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MIRVED MISSILES: PROGRESSION OF TECHNOLOGY IN SOUTHERN ASIA

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The development of Multiple Independently Targetable Reentry Vehicles (MIRVs) in three nuclear-armed states in Southern Asia—China, India and Pakistan—has led to the unfolding of a multi-dimensional nuclear competition among them to support their respective deterrence needs. This new MIRVed missile race is different from that of the Cold War. It is mired in the strategic chain conundrum:[1] four nuclear powers, with an absence of confidence-building and arms control measures. This strategic competition may alter the existing nuclear deterrence dynamics, and can trigger an arms race and the risk of conflict escalation.

In this context, this article, first, explores the complex nuclear dynamics in Southern Asia consisting of a chain dynamic among the US, China, India, and Pakistan. Second, it traces the advent of nuclear MIRVed missile technology in the Southern Asian states of China, India, and Pakistan. Third, this article investigates the perceived advantages and disadvantages of nuclear MIRVed missile technology in this region. Fourth, it charts out possible ways to restrain the ongoing march of MIRVs in Southern Asia.

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1. Terminology used by Manpreet Sethi, UNIDIR, *Nuclear Risk Reduction: Closing Pathways to Use* https://unidir.org/publication/nuclear-risk-reduction-closing-pathways-use

Nuclear technology progression follows a unique course in Southern Asia. There is a strategic nuclear chain which links the US, China, India, and Pakistan in this region. Evidently, this makes it much more complicated than the Cold War bipolar nuclear dynamics.

This article argues that the ongoing march of MIRVs in Southern Asia is a consequence of the chain conundrum among the US, China, Pakistan and India. Also, given the twin challenges of the nuclear China and Pakistan, for India, MIRVs become an unavoidable necessity. Each of the three states believes that it needs this new technology to enhance its nuclear deterrence. However, like the induction of every new technology, the risks will inevitably also increase. It is, therefore, necessary to consider the possibilities of risk mitigation, even though this looks quite difficult at the moment.

STRATEGIC CHAIN CONUNDRUM IN SOUTHERN ASIA NUCLEAR DYNAMICS

Nuclear technology progression follows a unique course in Southern Asia. There is a strategic nuclear chain which links the US, China, India, and Pakistan in this region. Evidently, this makes it much more complicated than the Cold War bipolar nuclear dynamics. The strategic chain concept shows that the actions taken by one country may have "unintended second or third order effects on other countries in the chain".[2] In the context of Southern Asia, there are "three adversarial nuclear dyads: India-Pakistan, India-China and US-China" and a fourth nuclear dyad of the Pakistan-China strategic partnership for ostensible cooperation on nuclear and missile developments.[3] The region is also mired in idiosyncratic challenges such as "nuclear-armed states sharing contiguous, contested borders;

2. Robert Einhorn and Waheguru Pal Singh Sidhu, "The Strategic Chain: Linking Pakistan, India, China and the United States", Brookings, March 2, 2017, https://www.brookings.edu/research/the-strategic-chain-linking-pakistan-india-china-and-the-united-states/. Accessed on November 4, 2021.
3. Sethi, n. 1.

each sitting at a different perch of nuclear capability; the presence of cross-border terrorism; and a general lack of shared perception or understanding of nuclear risks".[4] In all these complexities of this region, the "emergence of new nuclear capabilities, doctrines or postures in any of the constituent states has a cascading effect across others", thus, resulting in a chain conundrum.[5]

Any change in the US nuclear posture such as upgrading missile defence, development of new nuclear missiles, or withdrawal from nuclear treaties, affects China's nuclear posture.

For instance, in simple terms, any change in the US nuclear posture such as upgrading missile defence, development of new nuclear missiles, or withdrawal from nuclear treaties, affects China's nuclear posture. Thus, the consequent reactions in China, whether countervailing or imitative, produce implications for India, which, in turn, impact Pakistan's strategic choices. Thus, a strategic chain reaction takes place. However, this is much more complex than a simple chain reaction as it has a web of multiple dimensions and complexities.

In another description of the nuclear situation of Southern Asia, the Stockholm International Peace Research Institute (SIPRI) study of 2021 describes the dynamics of "twin triangles" in which "China sits at the nadir of an inverted triangle with Russia and the USA at the top, and at the apex of a lower triangle, with India and Pakistan at the base".[6] This position of China extends the nuclear dynamics beyond South Asia. As explained by Manpreet Sethi, "As each country's inventories evolve, they will inevitably impact the others' threat perceptions and potential responses. Based on how the developments across the borders are perceived, counteractions could be taken, leading to a chain of action and reaction".[7]

4. Ibid.
5. Ibid.
6. Lora Saalman and Petr Topychkanov, "South Asia's Nuclear Challenges", SIPRI, April 2021, https://www.sipri.org/sites/default/files/2021-03/2104_south_asias_nuclear_challenges_0.pdf. Accessed on December 7, 2021.
7. Manpreet Sethi, "Missile Developments in Southern Asia: A Perspective From India", The International Institute for Strategic Studies, June 17, 2021, https://www.iiss.org/blogs/

