

AIR POWER

Journal of Air Power and Space Studies

Vol. 16 No. 4 • Winter 2021
(October-December)



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XI'S NUCLEAR GARDEN: OF SPRAWLING SILOS AND SOBERING MESSAGES

MANPREET SETHI

The size of China's nuclear arsenal has been in particular focus over the last few months. In June 2021, the Swedish think tank, SIPRI, released its annual report on assessment of militaries across the globe. On China's nuclear weapons, it indicated an increase of as many as 30 nuclear warheads in the last year. This has brought up the estimated number of nuclear warheads to 350 as against 320 in 2020. This also makes China's nuclear arsenal the fastest growing amongst the nine nuclear-armed states.

Soon after the SIPRI report, some American analysts reported sighting new silos being constructed at three different sites in China. Drawing upon commercial satellite imagery, observant China watchers identified more than 200 new missile silos at different stages of construction near the northwest city of Yumen in Gansu province,¹ near Hami² and near Ordos.³ Besides these, expansion activity was also noticed at the PLA

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1. This was disclosed by James Martin Centre for Non-proliferation Studies, Middlebury Institute in late June. Washington Post, June 30, 2021.
2. This was disclosed by the Federation of American Scientists in late July. Construction of this field housing a 110 silos is suspected to have started in Feb 2021.
3. This was disclosed by a military research unit at Air University in mid-August. Its construction is estimated to have started in Apr/May 2021 and it currently appears to show 40 silos.

India would be prudent to draw its own judgments about these developments, juxtaposing the evident capability build-up with a deeper understanding of China's overall approach to nuclear weapons and its expressed threat perceptions.

Rocket Forces (PLARF) training site near Jilantai in inner Mongolia.⁴

These discoveries have, not surprisingly, generated considerable debate about the possible motivations for such nuclear expansion by China. In the US, questions have been raised and alarm expressed at what these developments portend for the future of China's nuclear arsenal, posture and doctrine. Given that the US has the best technical means to monitor China's activities, as also a battery of official and non-governmental China observers, assessments from Washington are

always prolific. Beijing, though, has been tight-lipped on the issue, neither confirming nor denying the discoveries or assessments.

Geographically close to China and in the direct crosshairs of its expansionist and aggressive behaviour at the disputed borders, India too is keenly monitoring these developments, as well as American interpretations of the same. However, India would be prudent to draw its own judgments about these developments, juxtaposing the evident capability build-up with a deeper understanding of China's overall approach to nuclear weapons and its expressed threat perceptions.

This paper argues for a more holistic assessment of the developments in China and against alarmist, knee-jerk responses directed solely at the immediate nuclear build-up. It calls attention to the basic tenets of nuclear deterrence and recommends fortifying India's deterrent strategy with adequate, calmly considered capability build-up, besides a clear signalling of resolve. Divided into four sections, the paper first explores the possible rationale for the Chinese silo construction. The second and third sections examine the American and

4. Hans M Kristensen and Matt Korda, "China's Nuclear Missile Silo Expansion: From Minimum Deterrence to Medium Deterrence", *Bulletin of Atomic Scientists*, September 1, 2021. Also see Kristensen, "China's Expanding Missile Training Area: More Silos, Tunnels and Support Facilities", at <https://fas.org/blogs/security/2021/02/plarf-jilantai-expansion/>. Accessed on September 3, 2021.

Chinese responses to these discoveries. The paper finally concludes with a considered analysis of these developments from an Indian perspective.

POSSIBLE RATIONALES FOR CHINA'S NEW SILO CONSTRUCTIONS

The term 'minimum' has long been associated with the Chinese nuclear strategy. From the time that Premier Mao had expressed faith in a small nuclear arsenal as being sufficient for deterrence, China's warhead numbers have always been assumed to be low. For many years, it was guesstimated that China maintained a stockpile of around 200-250 nuclear warheads. Of course, the annual US Department of Defence reports kept projecting a large-scale expansion of the arsenal. But, it never did happen, at least, not between 2000 and 2020. Rather, the evident focus of China's nuclear modernisation during this period was seen to centre around enhancing the reliability, ranges, accuracy, penetrability and survivability of its delivery systems, particularly the missiles. It was hardly surprising, therefore, when in 2016, the United States Defence Intelligence Agency (DIA) described China's missile forces as 'the world's largest and most comprehensive.'⁵ In 2019, then DIA director Lt Gen. Robert Ashley stated that in 2018 'China launched more ballistic missiles for testing and training than the rest of the world combined.'⁶

The mobility and penetrability of missiles received particular attention, as China reportedly made a large number of its missiles road and rail mobile and capable of carrying multiple warheads. In fact, going by estimates of the

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5. Lt Gen. Vincent R. Stewart, "Statement for the Record: Worldwide Threat Assessment", Armed Services Committee, United States Senate, February 9, 2016, at <https://www.dia.mil/News/Speeches-and-Testimonies/Article-View/article/653278/statement-for-the-record-worldwide-threat-assessment/>.

6. Lt Gen. Robert P. Ashley, Jr., "Russian and Chinese Nuclear Modernization Trends", US Defense Intelligence Agency, May 29, 2019, at <https://www.dia.mil/News/Speeches-and-Testimonies/Article-View/Article/1859890/russian-and-chinese-nuclear-modernization-trends/>.

early 2000s, China was reported to have as few as 40 ICBMs.⁷ Twenty years down the line, the 2020 DoD report highlighted an increase in such missile launchers from roughly 60 in 2010 to 100 in 2020.⁸ The 2021 edition of *The Military Balance* places the number of ICBM launchers at a precise 104.⁹ Of these, while some are expected to be for the silo-based liquid-fuelled DF-5 ICBMs, many more over the last decade, are reported to be for the more modern DF-41, solid-fuelled, mobile ICBM, capable of carrying multiple warheads.

With the advent of MIRVed missiles capable of carrying 3-10 nuclear warheads, China's nuclear warheads stockpile was expected to grow. But, as is becoming evident, the country is also engaged in construction of hundreds of silos. Given that Beijing maintains a high level of opacity on nuclear numbers and discloses only those aspects of the nuclear capability that it *wants* to be seen, it becomes important to discern the message being communicated by allowing these sites to be sighted. Is it that the silos actually house a network of tunnels that make use of mobility of missiles in underground structures? Many conjectures have been made on the possible rationale for these silos. The following paragraphs examine five possible reasons.

