



South Korea's Ballistic and Cruise Missiles

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South Korea's build-up of its missile arsenal is motivated by the threats from North Korea. Although its sources and advancements are not widely known, it is an important factor in the regional military balance. The development of the South's arsenal would be impossible without assistance from Russia and U.S. acceptance, even if both overlooked the avoidance of both the spirit and letter of the Missile Technology Control Regime (MCTR). Like NATO member states, the South Korean missiles will need to remain integrated with the U.S. military plans and capabilities.

Barriers to Date. In recent decades, the ambition and shape of South Korea's offensive missile programme were influenced by many limits. The direct impulse for it was comprised of concerns by the government in Seoul of the possibility U.S. forces would be withdrawn from Asia after the Vietnam War. At that time, South Korea tried to copy some of the American missiles and to initiate national nuclear weapons capabilities. Pressure from the U.S. forced South Korea to sign a 1979 agreement to halt its military nuclear programme but allowed research on missiles with a range of 180 km and conventional warheads of up to 300 kg. These limits were raised in 1997 under a revised U.S.-South Korea agreement, allowing missiles with a 300 km range and warheads of 500 kg. In 2001, Seoul signed the MTCR, which restricted the import or export of missiles or drones above these limits. A U.S.-South Korea agreement in 2012 significantly increased the limits on the South's allowed missile arsenal to 800 km with a 500 kg warhead, 500 km with a 1-tonne warhead and to 300 km with a 2-tonne warhead. The key to the South's initially limited progress in its missile programme was U.S. reluctance to share technology. The latest change in the American approach came in 2017 when the U.S. agreed to lift the limits on Seoul's missile arsenal.

Ballistic Missiles. In parallel with the loosening of formal limits, South Korea's ground-based ballistic missile programme was progressing. It began with a modification of surface-to-air Nike missiles, thanks to which it was able to construct the NHK-1 ballistic missile in 1978 and a second version (NHK-2) in 1986. Their value was limited by their ranges of 180–250 km and small warheads, so more advanced technology was needed. In the 1990s, new opportunities emerged for cooperation with Western Europe and Russia. Russian know-how and solutions were likely crucial for later breakthroughs by South Korea. The details are still unclear, but after 1994, Moscow, in exchange for the cancelation of Soviet debt, shared with Seoul technology for a few types of surface-to-air, ballistic, and cruise missiles, as well as tanks. North Korea's success with missile development also contributed strongly to the progress on the South Korean side. A crucial first step came in 1998 with the delivery of 30 American artillery rocket system launchers (MRLS), and later, in 2004–2005, with 220 ATACMS missiles with a 300 km range. It is very likely that the Hanwha company used the latter system as a base for its K-BATS theatre ballistic missile (aerial target for Patriot interceptors) and two versions of its KTSSM tactical ballistic missile, tested in 2017 with a 180 km range.

Contrary to concerns about South Korean cooperation with Russia and France, technology from Angara space-launch vehicles were used only in the civilian space programme. Launches of Angara-modified rockets in 2009, 2012, and 2013 served only to put civilian satellites in space. Iskander-E technology from

Russian company KBM gave the South its start on its most advanced ballistic missiles. First among them was the HM-2A missile, with a 500 kg warhead and a 200 km range, likely tested since 2009 and introduced to service in the South Korean Army since 2013. Its second variant, HM-2B, was tested in 2015 at a range of 500 km (i.e., like that of the Iskander-M). The third model of Seoul's advanced ballistic missile was also likely based on elements of the Iskander and from KBM projects of two-stage Volga and Volna missiles with a range of up to 900 km (these were never introduced to the Soviet arsenal). This version was called HM-3C and was demonstrated in the spring and summer of 2017 with a declared range of up to 800 km and a 500 kg warhead. It might be modified further, and Seoul is planning a missile with a heavier warhead, the so-called "Frankenmissile." South Korea is also planning to adapt its own variants of the Iskander to operate as sea-launched missiles for its KSS-III class submarines.

