China and Japan Ignite Asian Hypersonic Arms Race

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China's cutting-edge missile defense radar and Japan's hypersonic missile test may spark a new East Asian arms race, potentially escalating regional tensions.

The South China Morning Post reports that Chinese scientists from Tsinghua University have made an innovative radar that can track 10 missiles at Mach 20 with a mere 28-centimeter error in distance estimation and 99.7% accuracy in speed measurement.

SCMP says that this advancement, achieved through the integration of lasers, allows for light-speed information transmission and complex microwave signal processing. It notes that the radar's capabilities, verified through ground-based simulations, include a 600-kilometer detection range and the potential to equip air-defense missiles or planes.

The source says that China's new radar's use of laser technology and a novel algorithm also eliminates the issue of phantom images, ensuring the radar's reliability against false targets.

Further, Naval News reports this month that Japan's Acquisition, Technology & Logistics Agency has released footage of the test launch of the Hyper Velocity Gliding Projectile, marking a significant advancement in the country's defense capabilities.

Naval News mentions that the HVGP, a hypersonic weapon designed for island defense, has an estimated range of 900 kilometers and will be deployed by the Japan Ground Self-Defense Force in 2026.

The publication says that amid rising military threats from China and North Korea, Japan has accelerated the HVGP's production, with Mitsubishi Heavy Industries handling

manufacturing. It notes that the test has showcased the "Early Deployment Version (Block 1)" of the projectile, with plans to develop longer-range versions by 2030.

The proliferation of hypersonic weapons among major military powers has brought to the forefront the challenges of defending against them, with legacy missile defense systems possibly ineffective for various reasons.

In a December 2023 report for the Center for Strategic and International Studies (CSIS), Tom Karako and Masao Dahlgren note that defending against hypersonic weapons presents challenges in detection, tracking, cueing interceptors and sensor tradeoffs.

Karako and Dahlgren note that identifying the launch of hypersonic weapons is difficult due to their dimmer infrared signatures compared compared those of traditional ballistic missiles, especially after the boost phase.

Regarding tracking challenges, Karako and Dahlgren say that continuous tracking of hypersonic missiles requires elevated sensors with precise capabilities, as these missiles can have unpredictable maneuvers and lower flight trajectories that evade ground-based radar detection.

Karako and Dahlgren mention that providing accurate, real-time data for missile defense systems to cue interceptors is crucial. They emphasize that such demands fire control-quality tracking data, which involves synthesizing sensor measurements into reliable estimations of the missile's position and trajectory.

They add that factors such as sensor field of view, resolution, sensitivity and the required number of satellites must be balanced to create a successful sensor architecture for tracking hypersonic threats.

Further, Tang Rong points out in a January 2022 article for the People's Liberation Army Daily that hypersonic weapons mostly travel significantly lower than ballistic missiles at near-space altitudes. Tang says this makes them harder to detect and reduces the response time for defense systems due to the Earth's curvature.

Moreover, he says the aero-optical effect caused by the hypersonic weapon's flight makes it challenging for the defense system to track, identify and intercept the target accurately, as the target image detected by the interceptor weapon is offset, shaken and blurred.

Because of that, Tang says it is challenging to effectively track, identify, and locate hypersonic weapons, and the likelihood of successfully intercepting them is very low. He points out that these weapons' high speed and unpredictable trajectory make it extremely difficult for defense systems to counter them effectively, creating a situation akin to entering a "no-man's-land."

In contrast to China's advances in hypersonic missile defense, Mark Montgomery and Brad Bowman opine in a January 2024 Defense News article that the US fails to field credible defenses against hypersonic missiles for various reasons.

Montgomery and Bowman note that while the US has invested significantly in offensive hypersonic missile development, with over $8 billion spent in the past two years, defense efforts have received much less funding, with only $209 million requested for fiscal 2024 and less than $515 million for fiscal 2022 and 2023 combined.

Most tellingly, they mention that the US Department of Defense does not expect to field a hypersonic defense system until fiscal 2034, creating a significant capability gap. They say that the DOD seems to be taking longer than expected to choose a defense contractor for operational testing and development, which might result in a deployed system being functional before the decade's end.

Montgomery and Bowman stress that US forces may face unacceptable risks without expedited efforts to develop and field hypersonic defense systems.

As for Tokyo's pursuit of hypersonic weapons, Larissa Stünkel and Mats Engman state in a May 2020 Institute for Security and Development Policy article that such efforts are unequivocally tied to the defense of Japan's outer islands in the face of China's increasingly tenacious geopolitical objectives.

However, Stünkel and Engman caution that pursuing such weapons may challenge the country's longstanding pacifist orientation and increase tensions with China.

They say that while Japan's hypersonic weapons are limited to a maximum range of 300 to 500 kilometers due to legal constraints, especially concerning Article 9 of the Japanese constitution, advancements in technology may eventually override the political commitment to maintain this limit.

Stünkel and Engman state that despite the Japanese government's assurance that the introduction of such weapons will be solely for national defense, this is unlikely to reassure the Japanese public or neighboring countries.

They say that the speed and maneuverability of hypersonic weapons could outpace current defense systems, potentially escalating crises in a region already fraught with volatility and strained relations, particularly with China.

To mitigate these risks, Stünkel and Engman say that Japan's continuation of its hypersonic program should ideally be accompanied by bilateral or multilateral discussions to regulate development and deployment, preventing unnecessary tensions and preserving opportunities for reconciliation.

Further, Masashi Murano mentions in a March 2024 United States Studies Center article that Japan faces hurdles in extending the range of missiles, developing guidance systems, and creating effective warheads for different target types, including moving maritime and ground-based mobile targets.

Murano says that Japan needs to develop its counterstrike capabilities more urgently due to China's and North Korea's rapid development of theater-range strike capabilities.

He adds that there is a need for Japan to balance the technical difficulty of strike operations with political decision-making, considering the potential for escalation and the lack of experience in deep strike operations among Japanese political leaders.

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Featured image: Hypersonic missile concept art. Photo: Raytheon.

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