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Understanding the AGNI-P Missile Test by India

Mr Jay Desai

Research Associate, Centre for Air Power Studies

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Introduction

On October 21, 2022, for the third time India tested the Medium-Range Ballistic Missile (MRBM) AGNI-P.¹ AGNI-P is a next-generation missile of the AGNI series. News agency ANI reported defence officials stating “During the test flight, the missile travelled the maximum range and all test objectives were successfully met. With this third consecutive successful flight test of the Agni Prime missile, the accuracy and reliability of the system has been established,”² The best technologies from AGNI-IV and AGNI-V would be incorporated in AGNI-P. It has a canister launch from a Transporter Erector Launcher which is well camouflaged. The aerodynamics of the AGNI-P has also been improved.

Technological Attributes of AGNI-P

AGNI-P is a two-stage, solid-propellant missile. All motors (propellant) are made up of composite materials, where the powder oxidizer is mixed with a metal fuel along with a bind being put in place. Composite propellants are of two types, Ammonium Nitrate Composite Propellant and Ammonium Perchlorate Composite Propellant. In this case, aluminium is used as a fuel; its specific energy density gives it the capability to deliver high performance. Because this is a metal substance, after mixing it with an oxidizer, one will have to bind to attain a fixed shape. So by using such a propellant, one gets a better payload ratio (the mass of the payload divided by the mass of the propellant, structure). This is so because a larger payload that has been mounted on a missile can be lifted up with a less quantity of propellant.

It is a canister-launched system; as a result, the life of the missile will be long. This is also because most of the components in AGNI-P are made of composite material, which is corrosion free and lighter in weight, almost half that of AGNI III. That is why AGNI-P has a quicker deployment time. AGNI-P has a good accuracy observed due to the advanced ring-laser gyroscopes while an accurate figure for the Circular Error Probable is not available from official sources, it is expected to be good enough to precisely hit and destroy an aircraft carrier. In June 2021, Defence Minister Rajnath Singh said, “Many advanced technologies including composites, propulsion systems, innovative guidance and control mechanisms and state-of-the-art navigation systems have been introduced. The Agni-P missile would further strengthen India’s credible deterrence capabilities.”³

AGNI-P vis-à-vis India’s adversaries

The re-entry vehicle of AGNI-P is a Maneuverable Reentry Vehicle (MaRV). It is capable of hitting any mobile target. For example in the form of an anti-ship ballistic missile (ASBM), it can hit a

mobile target on land or at sea. Otherwise, a typical MRBM follows a ballistic flight path. So, it could miss hitting moving targets, but due to MaRV, it can manoeuvre⁴ and neutralise such a threat. So, AGNI-P has a quasi-ballistic flight path. In a broader sense, the AGNI-P is similar to the DF-21D. DF-21D is a conventionally armed MRBM of China which is meant to attack ships at sea.⁵ As far as the range of AGNI-P is concerned, it depends on the warhead. Thus, the range will vary between 1000-2000 km.⁶ This kind of capability will give India an edge in the Indian Ocean Region (IOR), where China is looking to increase its influence. Therefore, a large area can be defended from the land too. If China brings its aircraft carrier into the IOR, then the air defence systems on board will find it quite challenging to defend against AGNI-P. This is because the re-entry vehicle of AGNI-P is manoeuvrable. AGNI-P has multiple independently targetable re-entry vehicles too. As far as Pakistan is concerned, the whole country can be targeted anywhere due to the maximum range of AGNI-P being 2000km.⁷ AGNI-P is also rail mobile, allowing it to be taken to a place where its survivability just before launch would be maximum.⁸ When a cold launch of a canisterised missile is done, especially when it uses a solid propellant, then it would be giving India an edge in terms of conducting nuclear strikes in a shorter amount of time from any terrain.⁹ A cold launch is a technological process that allows the missile to be discharged from a silo using gases, so once it clears the silo then the engine of the missile turns on to give it a sustained vertical flight during its boost phase. If AGNI-P is deployed close to the Line of Actual Control (LAC) then it will be definitely able to hit China too.¹⁰

Conclusion

A nuclear-tipped missile, AGNI-P, is the latest in India's nuclear arsenal. It is not meant to replace any existing nuclear tipped missile¹¹ in India's nuclear arsenal starting from Prithvi and AGNI series of missiles. The AGNI-P missile is ultimately meant to help India provide an ASBM capability for potential sea denial against the Chinese Navy in the IOR. Once the AGNI-P is launched it will have a ballistic flight path but after the realignment of thrusters, the MaRV phase begins resulting in a quasi-ballistic flight path. As a result the warhead of AGNI-P has a guided flight using control surfaces. This helps in targeting the ship at sea which would have moved from its initial position when it was detected to its position finally at a time when it is neutralized. So essentially it will help India dominate the Northern part of Indian Ocean.

NOTES:

¹ "India successfully test fires Agni Prime ballistic missile off Odisha coast", *The Indian Express*, October 21, 2022, <https://indianexpress.com/article/india/agni-prime-new-generation-ballistic-missile-successfully-test-fired-odisha-coast-8222935/>, Accessed on November 8, 2022.

² *ibid*

³ Sidharth Kaushal, James Byrne, Joe Byrne and Gary Somerville, "India's Nuclear Doctrine: The Agni-P and the Stability–Instability Paradox", *RUSI*, July 8, 2021, <https://rusi.org/explore-our-research/publications/commentary/indias-nuclear-doctrine-agni-p-and-stability-instability-paradox>, Accessed on November 12, 2022.

⁴ Snehash Alex Philip, "Agni Prime is the new missile in India's nuclear arsenal. This is why it's special", *The Print*, June 30, 2021, <https://theprint.in/defence/agni-prime-is-the-new-missile-in-indias-nuclear-arsenal-this-is-why-its-special/687271/>, Accessed on November 8, 2022.

⁵ Missile Defense Project, "DF-21 (CSS-5)," Missile Threat, *Center for Strategic and International Studies*, March 28, 2022, <https://missilethreat.csis.org/missile/df-21/>, Accessed on November 10, 2022.

⁶ *ibid*

⁷ *ibid*

⁸ Kaushal, n3.

⁹ *ibid*

¹⁰ *ibid*

¹¹ Kaushal, n3.

