doubts about maturity. Recent reports that naval reactor-related equipment from Russia failed to transfer to North Korea suggests that North Korea may not yet have independently secured a stable naval reactor. In a strategic nuclear sub, the reactor is not just a component but a core element that defines the entire design. If this part is unfinished, the entire platform is unlikely to be a "finished" system.

Another example is China's first strategic nuclear sub, the Xia class (Type 092). Although the Xia class carried far more missiles than the Hotel class, it was rarely deployed for actual strategic patrols. That is because noise issues, lack of propulsion reliability, and immature operating systems held it back. This clearly shows that displacement or the number of missiles does not equate to the maturity of a strategic nuclear sub.

Estimates that the displacement of North Korea's newly unveiled SSBN exceeds 8,000 tons should be interpreted in the same context. While it could be evidence of technological progress, it is just as likely a result of insufficient internal systems integration. Historically, the earlier the stage of an SSBN, the more the hull tends to become unnecessarily large.

Inefficient hull and propulsion system limits

North Korea's newly revealed nuclear sub borrows the image of a strategic nuclear submarine in appearance, but its technological substance is far from a stable design. As seen with the Hotel class, the Soviet Union's early strategic nuclear subs, at the initial stage of strategic sub development, shortcomings in missile integration and propulsion system stability show up plainly in the exterior. The North Korean nuclear sub unveiled this time likewise strongly exposes these transitional features.

If North Korea had recently received a practical transfer of a modern nuclear sub propulsion system from Russia, the story would be entirely different. The OK-650 series reactors used in Russia's main attack and strategic nuclear subs have an output in the 200 MW (megawatt) class, and if one had been installed, it is likely they would have adopted a longer hull, balanced proportions, and a far more hydrodynamically elegant design. In reality, however, the North Korean sub that was unveiled is estimated at about 105 meters in length, about 11 meters in hull diameter, and about 19 meters in overall height, and it features an abnormally massive sail. This is the exact opposite of the Russian nuclear sub design philosophy.

The most likely reason such an inefficient hull form was adopted is probably the limits of the propulsion system. Without securing a reactor with sufficient output and reliability, they may have enlarged the hull and sail excessively to secure buoyancy and space even under conditions of insufficient thrust. In fact, this sub may have adopted a low-output 70–90 MW-class reactor rather than a 200 MW-class one, and in the worst case, it cannot be ruled out that it was designed to parallel or replace with a conventional propulsion system in case of reactor development failure. This means the vessel may not be a "finished nuclear-powered strategic submarine," but a risky hybrid platform built with technological uncertainties.

What to watch

In the end, North Korea's new SSBN is better seen not as a force that provides a mature sea-based second-strike capability, but as a symbolic, transitional platform that has emerged in the process of attempting to "layer" its nuclear forces. Through this, North Korea is likely to flaunt to internal and external audiences the message that "we also have sea-based nuclear forces," and to use it as a political and psychological pressure tool in a crisis.

This does not mean it is a trivial threat. But evaluating it on the same level as Russian or U.S. strategic nuclear subs right away could lead to dangerous misjudgment. If the nature of the threat is not distinguished accurately, responses can become excessive or veer in the wrong direction. The yardstick for assessing the reality of North Korea's new SSBN is not unveiling events or photographs, but actual signs of operation. Key questions include whether prolonged sea trials are repeated, whether safety procedures related to reactor operation take root, and whether repeated SLBM launches and the command-and-control system operate stably. Unless such indicators accumulate, North Korea's nuclear sub is likely to remain at the "proof of concept" stage, as the Hotel and Xia classes did.

It is certainly significant that North Korea unveiled a nuclear sub. But what is more important is what level of nuclear sub it is. What we need now is the strategic balance to distinguish coolly between function and appearance, operation and declaration, and substance and symbolism.

* The view expressed herein was published on February 19 in Chosun Biz and does not necessarily reflect the views of The Asan Institute for Policy Studies.