A first likely explanation has been attributed to what American analysts refer to as the shell game. It involves building more silos than missiles as a deception strategy. The idea behind this is to complicate the aggressor's targeting options by forcing him to waste his warheads on silos that may or may not contain any missiles. The United States had adopted such a strategy with its Minuteman (MX) missiles in the 1970s. According to Jeffrey Lewis, an American nuclear scholar, the US had built 23 silos for every one MX missile. It randomly shuttled them around, thereby forcing the Soviets to believe that the odds of their being able to plan a disarming strike were low.

7. Estimates are available in publications such as the International Institute for Strategic Studies' (IISS) *The Military Balance*, the Stockholm International Peace Research Institute's (SIPRI) *SIPRI Yearbook*, the Nuclear Notebook of the *Bulletin of Atomic Scientists*, and periodic US DoD reports.
8. US Office of the Secretary of Defense, "Military and Security Developments Involving the People's Republic of China 2010", Annual Report to Congress, p. 66, at https://archive.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf; US Office of the Secretary of Defense, "Military and Security Developments Involving the People's Republic of China 2020", p. 59.
9. See "Chapter Six: Asia", in *The Military Balance 2021* (London: Routledge for the International Institute for Strategic Studies, 2021), p. 249.

China could be playing a similar game—letting the silos be seen and appear to be available as targets, but using them as decoys, since the adversary would never know whether it was hitting real missiles or just wasting its own arsenal on empty pits. According to nuclear experts, destroying each silo would require not only hitting them individually, but also striking them with at least two missiles to assure its destruction.

China has traditionally adopted secrecy and a tendency to confuse the enemy as a means to enhance its deterrence. The driver for the silos could, therefore, be deception and ambiguity, to signal to the US that it would never be able to carry out a disarming first strike against China. Interestingly, China may be applying the principles of Wei Ch'I, a popular Chinese game that relies on deception, to its nuclear posture too. For instance, one of the popular strategies employed in the game is "beat the grass to startle the snakes." This suggests using a trick or ruse to evaluate enemy's reactions and create confusion in his mind. Similarly, "trouble the water to catch the fish" is another tactic that amounts to doing something unexpected to make the enemy doubt his own thinking. A third one, "create something from nothing", involves sending repeated false signals to create an expectation in the enemy, and then changing course to deceive him. Wei Ch'I believes in maintaining continuous ambiguity to confuse the opponent to the point of paralysis. Taking inspiration from such principles, China could be playing Wei Ch'I with the US, a "game [that] revolves around answering the questions of how to create strategic leverages, how to keep things in a state of perpetual haze and then to achieve multiple ends and interests."¹⁰

A second reason for China's decision to build the silos could be US' abandonment of arms control arrangements such as the INF treaty, which constrained its capability to build and field missiles with a range of 500-5,500 km range. While the US officially pegged its decision of INF withdrawal on alleged Russian violations of the agreement, there is no doubt that China's unrestrained development and deployment of missiles in such ranges was perceived to disadvantage the US, especially as the threat perception from

10. For more on this game see Brig Sanjeev Chauhan, *China's Strategic Posture* (New Delhi: Pentagon Press, 2019), pp 68-69.

China grew over the last decade. Meanwhile, for China, once the US had liberated itself from the treaty in 2017, it began to fear that Washington would quickly build and deploy missiles in these ranges closer to China. Given China's extreme sensitivity to a 'Taiwan contingency', it could have felt the need to enhance its deterrence vis-à-vis Washington by increasing the number of ICBMs. The silos under construction are believed to be for housing more DF-41s so as to signal that China has the ability to hold large parts of the US mainland to nuclear ransom, thereby deterring any interference in a situation involving Taiwan.

A possible third reason could be the advantage that silos enable the pre-positioning of missiles at a higher state of readiness by allowing the targeting coordinates to be pre-fed. So, while China may or may not transition into launch on warning or launch under attack postures, it is still able to signal greater speed for retaliation. Solid-fuelled, silo-based missiles could help the PLARF to better master operational procedures while also allowing for greater safety and security through underground movement rather than overground movement.

Fourthly, all the aforementioned considerations effectively add up to bolstering the survivability of China's arsenal. A small nuclear arsenal depends on deception and dispersal to signal that no first strike can make the first user avert nuclear retaliation. Mutual vulnerability is the anchor for nuclear deterrence. China seeks this mutuality with the US—the assurance that both are able to hurt each other so that deterrence can function. But when the US ballistic missile defence (BMD) deployments, and its focus on conventional global prompt strike (CGPS) and development of conventional hypersonic missiles, or deployment of SSBNs in the Pacific that hold the potential to destroy Chinese nuclear assets began to erode China's confidence in its ability to cause unacceptable damage after taking a first strike, it sought measures to further increase the survivability of its retaliatory capability. Besides building a credible triad, China could also be opting for dispersing its nuclear warheads on mobile and silo-based ICBMs, besides the air and sea legs of the triad, as a way to ensure

that its nuclear assets are better placed for surviving any potential first strike, and thus able to deter more effectively.

Lastly, the nuclear expansion can also be seen in the context of China's aspiration for great power status. In this context, Beijing appears to be wanting to 'beat' the US on every parameter. Its nuclear stockpile has seemingly been identified for this purpose besides its focus on technological superiority. As President Xi Jinping leads his country to fulfil his 'China dream', he seeks national renewal as also a rising

international influence based on 'mutual respect' and 'fair treatment'. Some scholars explain this as China "seeking global military dominance, not 'parity' with the West."¹¹ On the more specific issue of nuclear deterrence, in his address to the Party Congress, Xi Jinping identified three duties for the newly reorganised PLA Rocket Force (PLARF), which has also been elevated to the position of the fourth arm of the military alongside the army, navy and the air force. He exhorted it to act as the "core strength of China's strategic deterrence, the strategic support for the country's status as a major power, and an important cornerstone safeguarding national security."¹² With this Xi appears to have reinforced the centrality of nuclear weapons to China's national security and international status.