In a detailed analysis, it starts with the US' nuclear modernisation which, for most of the past, was in response to Russia. But US strategic developments also pushed China to develop more sophisticated technologies. China prioritises the US in its strategic calculations over India. China's MIRV developments are a response to the US' nuclear MIRV capabilities and the US' Ballistic Missile Defence (BMD) system. China also believes that the US' Indo-Pacific strategy, Quadrilateral Security Dialogue (QUAD) and the recently concluded Australia, United Kingdom, United States (AUKUS) deal are disrupters of strategic stability in the region. On the other hand, US strategists are concerned with containing China in the Indo-Pacific. The US also believes that China's nuclear and conventional assistance to Pakistan, and military training and the China-Pakistan Economic Corridor (CPEC) under the Belt and Road Initiative (BRI) are unsettling developments. On the other hand, China-Pakistan cooperation is very deep. It is believed that China's nuclear assistance reflects in Pakistan's nuclear posture.[8] For Pakistan, India is the only nuclear threat but for India, it is a two-front dynamic. It is constantly challenged by China's strategic modernisation and assistance to Pakistan. Pakistan's MIRV capability is also a result of China's assistance. Also, Pakistan's proxy war tactics against India through sub-conventional warfare in the nuclear shadow create instability. Thus, all these strategic calculations produce a multi-layered multi-dimensional intricate and complex chain conundrum. This chain dynamic creates a ripple effect in terms of perceived threats, doctrines, postures, and the need for counter-measures in the entire Southern Asian dynamics and beyond that.

CHINA AND MIRVS: RATIONALE, STATUS OF DEVELOPMENT AND DEPLOYMENT

Currently, China is estimated to have approximately 350 nuclear warheads, 280 land-based ballistic missiles, 72 Submarine-Launched Ballistic Missiles

research-paper/2021/06/missile-developments-southern-asia. Accessed on December 5, 2021.

8. Andrew Futter and Francesca Silvestri, "A New Nuclear Age in South Asia", Observer Research Foundation, January 7, 2022, https://www.orfonline.org/expert-speak/a-new-nuclear-age-in-south-asia/. Accessed on January 30, 2022.

(SLBMs), and 20 nuclear gravity bombs.[9] In November 2021, the Pentagon's annual report stated that China might possess 700 deliverable warheads by 2027 and 1,000 by 2030.[10] The increased numbers indicate that China is working on developing new Intercontinental Ballistic Missiles (ICBMs) with MIRV capabilities and plans to deploy them in the near future. In terms of the China-US equation, the MIRVed missiles will ensure the capability to penetrate the US missile defence, and, thus, increase the credibility of China's retaliatory strike force.

China is also building 300 missile silos in three areas across northern China which will contain approximately hundreds of new ICBMs. These silos will support the land-based component of China's nuclear triad. If these new silos were loaded with the "new MIRVed DF-41 ICBMs, then the Chinese ICBM force could carry approximately 1,000 warheads (assuming three warheads per missile), once all three silo fields are completed".[11] This is the most significant expansion of the Chinese nuclear arsenal ever. These massive silo constructions will ensure China's retaliatory capability against a surprise first strike.

China justifies its development of a "range of technologies for its nuclear forces—including Manouvrable Reentry Vehicles (MARVs), MIRVs, decoys, chaff, jamming, thermal shielding, and hypersonic glide vehicles—as necessary to counter US and other countries' Ballistic Missile Defence (BMD), Intelligence, Surveillance, Reconnaissance (ISR), and precision strike systems".[12] As said earlier, for China, MIRVs are important for penetrating the US BMD. The continued US Anti-Ballistic Missile (ABM) system development, including the SM-3 interceptor and the ground-based interceptor missile combined with the US' withdrawal from the Intermediate Nuclear Forces

9. Hans M. Kristensen and Matt Korda, "Nuclear Notebook: Chinese Nuclear Forces, 2021", *Bulletin of Atomic Scientists,* November 15, 2021, https://thebulletin.org/premium/2021-11/nuclear-notebook-chinese-nuclear-forces-2021/. Accessed on January 5, 2022.
10. Ibid.
11. Ibid.
12. Office of the Secretary of Defence, Annual Report to Congress, *Military and Security Developments Involving the People's Republic of China*, Department of Defence, https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF, p. 87. Accessed on November 4, 2021.

According to China's stance, it is at the behest of the US that Japan and South Korea are pursuing "technical hedging strategies" which can materialise in the building of nuclear weapons in the future. The deployment of the Terminal High Altitude Area Defence (THAAD) missile defence system in South Korea has irked China to a great extent.

(INF) Treaty is considered to have accelerated these developments. Though the US claims that these systems are designed to prevent missile attacks from Iran and North Korea, China does not believe this explanation. China is developing MIRV capability to maximise its strategic deterrence.

