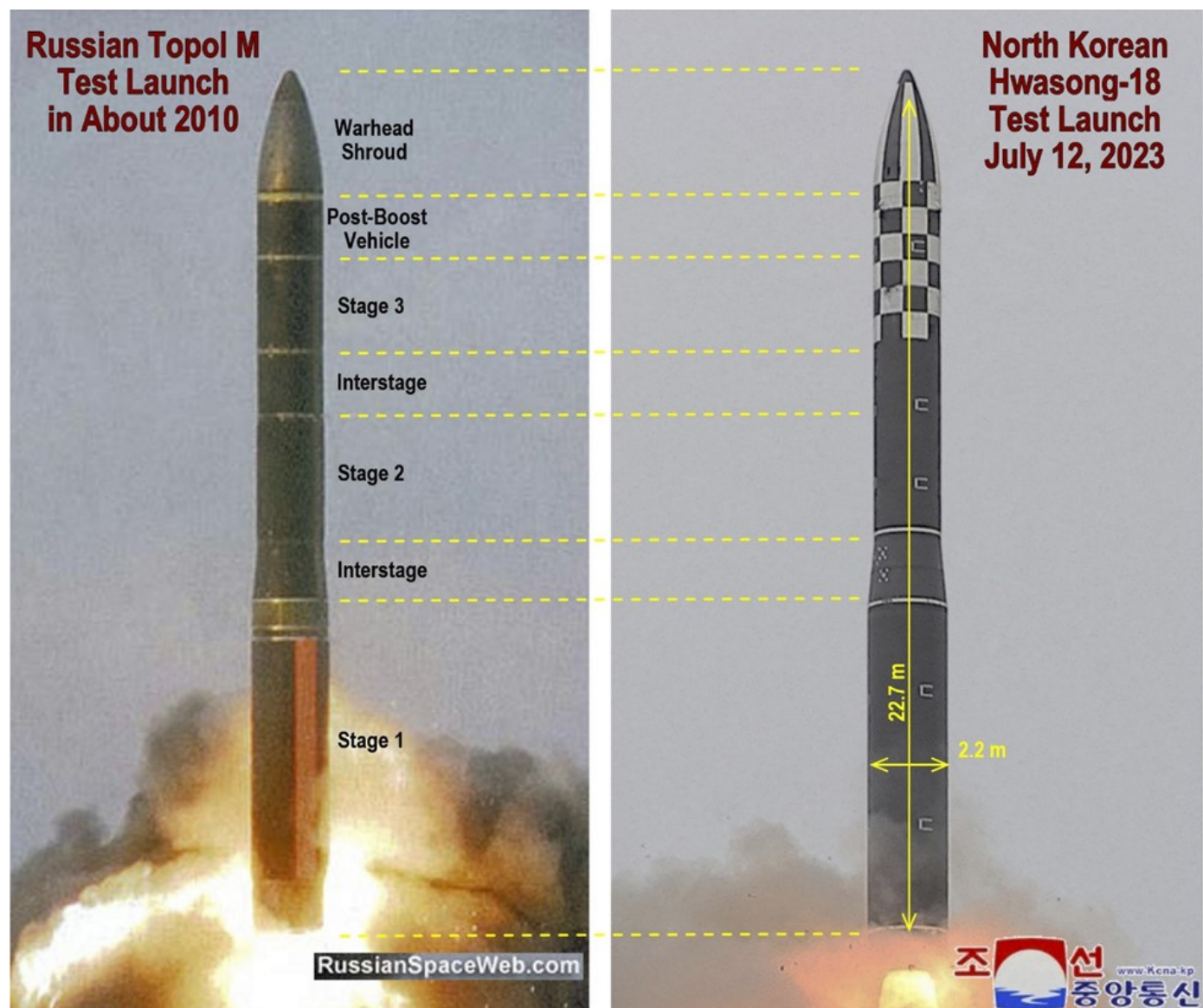


ANALYSIS , NUCLEAR WEAPONS

Protected: The Transfer of a Russian ICBM to North Korea: A Step Far Beyond Forbidden Political Boundaries

July 31, 2023, by Theodore Postol



Russia's multi-warhead intercontinental ballistic missile (SS-27 Mod 2) and North Korea's recently test-fired "Hwasong-18" (right)