Cruise Missiles. South Korea's cruise missiles also were influenced by foreign models. The first step seems to have been U.S. Harpoon missiles, which it bought in 1998, and a modification of the SLAM-ER missile in 2006. In 2003, the SSM-700K sea-launched cruise missile was shown, beginning with only an anti-ship version with a 220 km range and later modified as a Haesong missile with a land-attack role. The Haesong missiles' 220 kg warhead did not satisfy South Korea's need for a more powerful strike force capable of reaching targets deep within North Korea. Assistance with this likely came from Russia and its Novator Klub-Kalibr family. This made it possible to develop the sea-launched Cheon Ryong missiles with a 300 km range. In 2007–2009, these missiles were adapted to mobile ground launchers as HM-3A and HM-3B, with 500 and 1,000 km ranges, respectively, and later as the HM-3C missile, which has up to a 1,500 km range. But similar to its ballistic missile programme, there is a lack of credible information on the quantity of HM-3 cruise missiles in South Korea's arsenal.

Moreover, South Korea is developing air-launched cruise missiles, too. Although the Harpoon, SLAM-ER, and Haesong play this role, they are not capable of destroying hardened targets. In this area, and alternative to American and Russian technology emerged and contracts were signed to buy the German-Swedish KEPD350 Taurus missile with a anti-bunker double warhead. In 2014–2016, up to 170 Taurus missiles were delivered to South Korea; in March 2018, a second contract was signed for the delivery of another 90 missiles for F-15K fighter-bombers. South Korea is also interested in developing with the Europeans two modifications of the Taurus, one as a mobile ground-launched missile and lighter Taurus-350K2 air-launched missile for KAI AT-50 airplanes.

Changes in Strategy. South Korea is updating its military strategy and concepts for new capabilities. Seoul's long-term goal might be to achieve greater autonomy from U.S. decisions and military plans for the region. In light of the North's conventional and growing nuclear arsenals, priority appears to have been given to the neutralisation of its missiles and artillery. South Korea is implementing this strategy based on three elements: first, strengthening its ballistic missile-defence system (KAMD),¹ second its missile units, and third, its air and missile forces. The second involves a concept called "Kill Chain," which assumes the detection of a threat and the pre-emptive destruction of missile and artillery and command posts in the North. This might be possible with the ATACMS, KTSSM, HM-2, and HM-3, but with a lack of satellite and drone reconnaissance by South Korea, this seems unachievable without precise U.S. targeting intelligence. The third part is known as the "Korea Massive Punishment and Retaliation Plan," which would target artillery, missiles and command centres in the North. The South's capabilities to support this concept would help it neutralise targets in the North and threaten retaliation on the regime. South Korea's HM-2C and Taurus missiles would be used for this, and Cheon Ryong/HM-3 cruise missiles might be used to target North Korean administrative centres and surface military targets.

Conclusion. The U.S. decision in 2017 to lift the limits on South Korea's missiles was made because of the increasing threats from North Korea. During the 1970s and '80s, these threats seemed distant and Washington was more concerned with the prospects its ally would gain nuclear weapons. U.S. recognition of the expansion of South Korea's missile arsenal was *de facto* acceptance of a covert programme outside the MTCR rules. This change in Washington's attitude allows South Korea to further develop and improve its missile arsenal on diversified platforms. As shown during the summer 2017 joint military exercises, South Korea's arsenal during a conflict might augment U.S. capabilities. No less ambitious are the South's own concepts for use of its missiles, but even these capabilities probably have limited impact on the North's calculations, which are focused on U.S. strikes. The South Korea case shows that individual conventional and offensive capabilities should not be separate from the alliance. U.S. South Korea's missile capabilities for a long time might be tied to U.S. nuclear deterrence and dependent on the Americans' capabilities to precisely target enemy objects. The offensive missile programme also needs to be paired with a defensive pillar based on the KAMD national missile defence system but fully integrated with American sensors and interceptors in the region.

¹ See: M.A. Piotrowski, "South Korea's Air and Missile Defence: Below the Threat Level," *PISM Bulletin*, no. 64 (659), 13 May 2014.