China believes that the US has adopted a "containment strategy to check the growth of China's power and influence". The US, with its allies in the Asia-Pacific, poses a threat to China's sphere of influence. From China's perspective, the US meddles in almost every regional confrontation such as in the Senkaku Islands, in the South China Sea, and in the independence movement in Taiwan.[13] According to China's stance, it is at the behest of the US that Japan and South Korea are pursuing "technical hedging strategies" which can materialise in the building of nuclear weapons in the future. The deployment of the Terminal High Altitude Area Defence (THAAD) missile defence system in South Korea has irked China to a great extent. These developments led to China's relentless pursuit of MIRVs deployment. Jeffrey G Lewis argues that China's deployment of MIRVs may lead to a shift in the nuclear posture from "assured retaliation to counterforce targeting" and that it is a "race to parity" with the United States. Also, there is a possibility that China wants to "demonstrate technical mastery rather than to pursue counterforce targeting requirements".[14]

The following Table 1 illustrates the present status of MIRVed missiles deployment by China.

13. Einhorn and Sidhu, n. 2.
14. Michael Krepon, Travis Wheeler and Shane Mason, *The Lure and Pitfalls of MIRVs: From the First to the Second Nuclear Age* (Washington, D.C.: Stimson Centre, 2016), https://www.stimson.org/wp-content/files/file-attachments/Lure_and_Pitfalls_of_MIRVs.pdf pp. 96-97. Accessed on September 20, 2021.

Table 1: China's MIRVed Missiles

MIRVed Missiles	Year deployed	Missile Type	Range (km)	Warheads (approximately)
DF-5B	2015	ICBM	13,000	Up to 5
DF-5 C	2021	ICBM	13,000	Up to 10
DF-41	2020	ICBM	12,000	Up to 3-10
DF-41 (silo-version)	2025 (speculated)	ICBM	12,000	Up to 3
JL-3	2025 (speculated)	SLBM	9,000	Up to 3-10

Source: Compiled by the author from various sources.

DF-5B

The DF-5B is a MIRVed missile and was launched in 2015. It is an "intercontinental-range, silo-based, liquid-propellant ballistic missile".[15] The Pentagon's report of 2021 states that the DF-5B is capable of carrying up to five MIRVs.[16]

DF-5C

This was launched in 2017 and is equipped with up to 10 MIRVs which is considered a major increase from previous versions of the missile. The Pentagon report of 2021 noted that a follow-on DF-5C may be in development. Also, China is developing new DF-5 silos.[17]

DF-41

The DF-41- Dong Feng (East Wind)-41, also known as the CSS-20, is a nuclear MIRVed ICBM missile of China. It has a capability of carrying

15. Missile Defense Project, "DF-5," *Missile Threat*, Centre for Strategic and International Studies, August 2, 2021, https://missilethreat.csis.org/missile/df-5-ab/. Accessed on November 10, 2021.
16. US Department of Defence, "Military and Security Developments Involving the People's Republic of China, 2021", *Annual Report to Congress*, Office of the Secretary of Defence, https://media.defense.gov/2021/Nov/03/2002885874/-1/-1/0/2021-CMPR-FINAL.PDF, p. 61. Accessed on November 12, 2021.
17. n.15. Also, see n. 16.

approximately 10 nuclear warheads with a range of 12,000-15,000 km. Its development began in 1986 and on July 24, 2012, the first flight test of the missile was conducted. Subsequently, a number of tests were conducted with constant improvement in the warheads and canister-ejection system. In 2019, China unveiled this missile during its 70th anniversary parade. In 2021, China began preparing missile silos for the DF-41 near Yumen and Hami.[18]

JL-3

China's new next generation "Type 096" SSBN will be armed with the JL-3 SLBM. The JL-3 will use the technology of the DF-41 and will be capable of carrying MIRV warheads with a range of more than 10,000 km.[19] China will deploy it by 2025. The JL-3 will be able to target the US from littoral waters and, thus, "may consider bastion operations to enhance the survivability of its sea-based deterrent".[20] It is speculated that probably the South China Sea and Bohai Gulf will be the preferred options for employing this weapon system.

CHINA'S NFU VS MIRVS

MIRVs are generally considered as first strike weapons. China has maintained a "minimum deterrent" posture since 1964 with a No-First Use (NFU) pledge. It maintained credible second strike capability for deterrence purposes only, which was aimed at avoiding a costly nuclear arms race and to ensure the survivability of its nuclear arsenal. Therefore, a low alert level was maintained. China's White Paper on Defence 2019 states:

18. Missile Defense Project, "DF-41 (Dong Feng-41/CSS-X-20)," *Missile Threat*, Centre for Strategic and International Studies, July 31, 2021, https://missilethreat.csis.org/missile/df-41/. Accessed on January 10, 2022. Also see, Matt Korda and Hans Kristensen, "China Is Building A Second Nuclear Missile Silo Field", Federation of American Scientists, July 26, 2021, https://fas.org/blogs/security/2021/07/china-is-building-a-second-nuclear-missile-silo-field/. Accessed on January 7, 2022.
19. SIPRI Yearbook 2021, "World Nuclear Forces", SIPRI, https://sipri.org/sites/default/files/2021-06/yb21_10_wnf_210613.pdf, p. 377. Accessed on January 25, 2022.
20. n. 16.