Key Findings

- Russia has transferred an advanced high-accuracy heavy solid-fueled ICBM to North Korea capable of strategic nuclear strike capabilities on the U.S.
- North Korea's July 12, 2023 successful first launch of the Hwasong-18 missile has reported physical dimensions and flight trajectory data nearly identical to that of the Russian Topol-M ICBM.
- This missile is equipped to penetrate existing U.S. ballistic missile defenses with countermeasures and deliver multiple thermonuclear weapons to targets in the continental United States. A Hwasong-18 missile force will require the U.S. to consider additional concepts for missile defense including the use of airborne drone interceptors ("airborne patrol").
- Russian actions violate an unwritten international protocol to refrain from transferring nuclear strike capabilities to other parties.
- The visit by Russian Defense Minister Sergei Shoigu to DPRK last week to attend the 70th anniversary of the Korean war armistice is only the latest manifestation of growing Russian-DPRK ties that include the transfer of munitions in support of Putin's war in Ukraine and Russian food and energy transfers to the North in return. This transfer of the Topol-M has taken cooperation between Moscow and Pyongyang against the U.S. and Indo-Pacific allies to a new and more dangerous level.

The Hwasong-18 and the Topol-M ICBM

On July 25, 2023 Russia's Defense Minister, Sergei Shoigu, landed in Pyongyang. He was met at his plane by his North Korean counterpart, Kang Sun Nam, and the next day, he met with North Korea's leader Kim Jong-un.

The Russian Defense Ministry simultaneously announced that one purpose of Shoigu's visit was to "help strengthen Russian-North Korean military ties...in the development of cooperation between the two countries."

What has so far been unrecognized in the West, is that this meeting is only one indicator of how far beyond previously forbidden political boundaries Russia has

gone with this new initiative.

The real issue is a radical departure from past political practice by Russia to transfer to North Korea an advanced 50-ton solid propellant ICBM, the Topol M, also known as the SS-27.

Unlike the North Korean liquid propellant ICBMs we have seen over the last few years, this particular ICBM could not possibly have come into the hands of the North Koreans without the **full support and cooperation of Russia**. In addition, North Korea could not maintain and operate Topol M ICBMs without substantial cooperation and training from Russia. As such, the sudden appearance of the Hwasong-18 in North Korea cannot be ignored as simply “business as usual.”

The Topol M can deliver multiple thermonuclear bombs to the continental United States, and since North Korea has demonstrated in nuclear underground tests that it has thermonuclear weapons, it now has the ability to deliver these thermonuclear bombs to the continental United States. Further, its new Russian ICBM, called the Hwasong-18 by North Korea, is fully capable of carrying and deploying multiple bombs and decoy countermeasures that will, without doubt, easily defeat any missile defenses currently being operated and modernized by the United States.

What is also likely, but not yet known for sure, is whether the guidance system on the Hwasong-18 also provides it with sufficient accuracy, perhaps a few thousand feet (roughly 300 to 400 meters) to allow North Korea to target US cities with sufficient accuracy to assure the destruction of city centers.

Similarities in capabilities and dimensions

The diameter of the first stage is about 2.2 m (see side-by-side photos above), as identified by careful studies of films of a ground test in North Korea of the missile’s first stage on December 15, 2022. North Korea announced that the first stage motor has a thrust of about 140 tons, which is consistent with the observed acceleration rate in the videos of Hwasong-18 shortly after its first stage ignition at

launch.

Assuming the estimate of a 2.2 m diameter for the first stage is correct, the ratios of dimensions as determined in the side-by-side photographs derived from the July 12 test indicates the Hwasong-18 is slightly longer than 22 m, which is essentially the same length as that of the Topol M.

About two weeks prior to Russian Defense Minister Shoigu's visit, on July 12, North Korea launched a Hwasong-18 on a near vertical trajectory to 3,750 miles (6000 kilometers). The full flight time from launch to impact was reportedly 74 minutes, but the important demonstration in this flight was the decoy canister released at an altitude of roughly 460 to 480 kilometers, shortly after the third stage burned out.

The release of this canister would have been readily observable by South Korean, Japanese, and U.S. high-resolution X-band intelligence radars in Japan and South Korea and would have been an immediate indicator to Western intelligence of on-board missile defense countermeasure systems, in addition to multiple warhead capabilities.



Unpowered third stage of the Hwasong-18 third stage releasing a canister that could later deploy ant-missile defense countermeasures

Simulations of the near vertical flight trajectory flown by the Hwasong-18 indicate that its capabilities very closely match those of the Russian Topol M.