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THE US' ASSESSMENT OF THE SITUATION

American concerns around China's nuclear developments have been variously expressed. Ned Price, the US State Department spokesperson, described it as

11. William Schneider Jr., "China Sees its Nuclear Arsenal as More than a Deterrent", *Wall Street Journal*, September 7, 2021.

12. Xi Jinping, "Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era", Speech delivered at the 19th Party Congress, October 2018.

'concerning' because it raised questions on China's intent.¹³ The American concern arises from the suspicion that "the PRC's nuclear arsenal will grow more quickly and to a higher level than perhaps previously anticipated" and that this would be potentially destabilising.

Adm Charles Richard, Commander of US STRATCOM, in a speech to the space and missile symposium on August 23, 2021, described the information on China's construction of silos as "breath-taking growth" that, he feared, would make its posture and strategy more "coercive".¹⁴ As the person responsible for handling deterrence breakdown, he drew attention to the unprecedented "three-party dynamics" that had emerged with Russia and China becoming near peers. He expressed concern about the limitations imposed by New START on the number of missiles that USA can deploy to handle both the threats.

Adm Richard, therefore, urged his administration to undertake "threat-informed decision making" and to adopt a strategy that would be "resistant to adversarial coercion". He suggested that "China's strategic breakout" should be factored into the ongoing preparation of the US National Defence Strategy, Nuclear Posture Review and Missile Defence Review. Recommending a virtually no-holds barred approach, he pleaded Congressional support for the "Next-Generation interceptor and the due-outs from the 2019 Missile Defence Review ... research and development efforts on the hypersonic glide interceptor, high energy laser, and other directed energy technology complement the existing Ground-Based Interceptor capabilities to counter missile threats."¹⁵

The US bottom line, therefore, as summed up by Adm Richard seemed to be, "it doesn't matter why China is and continues to grow.... What matters is that they are building the capability to execute any plausible

13. David Brunnstrom and Daphne Psaledakis, "US Calls Build-up of China's Nuclear Arsenal 'Concerning'", *Reuters*, July 2, 2021, at <https://www.reuters.com/world/china/us-says-chinas-nuclear-buildup-concerning-2021-07-01/>. Accessed on August 26, 2021.

14. Speech by Adm. Charles Richard, commander of USSTRATCOM at <https://www.stratcom.mil/Media/Speeches/Article/2742875/space-and-missile-defense-symposium/>, August 23, 2021.

15. *Ibid.*

nuclear employment strategy ...” Is this, however, the Chinese goal? Or, is the US traditional approach of projecting deterrence through war-fighting being mirror-imaged upon the Chinese as well? Or, has Beijing been influenced by US nuclear thinking and is adopting similar postures?

CHINESE VOICES AND EXPLANATIONS

There has been no response from the officialdom in China to the reported discoveries and speculation about the missile silos. This is not unusual given that China has traditionally remained quiet on its nuclear capabilities and posture except for the few paragraphs that outline the broad doctrinal contours in the White Papers on National Defence that have been regularly released every two years since 1998. In the absence of any official statements on the what the silos mean for China’s future nuclear posture, one can only rely on some opinions or editorials of Chinese origin to gauge the thinking within the country.

Many Chinese nuclear analysts have long drawn a connection between China’s rising threat perceptions and US missile defence, nuclear/conventional counterforce capabilities, etc. These are perceived by China to erode its nuclear deterrence premised on small nuclear numbers, thus triggering a need to increase its nuclear numbers and the use of measures that signal greater survivability for nuclear deterrence.

While one Chinese scholar, Dr Tong Zhao, acknowledges that increased threat assessments are driving China in this direction, he attributes d the silos to “China’s idea to keep the enemies guessing.”¹⁶ This, he opined, would also “bolster China’s image as a much stronger nuclear power than before. Whether China will actually fill each silo with an ICBM is a different matter

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16. Tweet of Tong Zhao, at <https://twitter.com/zhaot2005/status/1410496411204943872>, July 1, 2021.

..." But, as he suggests, the "bigger arsenal would make the country's rivals *respect* China and exercise more self-restraint when dealing with Beijing."¹⁷ Therefore, as Zhao argues, it is a case of security and prestige that pushes China in this direction.

Meanwhile, another Chinese scholar, Dr Wu Riqiang has attributed a more operational motivation for the silos. He opined in a tweet that "the silos could be a precursor of launch on warning." This conjecture emerges from the apparent higher focus on keeping the nuclear forces in a more operationally ready state as was also indicated in the 2019 White Paper on National Defence.¹⁸ It is also pertinent to note that PLARF has been training for honing its operational chain of command in preparation for making critical decisions on the real-time battlefield. Examples such as the conduct in March 2021, of a six-day competition involving PLARF missile commanders in a competition called Jianfeng 2021 at Rocket Force Command College, Wuhan, are illustrative of this. This competition is organised by the Director of the Training Bureau of Rocket Forces Staff Headquarters and "places focus on solving problems, improving war strategy and strategic thinking capabilities, and deepening operational design and tactical innovation. Experts from various theatres and China's NDU were brought to challenge the commanders."¹⁹

It may also be recalled that Gregory Kulacki, a China analyst at the Union of Concerned Scientists in USA, cited the 2013 updated edition of *The Science of Military Strategy*, a standard Chinese military text on strategy to suggest that China's nuclear forces could move towards a "launch on warning" posture: "under conditions confirming the enemy has launched nuclear missiles against us, before the enemy nuclear warheads have reached their targets and effectively exploded, before they have caused us actual nuclear

17. Ibid. Emphasis added.

18. The full official English translation of the 2019 Chinese Defense White Paper, *China's National Defense in a New Era*, at <http://www.xinhuanet.com/english/download/whitepaperonnationaldefenseinnewera.doc>.