> China is always committed to a nuclear policy of no first use of nuclear weapons at any time and under any circumstances, and not using or threatening to use nuclear weapons against non-nuclear weapon states or nuclear weapon-free zones unconditionally. China advocates the ultimate complete prohibition and thorough destruction of nuclear weapons. China does not engage in any nuclear arms race with any other country and keeps its nuclear capabilities at the minimum level required for national security. China pursues a nuclear strategy of self-defense, the goal of which is to maintain national strategic security by deterring other countries from using or threatening to use nuclear weapons against China.[21]

China's behaviour is based on "minimum means of reprisal" in which the Chinese leaders believe that deterrence is more about "possession of equivalent nuclear capabilities" rather than "numerical calculations of exchange ratios" and this explains the slow pace of China's strategic modernisation. This indicates that China has prioritised quality over quantity.[22]

But today the scenario has changed and what was true in the past may not be true for the future. Xi Jinping has consolidated power and has done massive reorganisation of the People's Liberation Army (PLA). This step has reduced the power of the General Armaments Department (GAD), which is generally responsible for China's defence industry and for greater autonomy of the PLA Rocket Force (PLARF).[23]

While China has not officially made any change in its No First Use (NFU) policy, the pursuit of several new technologies, including MIRVs, can cast a shadow on it. China's own rationale for MIRVs has logic in the context of BMD, but will this also push the country to accept a more trigger friendly posture? In the past, it has been assumed that since MIRVed missiles carry a large share of nuclear warheads, they should be used for a first strike. But

21. Allison Pytlak and Ray Acheson, "Assuring Destruction Forever", January 2022 Edition, https://reachingcriticalwill.org/images/documents/Publications/modernization/assuring-destruction-forever-2022.pdf. Accessed on December 5, 2021.
22. Krepon, et al., n. 14.
23. Ibid.

Possession of MIRVs by China is pointing towards the evolving ambiguity of China's NFU doctrine. For China, an ambiguous NFU provides effective nuclear deterrence against the US Conventional Prompt Global Strike (CPGS) and BMD.

China appears to be accepting a new policy that keeps MIRVs and retains NFU.

This possession of MIRVs by China is pointing towards the evolving ambiguity of China's NFU doctrine. For China, an ambiguous NFU provides effective nuclear deterrence against the US Conventional Prompt Global Strike (CPGS) and BMD. An ambiguous NFU will also avoid any advanced conventional weapons attack by the US. This behaviour would ensure deterrence through the uncertainty of response.

Despite the NFU, pursuit of MIRVs by China could be for various reasons. In short, MIRVs for China are a necessity against the US BMD and, thus, provide strategic deterrence to it. Second, for China, MIRVs, are also strategic weapons to counter the US BMD in East Asia. They will be helpful in ensuring the strategic balance against the US THAAD in South Korea. Third, China's pursuit of MIRVs is also driven by its desire to have strategic parity with the US. Fourth, MIRVs are also weapons to showcase China's technological prowess. Lastly, if ever China comes into trilateral talks with the US and Russia, it can negotiate terms and conditions for the reduction of MIRVs.

Thus, with these multiple implications, MIRVs are going to stay with China. But this will have regional implications in India and Pakistan. The next section charts out the coming of MIRVs in Pakistan.

PAKISTAN'S MIRV TECHNOLOGY

Pakistan's missile programme is evolving rapidly, achieving greater accuracy, payload capacity, and range. Pakistan is trying to achieve a "full spectrum deterrence posture" against India which includes long-range short-range, and very short-range missiles of the ballistic and cruise variety. Its missile programmes have benefitted from foreign assistance. According to the SIPRI Yearbook 2021, Pakistan is continuously expanding its nuclear

forces: as of now it has a total of 165 warheads compared to 160 of last year. This estimate is based on Pakistan's nuclear posturing and statements made by officials.[24]

Pakistan made its entry into the world of MIRVed missiles with the Ababeel. This missile was Pakistan's first "surface-to-surface Medium Range Ballistic Missile (MRBM), reportedly capable of carrying MIRVs. This three-stage, solid-fuel missile was unveiled in a test on January 24, 2017".[25] The Ababeel's basic design is similar to Pakistan's other solid fuel MRBMs, such as the Shaheen II and Shaheen III. Pakistan's Inter-Services Public Relations press release of January 24, 2017, stated that this "missile is capable of delivering multiple warheads" using MIRV technology and has the "capability to engage multiple targets with high precision, defeating the enemy's hostile radars. Development of the Ababeel weapon system is aimed at ensuring the survivability of Pakistan's ballistic missiles in the growing regional Ballistic Missile Defence (BMD) environment. This will further reinforce deterrence."[26]

Development of the Ababeel weapon system is aimed at ensuring the survivability of Pakistan's ballistic missiles in the growing regional Ballistic Missile Defence (BMD) environment. This will further reinforce deterrence.