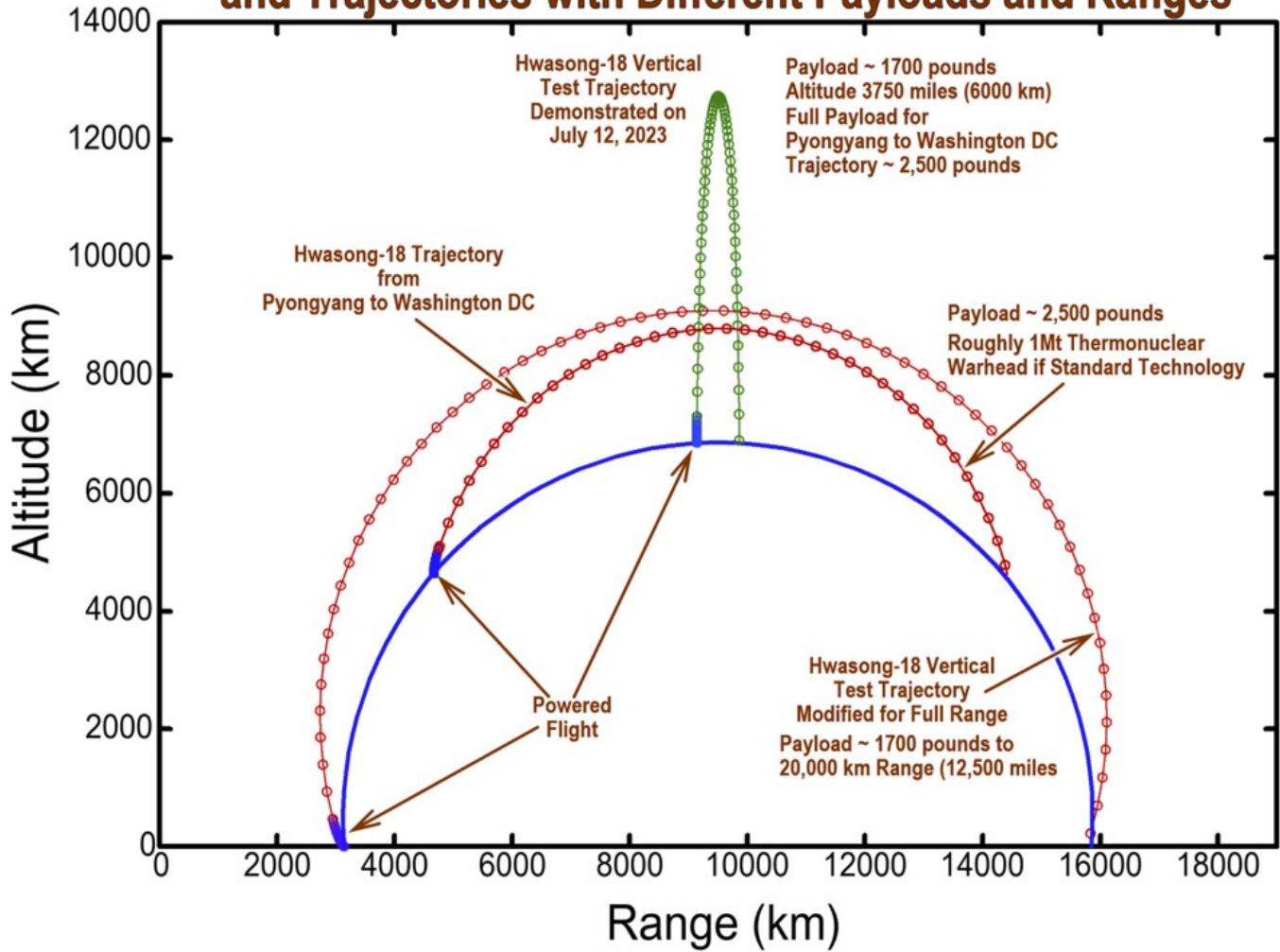
Since the full payload of the Hwasong-18 (Topol M) is about 2500 pounds, it is easily able to carry several warheads with yields of hundreds of kilotons. These demonstrated characteristics of the Hwasong-18 closely match the characteristics of the Topol M described in the open literature and confirmed by comparisons with ICBMs like the Minuteman III. Estimates indicate that the North Korean demonstration test was performed with a payload weight of roughly 70% of full payload.