19. Josh Baughman, "Assessing PLARF Missile Brigade Commander Competition – Jiangfeng 2021", China Aerospace Studies Institute, Air University, August 4, 2021. Accessed on October 6, 2021.

damage, quickly launch a nuclear missile retaliatory strike.”²⁰ Taking the argument further, he also cites some

“newly translated Chinese sources, [where] discussions of putting missiles on high alert appear to stem from increasing Chinese military concerns about retaining a credible nuclear retaliatory capability in the face of accurate U.S. nuclear weapons, the development of high-precision conventional weapons, and missile defenses. In addition, U.S. unwillingness to acknowledge mutual vulnerability in bilateral nuclear talks with China creates the impression that the United States is still seeking to render itself invulnerable to a Chinese retaliatory strike.”²¹

Interestingly, in contrast to the views of the scholars, some Chinese military analysts have dismissed such speculations of moving to LOW posture as baseless. Claiming silos to be an obsolete technology, a former PLA official, for instance, said “China has already used mobile launchers and discarded these fixed silos, which are time-consuming, labour-intensive, costly and vulnerable to be attacked and destroyed.”²² Rather than building silos, he recommends that China should be prioritising sea-based nuclear power.

Hu Xijin, the editor in chief of *Global Times*, makes a similar point. He argues that with the DF-41 being a solid-fuelled, road-mobile ICBM, “its biggest advantages is its mobility and vitality. There is no point to put it inside a silo.”²³ According to him, the claims by US think tanks have a sinister “aim to put pressure on China ... to force China to issue a statement regarding its nuclear plan and squeeze the room for China’s nuclear development through public opinion pressure.” It is to mount the pressure of “international morality” to force China to exercise stricter self-discipline.

20. Gregory Kulacki, “China’s Military Calls for Putting its Nuclear Forces on Alert”, *Report of Union of Concerned Scientists*, January 2016, p. 1, at <https://www.ucsusa.org/sites/default/files/attach/2016/02/China-Hair-Trigger-full-report.pdf>.

21. Ibid.

22. Liu Zhen and Kristin Huang, “Is China Building a Vast Network of Nuclear Missile Silos?”, *South China Morning Post*, July 2, 2021.

23. “China’s Nuclear Deterrence Build-up Cannot be Tied Down by the US: Global Times Editorial”, *Global Times*, July 2, 2021.

His recommendation to his government is to “neither confirm nor deny such ‘revelation’ and let the Western media imagine it. This is what nuclear deterrent means.”

Indeed, enhancement of its deterrence in view of growing American threats is surely one reason for the silos. The *Global Times* editorial exposes such thinking when it writes, “Once a military confrontation between China and the US over the Taiwan question breaks out, if China has enough nuclear capacity to deter the US, that will serve as the foundation of China’s national will.” Such a position is not surprising given that the US has been signalling a possibility of nuclear war-fighting. In response, China is adding to the complications by multiplying the targets. This is meant to make pre-emptive, first strikes much harder, since in order to reduce chances and intensity of retaliation, the US would have to target the silos without knowing whether they were empty or populated, as well as detect and hit the mobile launchers too. By doing so, China is signalling the military inefficacy of nuclear attacks, or even conventional attacks on its nuclear assets, because of the deception that has been woven into its capability. The intention is to strengthen China’s deterrence by building a credible nuclear second-strike capability “to curb the US strategic impulse.”

Interestingly, in Chinese writings the nuclear expansion is more often associated with a possibility of crisis over Taiwan. In fact, as the preceding editorial stated tellingly, “Once a military confrontation between China and the US over the Taiwan question breaks out ...”, the use of the word “once”, rather than “if”, indicates an inevitability of such a situation coming to pass. Therefore, China is counselled by a compatriot to remain “sober and firm about what it should do.”

CHINA’S DEVELOPMENTS FROM INDIA’S PERSPECTIVE

The nuclear modernisation underway in China has long been monitored by India. Though the pace of development and scale of the recent discoveries are certainly surprising, they largely seem to fit into a pattern that has been evident for some time. India has been observing the continued development and deployment of road-mobile ICBM capability, solid-fuelled ICBM silos, H-6N

nuclear-capable aircraft, and second-generation Jin class nuclear submarines equipped with longer range and better accuracy JL-3 SLBMs. In fact, for India, the DF-26 medium range missiles are a source of greater concern, more than the silos that are being suspected for ICBMs. Their range, precision, and hot swap strongly suggest theatre nuclear warfighting capability. This dual use delivery system is known to have been operationalised over the last two decades, irrespective of how Western analysts choose to defined this capability as China's "minimum deterrence" or "medium deterrence".

None of these Chinese developments is triggered by a threat perception of India; not even despite the ongoing China-India military stand-off at the line of actual control. For Beijing, the US is its primary threat. But, India becomes the affected party. However, at least until now, India has steadily gone on operationalising its own nuclear force structure based on a clear doctrine and unaffected by the adversary's capability trajectory. Two things have made this possible. One, a basic understanding of nuclear weapons as best suited for deterrence by punishment. And that imposing punishment with nuclear weapons is fairly easy given that they cause damage that cannot be constrained in space and time. Hence, there has been no hurry to add to the warhead stockpile. India believes that even small numbers, targeted wisely, can suffice to cause unacceptable damage.

The second point has been a quiet confidence in mutual vulnerability arising from the significant progress that has been made towards building robust and survivable second-strike forces. Some of India's capabilities are yet to be completely deployed; nevertheless, enough progress has evidently been made to ensure that the adversary cannot afford to take a chance that its nuclear attack on India would go unanswered. The ability to signal certainty of retaliation is then at the heart of credible deterrence.

India is now confronted with many questions. Is China becoming a bigger nuclear threat than what it was? How should New Delhi respond to these developments—with an accelerated response of its own? With changes in force structure and/or force posture? How should we spend our limited, finite resources to ensure deterrence? Which capabilities should

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be prioritised? Should India also build more silos or depend on mobility of missiles? After all, if mobile systems offer the advantage of concealment and dispersal, they become extremely vulnerable if and when found; in contrast, silos are more visible, but not that easy to destroy besides offering the possibility of deception under the ground.

In crafting its own response to the seemingly overawing Chinese developments, India must not forget the context and nature of nuclear deterrence. Once that is maintained, it would automatically address the sense of panic or alarm, since irrespective of numbers available with the adversary, it is one's own capability to threaten nuclear retaliation to cause unacceptable damage that really matters. Therefore, one thing is clear that India's focus should not be on obtaining numerical parity on nuclear warheads, but on technologies that enable assured retaliation through robustness of second strike.