According to BBC, China has assisted Pakistan in developing MIRV technology.[27] There are doubts that Pakistan could have, by itself, surmounted various technological hurdles required for MIRVed missiles. Deploying MIRV technology requires "greater miniaturisation", a post-boost control vehicle or bus that requires immense "expertise in design and fabrication of

24. SIPRI, "Global Nuclear Arsenals Grow as States Continue to Modernize–New SIPRI Yearbook out now", June 14, 2021, https://www.sipri.org/media/press-release/2021/global-nuclear-arsenals-grow-states-continue-modernize-new-sipri-yearbook-out-now. Accessed on November 20, 2021, p. 385.
25. Missile Defense Project, "Ababeel," *Missile Threat*, Centre for Strategic and International Studies, June 15, 2018, https://missilethreat.csis.org/missile/ababeel/. Accessed on June 20, 2021.
26. Inter-Services Public Relations Pakistan, Press Release, No PR-34/22017, January 24, 2017, https://www.ispr.gov.pk/press-release-detail.php?id=3705. Accessed on January 2, 2021.
27. Syed Shoaib Hasan, "Pakistan's Growing Nuclear Programme", BBC News, December 1, 2010, URL: https://www.bbc.com/news/world-south-asia-11888973. Accessed on January 5, 2021.

small thrusters, fabrication of propellant and gas tanks, precision fabrication of valves, high-pressure plumbing, quality control and storable liquid propellants". Therefore, it is speculated that Pakistan's MIRV deployment has become possible with the assistance of China.[28]

On the question of why Pakistan developed MIRVs, Feroz H Khan and Mansoor Ahmed state that Pakistan's motive for MIRVs is rivalry with India. Moreover, if India develops such missiles and gets ballistic missile defences, then Pakistan will certainly catch up. Though this competition may be constrained due to economic reasons and Pakistan's limited capability to produce fissile material. Pakistan may deploy "countervailing measures while seeking to avoid an even more costly arms race".[29]

Another scholar from Pakistan, Sadia Tasleem, argues that Pakistan's rationalisation for pursuing MIRVs was always India's BMD. Though India may have a myriad reasons for developing BMD such as to protect India's political leadership, command and control centres and other vital assets, Pakistan's testing of the MIRV has inextricably been linked with the Indian BMD. This may heighten the security dilemma in the region.[30] Tasleem suggests that a trade-off involving Pakistan's MIRVs and India's BMD could be helpful in restraining the arms race. This proposal, however, ignores the China threat that looms for India. It also overlooks the nature of the Indian BMD which is expected to be for area or point defence in order to enhance the survivability of its nuclear arsenal for assured retaliation. Pakistan, however, has used the peg of the Indian BMD to justify its move towards MIRVed missiles.

Pakistan has a 'first use policy' and ascribes to 'Full Spectrum Deterrence' (FSD). FSD encompasses "deterrence at all levels of conflict—sub-conventional, conventional and nuclear—with an arsenal that includes varied yields of warheads and a range of delivery systems".[31] According to

28. n. 25.
29. Krepon, et al., n. 14.
30. Sadia Tasleem, "No Indian BMD for No Pakistani MIRVs", *South Asian Voices*, October 2, 2017, https://www.stimson.org/2017/no-indian-bmd-no-pakistani-mirvs/. Accessed on December 30, 2021.
31. Manpreet Sethi, "'Early Adulthood, 22 Years of Nuclear India and Pakistan", Institute of Peace and Conflict Studies, May 26, 2020, http://www.ipcs.org/comm_select.php?articleNo=5692. Accessed on February 13, 2022.

General Khalid Kidwai, FSD will help in developing Pakistan's capability in "bringing every Indian target into Pakistan's strike range".[32] FSD maintains an India-centric posture, and is a response to India's strategy of massive retaliation and cold start. It tries to deter India from conventional to nuclear level conflict by threatening nuclear escalation even in a conventional attack, thus, is known as a comprehensive response. The FSD affirms Pakistan's first use policy.[33]

The recent technological development of MIRVs and other missiles is an indicator of Pakistan's growing counterforce targeting posture. It also indicates China's continued assistance to Pakistan on strategic technologies. Besides other help, China, in 2018, provided Pakistan a highly sophisticated, large-scale optical tracking and measurement system. An optical system is a critical component in missile testing. With high performing telescopes, it is equipped with a laser ranger, high-speed camera, infrared detector, and a centralised computer system. It would be helpful for Pakistan in testing and developing new missiles.

In this situation of two MIRVed neighbours helping each other in technological advancements to deter India, the next section charts out India's rationale for MIRVs.

INDIA'S CURRENT POSITION ON MIRVS

According to the SIPRI Yearbook 2021, India has an inventory of nearly 156 warheads.[34] India's nuclear doctrine comprises "building and maintaining a credible minimum deterrent" and a posture of "no first use".[35] India is moving towards canisterisation of missiles and the Agni-V was the first canisterised missile of India; the Agni-Prime (Agni-P), tested in June 2021,

32. "Rare Light Shone on Full Spectrum Deterrence Policy", *Dawn*, December 7, 2017, https://www.dawn.com/news/1375079. Accessed on February 2, 2022.
33. Sannia Abdullah, "Pakistan's Full Spectrum Deterrence: Trends and Trajectories", December 13, 2018, https://southasianvoices.org/pakistan-full-spectrum-deterrence-trends-trajectories/. Accessed on February 13, 2022.
34. n. 20.
35. Prime Minister Office, "Cabinet Committee on Security Reviews Progress in Operationalizing India's Nuclear Doctrine", January 4, 2003, https://archive.pib.gov.in/archive/releases98/lyr2003/rjan2003/04012003/r040120033.html. Accessed on December 20, 2021.