Trajectories showing the range-capability of the Hwasong-18 on its vertical trajectory with a 70% payload and with a full payload of 2500 pounds are shown in the graph below. The range chosen for this ICBM trajectory with full payload is roughly 11,000 km (6835 miles), the distance between Pyongyang and Washington, D.C.

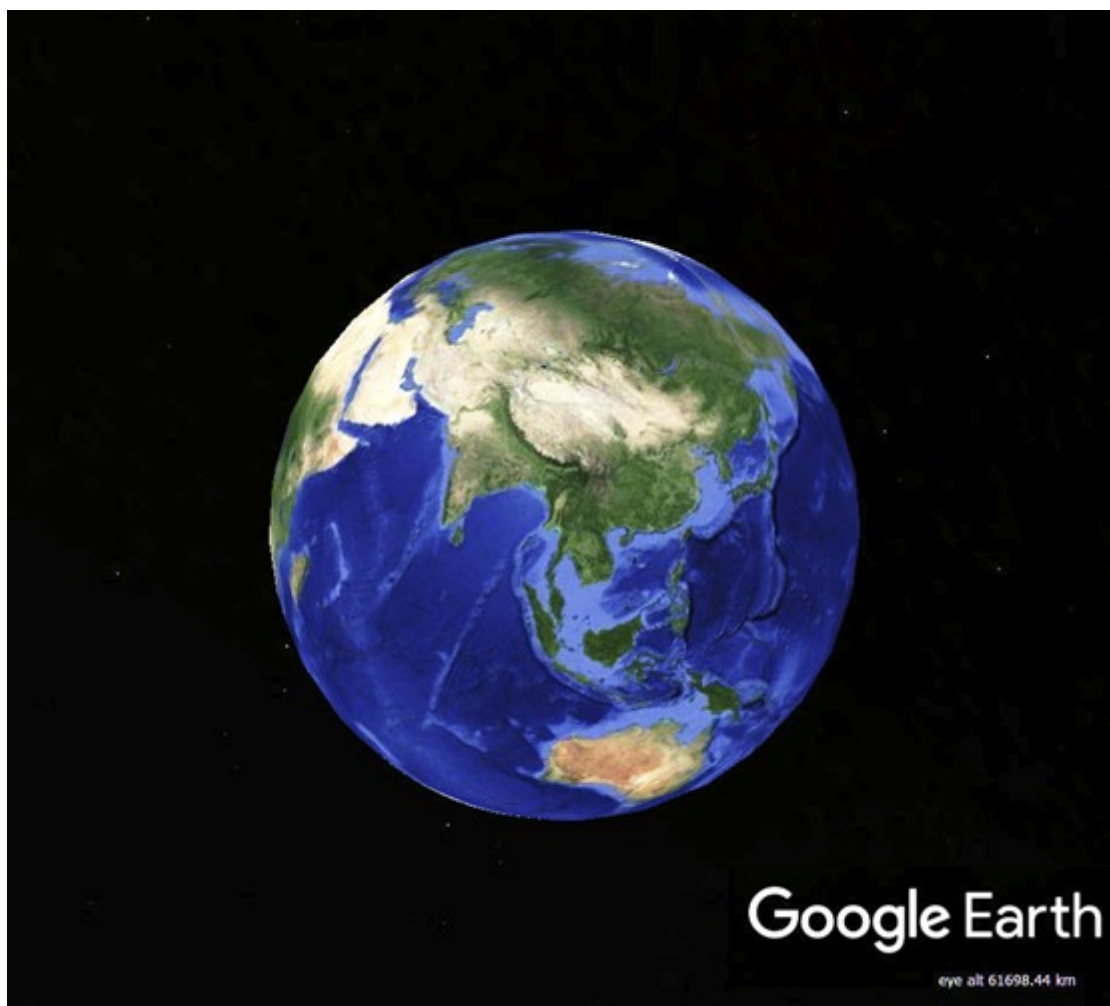
Also shown is a trajectory of 20,000 km (12,500 miles) range, which assumes the same 70% payload flown on the demonstration test of July 12.

These trajectories show the exceptional flexibility of the Hwasong-18 for carrying large payloads of warheads and missile defense countermeasures to many different ranges of strategic significance.