The fact that China has more nuclear warheads than India should be no reason for angst in New Delhi. The number of nuclear weapons matter when countries believe that they can fight a nuclear war of attrition against the other side to prevent it from achieving its military objective. But given the nature of the nuclear weapon, which is a weapon of mass destruction, a bean-counting approach to match the adversary's arsenal weapon for weapon is completely unnecessary and even downright foolish. The determination of numbers has to be based on one's own sense of what would be necessary to cause the kind of damage that the adversary would not want to risk at any cost, and how much faith one has in one's own reliability and survivability of the arsenal. If every warhead is expected to perform as conceived, and if the dispersal and deception has been so planned as to ensure survivability, the warhead numbers can remain at lower level. Therefore, estimation of

one's own number requirements can be relatively decoupled from the numbers of the adversary. What would ultimately matter is the ability to signal punishment. However, if an adversary's capability, such as through deployment of missile defence, interferes with that, then a recalibration of numbers may become necessary. This is what China appears to be doing vis-à-vis US. For India, no such threat yet exists, though developments of BMD will have to be closely monitored across both sides of the border.

In any case, increase in nuclear warhead numbers can never hope to give absolute security to a state. US has the biggest nuclear arsenal in the world and yet has faced defeats in all its military engagements. Neither has Russia been able to force its will on others only on the basis of its nuclear capability. These numbers have to be intelligently built with a clear grasp of their role and with an even clearer understanding of what they cannot do, and for which other types of more practical instruments must be ensured in the country's security quiver.

China's reasons for undertaking such an expansion, and upgradation, of its nuclear forces range from its sense of insecurity towards the US to a desire to achieve great power status by 'beating' the existing great power. It is also flush with money and has invested lavishly in raising its technological capability. None of this holds true for India. It must choose its defence expenses wisely.

At the same time, India should not hesitate to look for and exploit possibilities of diplomatic conversations, especially those that highlight the

Given India's threat perceptions that include the probability of conventional war with both its nuclear-armed adversaries, New Delhi must maintain a sharp focus on building conventional military capability, irrespective of the Chinese silos. The nature of nuclear weapons, as instruments of mass destruction, significantly limits the contingencies in which these can be credibly used. Hence, overspending on a capability of limited utility will not make sense.

dangers of deterrence breakdown. While such engagements at the bilateral level with China look difficult at this juncture, India should encourage the US to engage with China on arms control and also search for multilateral forums that seek to reduce nuclear risks for all nations. Bonnie Jenkins, US Undersecretary of State, recently expressed the hope that China will come to see that arms control is in its security interests. "Arms control is not a trap designed to weaken China's defenses, but a mechanism to reduce risk and the chance of unnecessary arms races ... we will apply and tailor the lessons we've learned in the U.S.-Russia arms control process when possible to U.S.-PRC discussions."²⁴ It would be in India's interest to nudge the US and China along this route.

Given India's threat perceptions that include the probability of conventional war with both its nuclear-armed adversaries, New Delhi must maintain a sharp focus on building conventional military capability, irrespective of the Chinese silos. The nature of nuclear weapons, as instruments of mass destruction, significantly limits the contingencies in which these can be credibly used. Hence, overspending on a capability of limited utility will not make sense. Rather, it is necessary to display confidence in the second-strike capability that credibly signals the ability to respond to cause a nuclear bloody nose in case of any kind of first use/strike.

24. Bonnie Jenkins, "Nuclear Arms Control: A New Era", Remarks at NATO Conference on WMD Arms Control, Disarmament and Non-proliferation, Copenhagen, September 6, 2021, at <https://www.state.gov/under-secretary-bonnie-jenkins-remarks-nuclear-arms-control-a-new-era/>.

EAGLE VERSUS DRAGON: THE INTENSIFYING US-CHINA NUCLEAR COMPETITION

SANJANA GOGNA

China's nuclear weapons programme grew out of the need to deter any potential nuclear coercion and the use of nuclear weapons from the United States (US) and, to some extent, the Soviet Union. By the mid-2000s, China was on the verge of achieving the goal through the deployment of its road-mobile, solid-fuelled intercontinental ballistic missiles (ICBMs). However, advances in the US strategic capabilities focused on limiting damage, namely the Conventional Prompt Global Strike (CPGS) weapons, along with the presence of its Ballistic Missile Defence (BMD) systems, posed new challenges for China by undermining its deterrence.

China has sought to rebalance its deterrence by developing more asymmetric, competitive and 'assured retaliation' capabilities combined with risky elements of a strategy involving nuclear ambiguity. Currently, the Sino-US deterrence dynamics is characterised by numerous imbalances in terms of the size of their nuclear arsenal, counter capabilities and strategies. Such dynamics remains in sharp contrast with the US-Russia nuclear relations, which is symmetrical in all three of those aspects.

This paper traces the origin and the evolution of the Sino-US nuclear dyad and assesses the current and the emerging contours in their nuclear relations. Concurrent with this work is an attempt to bring out the parallel nuclear thinking

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in Beijing and Washington DC that guides those dynamics. Lastly, it assesses the possible changes in China's nuclear forces and the prospects of arms control agreements with regards to the US.

ORIGINS OF THE SINO-US NUCLEAR DYAD

China initially developed nuclear weapons as a response to its confrontations with the US during the 1950s and early 1960s, when the latter first signalled a possible nuclear use against China's territories. These confrontations chiefly included the Korean War (1950-53) and the Taiwan Strait crisis (1954-55). While Beijing was able to pose a substantial challenge to the US in these conflicts, the leadership in China suspected that Washington DC would not take that challenge lightly and fight back. They also suspected that the US would come to regard China as an adversary and seek pretexts to directly hit mainland territory or even engage in a nuclear confrontation.

THE END OF THE KOREAN WAR

The first nuclear threat came during the end of the Korean war when US President Dwight Eisenhower signalled a possible nuclear use against the Chinese territories if "rapid progress toward a negotiated settlement was not made."¹ John Lewis and Xue Litai have noted that Eisenhower believed that a combined strategy of warnings and blandishments was necessary to make the Chinese leadership hasten the Korean war's end. The leadership in China, at this juncture, decided to exercise greater caution against the American nuclear threat. As a result, Beijing engaged in several negotiations with the US, including the exchange of the sick and wounded prisoners of war. In response to the US nuclear threat, the Chinese leadership ramped up constructing fortifications, such as frontline battlefields and anti-atom shelters, to signal the country's readiness.