In 2021, India conducted two tests of the Agni-P: one in June and the other one in December. The June 2021 test of the Agni-P was called the "new generation nuclear capable ballistic missile" by government sources.

is also a canisterised missile.[36] There are some speculations about India's MIRV technology induction in its Agni series of missile. Some sources claim that after the Agni-V, India is developing the Agni-VI which may be armed with MIRVs and will have a strike range of 8,000-10,000 km.[37]

AGNI-P

In 2021, India conducted two tests of the Agni-P: one in June and the other one in December. The June 2021 test of the Agni-P was called the "new generation nuclear capable ballistic missile" by government sources. It is a "new generation advanced variant" of the Agni class of missiles with a range of 1,000-2,000 km.[38] For the December 2021 test of the Agni-P, government sources released the statement that the Agni-P uses a "two-stage canisterised solid propellant ballistic missile with a dual redundant navigation and guidance system. This second flight test has proven the reliable performance of all the advanced technologies integrated into the system".[39]

The Agni-P missile is believed to be capable of delivering MIRVs against a single target. It is a Manouvrable Reentry Vehicle (MARVed) missile. The June test of the Agni-P was also rumoured to have used "two manoeuvrable decoys to simulate a MIRVed payload".[40] However, the government sources have not released any statement on the MIRV capability of these missiles.

36. n. 20.
37. Arms Control Association, "Fact Sheets and Briefs", https://www.armscontrol.org/factsheets/indiaprofile. Accessed on June 15, 2021.
38. Ministry of Defence, "DRDO Successfully Flight Tests New Generation Agni-P Ballistic Missile", June 28, 2021, https://pib.gov.in/PressReleasePage.aspx?PRID=1730828. Accessed on December 5, 2021.
39. Ministry of Defence, "New Generation Ballistic Missile 'Agni-P' Successfully Test-Fired by DRDO", December 18, 2021, https://pib.gov.in/PressReleasePage.aspx?PRID=1782960. Accessed on December 30, 2021.
40. Matt Korda and Hans Kristensen, "India's Nuclear Arsenal Takes a Big Step Forward", Federation of American Scientists, December 23, 2021, https://fas.org/blogs/security/2021/12/indias-nuclear-arsenal-takes-a-big-step-forward/. Accessed on December 30, 2021.

The Agni-VI and K-5 SLBM that are currently being developed are also speculated to be capable of carrying MIRVs.

The Agni-VI and K-5 SLBM that are currently being developed are also speculated to be capable of carrying MIRVs.

Vijay Kumar Saraswat, then head of the Defence Research and Development Organisation (DRDO), said in an interview in 2013 to NDTV, that as the "next logical corollary as far as the long-range ballistic missile deterrents capability of this country is concerned, we will switch over to force multiplication". This force multiplication will be achieved by "way of multiple independently manoeuvrable reentry vehicles". He further stated that the "Agni-V is a major strategic defence weapon. Now, we want to make the Agni-VI, which will be a force multiplier". The new Agni variant "will have force multiplier capability by the MIRV approach which would enable us to deliver many payloads at the same time using only one missile. Work is on in this area and designs have been completed. We are now in the hardware realisation phase".[41]

India's pursuit of MIRVs has various factors behind it. But the first one among them is the twin challenge of China and Pakistan. Hans M. Kristensen and Matt Korda (2020), argue that one of the reasons why India is opting for MIRVs is because China has equipped some of its ICBMs with MIRVs and recently Pakistan has also tested the Ababeel missile which reportedly has MIRV capability.[42] Therefore, it becomes imperative for India to have MIRVs in a two-front dynamic adversarial setting.

Rajesh Basrur and Jaganath Sankaran argue that India's pursuit of MIRVs on the external front has been a result of "China's strategic modernization."[43] But beyond the external, there is also the domestic front in which "India's

41. Hans Kristensen, "India's Missile Modernization Beyond Minimum Deterrence", Federation of American Scientists, 2013, https://fas.org/blogs/security/2013/10/indianmirv/. Accessed on June 30, 2021.
42. Hans M. Kristensen and Matt Korda, "Indian Nuclear Forces", *Bulletin of the Atomic Scientists*, vol. 76, no. 4, 2020, p. 221.
43. Krepon, et al., n.14.

military and scientific research and development establishments advocate for New Delhi to jettison a minimalist approach to deterrence in favour of a more 'credible' doctrine and posture".[44] They argue that India's MIRVing would not shift towards counterforce targeting and neither would there be a large increase in warheads. Instead, India's MIRVing is a result of "technological momentum and the deference of decision-makers to the defense-technical establishment".[45] To some extent, these arguments seem rational but for India, besides the technological momentum, acquisition of MIRV capability appears to have become a necessity given the two adversarial neighbours—the MIRVed China and Pakistan.