Hwasong-18 July 12, 2023 Vertical Demonstration Test and Trajectories with Different Payloads and Ranges



Trajectories that can be flown by the Hwasong-18 as determined by the demonstrated trajectory flown in the July 12, 2023 near-vertical flight demonstration.



The Earth seen from an altitude of about 6000 kilometers.

Implications for the U.S.

The implications of this transfer of strategic nuclear-strike capabilities by Russia to North Korea are obvious and politically far-ranging.

First, it appears that Russia has broken an unwritten international protocol to not provide nuclear strike capabilities to states that potentially pose a significant security threat to other nations, in particular the United States.

Second, the United States currently has commitments to defend South Korea and Japan in the case of North Korean aggression against either or both nations. An important part of this US commitment is maintaining the confidence of the two allies that the United States will stand by them in a time of crisis.

The new ICBM capability provided to North Korea by Russia, significantly enhances North Korean capabilities to threaten the United States mainland with a nuclear attack if the United States were to intervene in a crisis.

This is not unlike the dilemma that confronted the U.S. and its allies during the Cold War – would the United States trade Washington for Berlin?

Russia and North Korea's objective is to threaten the U.S. so that South Korea will not trust the U.S. commitment to come to its assistance.

Although North Korea is not suicidal and understands that the United States would destroy it in response to an attack, this development still has very far-ranging implications for U.S. national security policy.

For example, is it possible that Russia gave these missiles to North Korea as a warning to the United States that things are getting out-of-hand between the two nations? Is it an indicator of a new type of hostile actions by Russia? Is it an indicator of how much advanced strategic military technology the Russians are willing to share with China? Could the next step by Russia be a game-changing transfer of advanced air defenses to North Korea?

All of these questions, and many more, seem to now be in play.

The current Topol M (Hwasong-18) will be capable of overwhelming all and any of the long-range missile defense systems the United States has been building over the last more than 20 years. It was designed from the beginning to be able to deploy large numbers of decoys, which are the bane of all current US missile defenses.

However, there is a missile defense concept that could be effective if deployed against North Korea. This missile defense, we call the "airborne patrol", takes advantage of the fact that North Korea is a small country and adjacent to the Sea of Japan, which provides a large area of adjacent international airspace over which drones can fly.

This different missile defense concept nullifies the decoy problem by destroying

North Korean ICBMs while they are in powered flight. The “airborne patrol” need not even be fully implemented to be of significant use within the context of North Korea. In the case of a limited deployment, a very small number of interceptors carried by drones could be used to shoot down long-range ICBMs being tested by North Korea.

Currently, North Korea would have to flight-test any long-range ICBM to its full range.

Although this is not technically demanding, it is essential for verification that a particular missile will be able to fly a trajectory where it tips over in order to place a payload on a long-range trajectory. The flight test would also have to be on an ICBM trajectory, where the deployment of warheads and decoys could be monitored for anomalies by North Korean missile engineers. The reentry of warheads would also have to be monitored in the target impact area, requiring the deployment and operation of a small fleet of specialized ships to observe the behavior of warheads as they reenter and move through the atmosphere. While this different flight trajectory is not demanding relative to a near vertical trajectory, a nation could not have confidence that their missile could be used reliably unless they tested it on such a full trajectory.

One possibility that might be introduced through the UN, is an international sanction that permits South Korea, Japan, and the United States to shoot down any ICBMs being tested by North Korea.

A closely related possibility is for such a sanction to approve interference with North Korea’s ships that must be deployed in the ICBM impact area to monitor the final phases of its tests.

Ignoring the fact that current U.S. missile defenses have essentially no capability against the competent adversaries we now face, when we actually have a technically feasible missile defense like the airborne patrol that could work in East Asia, is irresponsible, ignoring technology and history – a repeat of the Maginot line of World War II.

At this time we do not yet have any special insights into the wide-ranging,

unpredictable and complex political implications of this singular but deeply disturbing development. But there can be no doubt that Russia's passing of advanced long-range ICBM technologies to North Korea was not an accident and indicates some kind of policy decision on the part of Russian leadership.

This alone indicates that this singular event should be a matter of greatest concern to the U.S. national security establishment.

Theodore Postol was a Science and Policy advisor on Strategic Nuclear issues to the Chief of Naval Operations. He is currently Professor Emeritus of Science, Technology, and National Security Policy at Massachusetts Institute of Technology and a member of the New York Council on Foreign Relations.

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