1. Roger Dingman, "Atomic Diplomacy During the Korean War", *International Security*, vol. 13, no. 3 (1988) doi:10.2307/2538736.

THE TAIWAN CRISIS

Following the Korean War, the US had begun to believe that China's revolutionary expansionism would spread across Asia and threaten vital American interest in the region. The White House Document titled 'US Policy Towards Communist China'² released in November 1953 perceived China as a formidable power with capabilities and outlined a strategy for reducing those capabilities and the impairing the Sino-Soviet relations. The document also recognised Taiwan as an essential asset of the US in the Far East, following which it incorporated Taiwan into its defence network. As a result of these steps, the Chinese leadership injected urgency into its strategic military programme, perceiving Taiwan's developments as an indication of the US determination to wage a nuclear war with China.

In the summer of 1954, the US attempted to initiate an open nuclear confrontation with China by sending two nuclear-capable carrier aircraft into the East China Sea. Lewis and Xue note that the by such a move, the US sought to test the Chinese defences. Further, in a press statement in August that year, the US Secretary of State John Foster Dulles declared that the US would finalise a military treaty with Taiwan and use force to prevent the Chinese conquest of Taiwan. A week later, China's then-Foreign Minister Zhou Enlai, responded by declaring in a widely distributed governmental report by stating China's intention to liberate Taiwan. The leadership in the US, however, believed that the Chinese lacked the military means to take actions against Taiwan, and therefore, saw China's intention as political rather than military.

Notwithstanding, Lewis and Xue reveal that China's leadership perceived talks of a defence pact between Taiwan and the US as a move of aggression and sought to respond aggressively. China began heavy artillery fire over the offshore Taiwanese islands of Quemoy in September 1954, and later in November, it began to use its planes in the bombing of the Dachen Islands. In retaliation, the Taiwanese nationalist forces seized several Chinese-bound ships, including a Soviet oil tanker.

2. "Foreign Relations of the U.S., 1952-1954, China and Japan", Volume XIV, Part 1, Office of the Historian, at <https://history.state.gov/historicaldocuments/frus1952-54v14p1>. Accessed on February 25, 2021.

Insufficient financial resources and technological capabilities had also put quantitative restrictions on China's nuclear armoury. Following the first Chinese nuclear tests on October 16, 1964, Mao had stated that the atomic bombs should not be taken casually, as their use would amount to a crime.

Eisenhower formalised the Defence Treaty with Taiwan in January 1955 and passed the Formosa Resolution that sought to protect Taiwan from further aggression. Subsequently, the US halted taking further steps to bolster its military forces in Taiwan and began to count on the right to use nuclear weapons as a means to defend Taiwan's offshore islands. The Chinese leadership perceived the Formosa Declaration as the US resolve to fight a nuclear war against China. Consequently, the Chinese leadership prioritised its strategic military programme and began acquiring its nuclear weapons.

SINO-US NUCLEAR DYNAMICS IN THE EARLY YEARS

The Chinese leadership's decision to develop nuclear weapons was aimed to counter the US security challenge and safeguard Beijing's national interest. As noted earlier, Mao was keen on restoring China's international position and destroying its adversaries' 'nuclear monopoly'. In 1954, Mao had argued, "We also need the atom bomb. If our nation does not want to be intimidated, we have to have this thing."³ Before the tests, there seemed to be two rationales for China's decision to acquire nuclear weapons: first, to defend against nuclear blackmail and nuclear war; second, to safeguard national security and sovereignty.

The Chinese leadership held that a threat of a bit of revenge is enough to deter an adversary. Mao had asserted, "have some achievement, and be fewer but better."⁴ Insufficient financial resources and technological capabilities had also put quantitative restrictions on China's nuclear armoury. Following the first Chinese nuclear tests on October 16, 1964, Mao had stated that the

3. "China's Strategic Nuclear Weapons—Chinese Views of Future Warfare, Part Three", Federation of American Scientists – Science for a Safer, More Informed World. Accessed on February 22, 2021.

4. Ibid.

atomic bombs should not be taken casually, as their use would amount to a crime. To protect its interests at the time, Chinese leadership did not wholly disclose its strengths and resources and kept information on its nuclear weapons capabilities vague.

At the time of the Chinese tests, the US intelligence had no idea how China acquired enough weapons-grade Uranium for a bomb. A 'research memorandum' from the State Department's Office of the Director of Intelligence and Research on November 2, 1964, stated: "Our pre-October 16th estimates did not anticipate that [China] had the capability of producing the U-235 isotope."⁵ Notwithstanding, the Joint Chiefs of Staff's assessments following the tests suggest that there was a belief in the US that the nuclear weapon acquisition by China would not alter the power relations among the major states or the balance of military power in Asia for an indefinite future.⁶

Following the first tests, the Chinese government declared that it had developed "nuclear weapons for defence and for protecting the Chinese people from US threats to launch a nuclear war" and that it "will never at any time or under any circumstances be the first to use nuclear weapons."⁷ This reaffirmed the US' position. For the better part of China's nuclear weapon's history, its leaders' thinking regarding nuclear weapons remained highly ideological.⁸ They believed that the mere existence of nuclear weapons would make China's adversary think twice before striking their country with a nuclear weapon. At the time, the prevalent view was that nuclear weapons are to address nuclear threats and not to deter a nuclear attack. The Chinese leaders equated nuclear deterrence to a policy of coercion and perceived it to be a form of aggression.

5. "China's Advance Toward Nuclear Status in the Early 1960s Held Surprises for U.S. Analysts, Generated Conflicting Opinions About the Potential Dangers", The National Security Archive, at <https://nsarchive2.gwu.edu/nukevault/ebb488/>. Accessed on February 23, 2021.

6. "Here's How the U.S. Reacted to China's First Nuclear Test 50 Years Ago", *Business Insider*, last modified October 29, 2014, at <https://www.businessinsider.in/politics/heres-how-the-us-reacted-to-chinas-first-nuclear-test-50-years-ago/articleshow/44966044.cms>.