According to Lieutenant General Amit Sharma (Retd), for India, MIRVs are not a result of some technological momentum but an "operational necessity" and India needs them immediately. MIRVs in themselves are not only 'first-strike weapons' but also comprise a 'retaliatory capability'. They increase the chance of better retaliation after absorbing a first strike. India needs to improve its missile systems and have better retaliatory capability. Moreover, India has less warheads in comparison to China and Pakistan, hence, needs MIRVs to maintain its 'credible minimum deterrence' against these two countries.[46]

MIRVs AND INDIA's NFU

India's nuclear doctrine comprises No-First Use (NFU) and credible minimum deterrence. MIRVs, being first strike weapons, seem to go against the doctrine. Kristensen and Korda argue that India's "increased readiness and pursuit of MIRV capability could complicate India's adherence to its NFU policy and could potentially cause India's nuclear adversaries to doubt its NFU policy altogether".[47] Moreover, for MIRVed missiles, India will also have to increase its nuclear stockpile in the future.[48] Such an

44. Ibid.
45. Ibid.
46. Remarks in a personal interview by Lieutenant General Amit Sharma (Retd) VSM, Commander in Chief, Strategic Force Command, India.
47. Korda and Kristensen, n. 40.
48. Ibid.

assessment, however, ignores the basic tenets of India's nuclear doctrine of credible minimum deterrence. Since the numbers are expected to remain just enough to signal unacceptable damage, India's inclination towards MIRVed missiles is likely coming from a desire to signal assured retaliation. Technological progression and the regional threat scenario have brought India to the threshold of MIRVed missiles.

The constant threat from China and Pakistan, and China's assistance to Pakistan compels India to seek MIRVs. India is also concerned about China's ambiguous nuclear NFU doctrine and Pakistan's first use posture with full spectrum deterrence. With both nations, India shares disputed contiguous borders. In the context of technological developments in India and especially MIRVs, there are voices that state that India may shift to a counterforce posture and may also alter its NFU or adopt strategic ambiguity for strengthening nuclear deterrence. But that is highly unlikely. MIRVs are only a necessity for India and they do not entail the need for India to tailor its NFU doctrine again.

ADVANTAGES AND DISADVANTAGES OF MIRVS: AN ASSESSMENT

MIRVs are considered to have a strategic utility as both defensive and potentially aggressive weapon systems. They facilitate a single ICBM to carry multiple warheads and act as a dispenser of warheads. If the other nation has ABM defence, MIRVed missiles confront the defence with a larger number of warheads, which increases the chance that at least one of the warheads reaches its target. Therefore, MIRVs are known as penetration aids and make the ABM systems of the adversary redundant. It is advisable to destroy the MIRVed ICBM in the boost phase because once the warheads are separated from the booster in the midcourse phase, they are difficult to intercept as they disperse to hit multiple targets. And tracking each one of them and destroying them becomes nearly impossible. Most of the existing BMD systems are capable of intercepting ballistic missiles in their midcourse or terminal phase. Interceptor missiles are also costly and, therefore, ensuring a defence against MIRVs becomes difficult. MIRVed missiles

MIRVs are likely to increase the phenomenon of the 'offence-defence spiral'. Because, in response to such technologies, states adopt hedging strategies which create misperceptions and misunderstandings. These misperceptions can lead to escalation and preemption in moments of crisis, especially by the smaller nuclear states.

cause a saturation attack because they act as dispensers of warheads, and can completely disarm the opponent by saturating it with a MIRV barrage. Also, they are capable of precision attack.[49]

By deploying MIRVs, a nation greatly increases its capacity to strike first at the adversary's targets. It is also important to understand that though the first level of MIRV capability may not be perfect, once deployed, further improvements can continue.

Having reached this far with MIRVs in Southern Asia, a ban on the technology is not promising. Even in the case of the US-Soviet Union/Russia, it has been evaluated that if an effective and verifiable agreement for banning could have been achieved before the flight test of US MIRVed ICBMs, then, an agreement on banning MIRVs was feasible. Once the technology has been deployed, even if physical inspections are allowed, it is generally perceived that it cannot be determined whether or not the MIRVs have been dismantled. In the case of the United States and Soviet Union, once the MIRVs were deployed, it became almost impossible to undo them.

The situation is unlikely to be very different for Southern Asia. MIRVs are likely to increase the phenomenon of the 'offence-defence spiral'. Because, in response to such technologies, states adopt hedging strategies which create misperceptions and misunderstandings. These misperceptions can lead to escalation and preemption in moments of crisis, especially by the smaller nuclear states. Thus, such technologies, increase

49. Remarks by Scientist, Dr M Manickavasagam, during a paper presentation on MIRV at the Centre for Air Power Studies, New Delhi, on March 10, 2022.

the chance of nuclear war:[50] the negative fallouts of MIRVs are more prominent than any gains.

MIRVed missiles affect strategic stability in two ways. First, MIRVed ICBMs increase one's first strike capability against an adversary's forces, because, with increase in accuracy and, thus, counterforce targeting, it enables a state with first strike options. Second, a MIRVed missile "loaded with a large number of warheads" is a tempting target also; if the warheads owners believe that they are threatened by an enemy first strike, then there is a greater incentive to fire them first before they can be wiped out on the launchpad".[51] This creates a tendency to use the 'first strike' option and perpetuates the 'use it or lose it dilemma' for both sides, which is a fundamental problem with MIRVed missiles. Thus, MIRVs pose an enormous threat to strategic stability, and since the 1960s, the case against MIRVs remains unchanged. Also the MIRV missiles race is costly. A single MIRVed missile costs more than Rs 50 crore.