7. People's Daily 1964. Zhonghua Renmin gongheguo zhengfu shengming (Declaration of the government of the People's Republic of China), October 16, at <https://digitalarchive.wilsoncenter.org/document/134359.pdf?v=b1e04ac05705>

8. Li Bin, "Differences Between Chinese and U.S. Nuclear Thinking and Their Origins", In *Understanding Chinese Nuclear Thinking*, Carnegie Endowment for International Peace, 2016, p. 3.

During this time, China also lacked the warfighting capabilities that the US employed including the SLBM Lockheed UGM-27 Polaris and the ICBM Boeing LGM-30 Minuteman-I. For instance, the Chinese leadership from Mao Zedong to Marshal Nie Rongzhen continued to limit the scale of China's nuclear arsenal to 'minimum retaliation means' and provided no further detail. Even as the Second Artillery was formally established on July 1, 1966, China did not have an explicit nuclear strategy in the next two decades. It was only in the 1970s and early 1980s that the groundwork of China's nuclear operationalisation began, with the establishment of several academic units, namely the Academy of Military Sciences, along with a committee for academic research, to formulate a 'science of operations' and 'operational principles and rules' for missile units.⁹

Although China began deploying a small number of Dong Feng (D.F.) missile series between 1981 and 1982,¹⁰ namely DF-4 and DF-5 intercontinental ballistic missiles (ICBM), its relations with the US improved in that period, which led Deng to conclude that global or imminent war would not occur. Thus, in the 1990s, the Chinese leadership instead focused on building economic might and achieved 10 per cent annual Gross Development Product (GDP) growth owing to the establishment of the liberal international economic order.

EMERGENCE OF SINO-US NUCLEAR COMPETITION

While the US has maintained a military presence in China's neighbourhood since the start of the Cold War in the form of extension of the US nuclear umbrella to Japan and South Korea along with deployment of anti-missile units in South Korea and Guam islands, the operational aspects of the Chinese nuclear strategy received momentum when the US demonstrated superior capabilities in the Gulf War. The declarations of Taiwanese independence provided further impetus to the operationalisation of China's nuclear weapons programme as Beijing began to claim that the US had

9. John W. Lewis and Xue Litai, "Making China's Nuclear War Plan", *Bulletin of the Atomic Scientists*, vol. 68, no. 5, 2012, p. 48, doi:10.1177/0096340212459155.

10. Jeffrey G. Lewis, *Paper Tigers: China's Nuclear Posture* (London, UK: Routledge, 2017), p. 105.

been secretly providing support to Taiwan's independence. Consequently, China began to develop sophisticated command-and-control mechanisms and assigning roles for its nuclear and conventional missiles in order to support peacetime diplomacy, manage military crises and pursue combat readiness.

China's threat perceptions were further triggered following the 2002 Nuclear Posture Review (NPR) release, wherein the US identified the Taiwan Strait region as one of the seven possible nuclear weapons targets. During this time, the US also improved its precision strike capability of its conventional long-range missiles to target China's nuclear assets. China termed the US' military presence, its bilateral military alliances in East Asia and its plans to develop and deploy the Theatre Missile Defence (TMD) system as a negative development. The Chinese leadership expressed concern in the 2005 Defence White Paper regarding the complicated security factors in the Asia-Pacific, pointing out that the US was reinforcing its military presence. It stated that developments such as these had led China to enhance its nuclear counter-attacks capabilities. In the several Defence White Papers that followed, China reiterated its concerns regarding the US interference in its neighbourhood. Further, as a result of superior conventional capabilities against China, US President Barack Obama stated in his 2009 Prague Speech that he intended to reduce the role of nuclear weapons to that of solely deterring nuclear attacks in his second term—even though on the declaratory level, Washington DC has not taken the 'No First Use' (NFU) pledge.¹¹ However, such considerations arose out of the US' confidence in its conventional capabilities, further putting China on the defensive.

THE SWORD AND THE SHIELD: US CPGS AND BMD SYSTEMS

Tong Zhao, an expert on China's nuclear policy, suggests there has been an attempt in Beijing to increase the threshold of nuclear self-sufficiency and move towards 'assured deterrence' as China feels increasingly

11. "No First Use' and Nuclear Weapons", Council on Foreign Relations, last modified July 17, 2018, at <https://www.cfr.org/backgrounders/no-first-use-and-nuclear-weapons>.

The CPGS capability, which includes long-range ballistic missiles or boost-glide systems and scramjet-powered hypersonic cruise missiles, allows the US to attack high-value targets or fleeting targets at the start of or during a conflict.

challenged by the US strategic capabilities, namely, the growing emphasis in the US to develop the CPGS weapons and the BMD systems.¹² The CPGS capability, which includes long-range ballistic missiles or boost-glide systems and scramjet-powered hypersonic cruise missiles, allows the US to attack high-value targets or fleeting targets at the start of or during a conflict; the BMD, on the other hand, consisting of its National Missile Defense (NMD) and advanced Theatre Missile Defense (TMD) in East Asia, allows the US to intercept an incoming adversary

missile. Caitlin Talmadge, a scholar at the Georgetown University, suggests the motive behind the US enhancement of its ability to limit damage in an all-out nuclear war with China is to make Beijing worry that if it starts a crisis that raises nuclear escalation, Washington DC will have a greater tolerance to bear those risks than China.¹³

Lora Saalman, an expert on China's nuclear weapons programme, notes, "The Chinese analysts view CPGS as part of a larger US effort to achieve 'absolute security', with BMD as the shield and CPGS as the sword such that Washington is able to act preemptively."¹⁴ Chinese leaders and strategic experts fear that in a potential conflict, the US may use its CPGS weapons to destroy a fair share of China's nuclear forces and use its BMD systems to intercept the surviving weapons Beijing may want to use. There is also a more significant concern that such a situation may make Beijing vulnerable to nuclear blackmail by Washington DC.

12. Tong Zhao, "China's Nuclear Posture", presentation, China's Nuclear Doctrine, Manohar Parrikar Institute for Defence Studies and Analyses, New Delhi, October 20, 2020.

13. Caitlin Talmadge, "The US-China Nuclear Relationship: Why Competition is Likely to Intensify", Brookings, last modified September 30, 2019, at <https://www.brookings.edu/research/china-and-nuclear-weapons/>.