During the first Strategic Arms Limitation Talks (SALT), Henry Kissinger, the then national security advisor, opposed the ban on MIRVs but later he regretted this, and said, "I wish I had thought through the implications of a MIRVed world more thoughtfully in 1969."

Moreover, as stated earlier, once MIRVs are deployed, the involved states also resist arms control. Negotiating about MIRVed missiles remained a difficult exercise during whole Cold War period. In 1991, the Strategic Arms Reduction Treaty (START I) talks began to roll back MIRVs. It is worth mentioning that in South Asia, MIRVs are proliferating, with no treaty constraints, unlike in the Cold War. During the first Strategic Arms Limitation Talks (SALT), Henry Kissinger, the then national security advisor, opposed the ban on MIRVs but later he regretted this, and said, "I wish I had thought through the implications of a MIRVed world more thoughtfully in 1969 and

50. Sethi, n. 3.
51. Tong Zhao and David Logan, "What if China Develops MIRVs?", March 24, 2015, Carnegie Endowment for International Peace, https://carnegieendowment.org/2015/03/24/what-if-china-develops-mirvs-pub-59515. Accessed on December 3, 2021.

1970 than I did".[52] During the SALT II testimony, Kissinger again reiterated that "in retrospect, I think, if one could have avoided the development of MIRVs, which means also the testing of MIRVs by the Soviets, we would both be better off".[53] START II was the first agreement to envision a complete ban of all land-based MIRV missiles but it could not enter into force. The only remaining arms reduction treaty, the New START, does not place any explicit limitations on MIRVs. Besides creating strategic instability and an offence-defence spiral, their operation also requires massive expenditure by states.

CONCLUSION

This paper, firstly, explored the complex nuclear dynamics in Southern Asia consisting of a chain conundrum among the US, China, India, and Pakistan. Secondly, this paper traced the ongoing proliferation of nuclear MIRVed missile technology in Southern Asia: China, India, and Pakistan. Thirdly, it investigated the perceived advantages and disadvantages of the march of nuclear MIRVed missile technology in Southern Asia. The next section will explore the possible ways to restrain the ongoing march of MIRVs in Southern Asia.

At first glance, it is difficult because India and Pakistan have a trust problem and India and China have an approach problem. Though India and China have a similar approach towards nuclear weapons, there are factors which inhibit the cooperative approach between India and China. China seeks parity with US and considers India an 'illegitimate nuclear' state. China is wary of engaging with India in nuclear talks because that may "appear as if it was conferring legitimacy to India's nuclear status".[54]

Despite these challenges, there are a few steps that can be taken to manage the ongoing march of MIRVs. Manpreet Sethi suggests that the

52. Henry Kissinger, "The Vladivostok Accord: Background Briefing by Henry Kissinger 3 December 1974," *Survival,* vol. 17, no. 4, July 1, 1975, pp. 191-198.
53. Michael Krepon, "MIRVs and Remorse, Sort of", October 15, 2009, http://www.armscontrolwonk.com/archive/402503/mirvs-and-remorse-sort-of/. Accessed on December 4, 2021.
54. Sethi, n. 1.

"initiation of strategic dialogues", either bilateral or multilateral, would help in understanding the "threat perceptions and nuclear doctrines" of each other. This is an easy step to initiate and follow. This will also reduce the opacity and brinkmanship tendencies.[55] Rakesh Sood also suggests that "a shared understanding on these new risks must be struck via dialogue at the bilateral or multilateral level".[56]

As there is a chain conundrum, it can also be said that restraint by the US and China might be helpful in restraining MIRV proliferation in India and Pakistan. In this context, Manpreet Sethi postulates that "unless inter-state relationships improve through dialogue on strategic issues, hedging strategies will fuel offence-defence spirals". In such a situation, missile developments in Southern Asia can best be "influenced by improvements in the overall security environment among China, Russia and the US." It is also possible that "strategic stability at the global level could similarly encourage cooperative approaches in the regional nuclear dynamics."[57]

Krepon *et al* suggest that the decision-makers in China, India and Pakistan should avoid repeating the missteps of the US and Soviet Union of the Cold War era. The Southern Asian countries need to "limit the extent to which multiple warheads are placed atop missiles, proceed at a slow pace and, most important reject the lure and pitfalls of counterforce targeting strategies".[58] They state that a trilateral arms treaty in South Asia is most unlikely. Therefore, a "tacit understanding" can be reached by bilateral and trilateral political agreements based on mutual trust and transparency.

In Southern Asia, the risks of deployment of MIRVs are yet to be fully understood. It can only be hoped that improvement in political relations between and amongst the three will enable them to find ways of mitigating the risks.

55. Ibid. 3.
56. Rakesh Sood, "[WMD] India-Pakistan Nuclear Dynamics", September 23, 2021, https://www.apln.network/analysis/special-report/wmd-india-pakistan-nuclear-dynamics. Accessed on December 20, 2021.
57. Sethi, n. 7.
58. Krepon, et al., n. 14.