14. Lora Saalman, "China's Evolution on Ballistic Missile Defense", Carnegie Endowment for International Peace, last modified August 21, 2012, at <https://carnegieendowment.org/2012/08/23/china-s-evolution-on-ballistic-missile-defense-pub-49171>.

THAAD AND THE ISSUE OF NUCLEAR NORTH KOREA

The US efforts to contain North Korea's nuclearisation also have implications on the Sino-US nuclear relations: China has lent political and economic support to North Korea since 1950. China is interested in North Korea as it offers a buffer with South Korea, which hosts twenty-nine thousand US troops and marines and US missile defences.

¹⁵ While the US has stated that its missile defences in South Korea, namely, Terminal High Altitude Area Defense (THAAD)—a globally transportable ballistic missile defence system, is aimed at North Korea's missile threat, China is concerned that it can be relocated/refocused against its territories. It also fears that THAAD's X-band radar can look deep into China if configured to 'Look mode'.¹⁶ While both China and the US prefer a non-nuclear North Korea, the latter is interested in keeping the present North Korean Region. There seems to be a difference in how the US and China seek to resolve the North Korean nuclear issue: Jennifer Lind argues that while Washington DC sees North Korea as "a dangerous rogue state that broke international law to acquire nuclear weapons", whereas Beijing sees North Korea as "motivated by insecurity."¹⁷

In 2006, China supported the UN Security Council Resolution 1718, which imposed sanctions on Pyongyang. China has also advocated for the Six-Party Talks' resumption, a multilateral framework to denuclearise North Korea. However, many in China argue that the US should stop military exercises

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15. "Understanding the China-North Korea Relationship", Council on Foreign Relations, last modified July 11, 2006, at <https://www.cfr.org/backgrounders/china-north-korea-relationship>.

16. "How China Sees THAAD", Council on Foreign Relations, last modified April 2, 2016, at <https://www.cfr.org/blog/how-china-sees-thaad>.

17. Jennifer Lind, "Will Trump's Hardball Tactics Work on China and North Korea?", CNN, last modified August 7, 2017, at <https://edition.cnn.com/2017/08/07/opinions/china-north-korea-opinion->

with South Korea that frighten North Korea, provide security assurances to Pyongyang, and withdraw military forces from South Korea.¹⁸ In sharp contrast, state officials and experts in the US have argued that China's punitive steps have been somewhat restrained. On several occasions, they have accused China of circumventing sanctions, especially as there has been a tenfold increase in bilateral trade between 2000 and 2015.

CHINA'S NUCLEAR MODERNISATION

China announced in the 2013 Chinese Defence White Paper that it would maintain an acceptable degree of readiness in peacetime in response to the growing US military footprint well into South Korea, where it deployed the THAAD. Further, it added that it would combine peacetime needs with wartime needs, and maintain vigilance at all times to deter the enemy from using nuclear weapons against China.

The US has been concerned about the Chinese nuclear challenge to its interests in the Indo-Pacific region, especially as Beijing is not constrained with the Intermediate-Range Nuclear Forces (INF) agreement signed between the US and the erstwhile Soviet Union in 1987 to eliminate all their nuclear and conventional ground-launched missiles between the range of 500-5,500 km. According to Ramesh Thakur, without being party to the INF treaty and having 95 per cent missiles in the intermediate range, China can effectively target forward-deployed US forces in the Indo-Pacific region.¹⁹ As a result, the US withdrew from the INF treaty in August 2019 and has evinced plans to develop and station ground-launched intermediate-range cruise missiles in Guam, Japan, South Korea, and northern Australia in order to reach deep into China's interior. A potential counterforce use of such missiles against China poses a threat to the survivability of its nuclear weapons. Beijing has reacted to such developments by cautioning the Indo-Pacific countries against permitting INF-range missiles to be deployed on their territory.

18. Ibid.

19. Ramesh Thakur, "China Balks at U.S. Efforts for Nuclear Arms Talks", *The Japan Times*, last modified September 30, 2020, at <https://www.japantimes.co.jp/opinion/2020/09/30/commentary/world-commentary/china-us-nuclear-arms-talks/>.

For China, deployment of the intermediate-range missile would not only challenge its nuclear deterrent capabilities but also disrupt the regional balance of power. Thakur argues, “US refusal to acknowledge mutual vulnerability and efforts to enhance damage-limitation and long-range precision strike capabilities signal a higher nuclear risk threshold.” He suggests that such actions reflect a form of classic security dilemma wherein “one side’s defense-cum-deterrence preparedness to bolster national security is perceived by the other side as strengthened offensive capability and hence a threat to its security.”²⁰

As a corollary, China has responded to these challenges by adopting a hedging strategy that has caused a sharp accretion in its nuclear capabilities. Over the years, China has rapidly modernised its nuclear weapons capabilities. China has significantly expanded the range of its ICBM to surpass the range of the US ICBMs. It includes new penetration capabilities such as Hypersonic Glide Vehicles (HGVs) and Multiple Independently Targetable Reentry Vehicles (MIRVs) to counter the US BMD systems. In 2019, China introduced its ICBM DF-4I that offers an operational range exceeding 14,000 km. It enables China to reach the US within the time frame of thirty minutes. This range allows China to surpass the longest US ICBM LGM-30 Minuteman with a reported range of 13,000 km.²¹ China has also introduced its potentially dual-use DF-17 Hypersonic Glide Vehicle that follows an unpredictable trajectory and travels at speeds exceeding Mach 5 (6,100 km an hour) to penetrate the US defence systems.

EMERGING SINO-US NUCLEAR DYNAMICS AND ITS IMPLICATIONS

The US CPGS and BMDs remain a predominant concern in Beijing’s strategic calculations and a cause of China’s nuclear modernisation. There is also a growing concern that such a situation could expose Beijing to nuclear blackmail by Washington DC. To overcome those fears, China has adopted a strategy of ‘nuclear entanglement’ to increase the survivability of its

20 Ibid.

21. “China Debuts Most Advanced ICBM DF-41 at Parade”, *Global Times*, last modified October 1, 2019, at <https://www.globaltimes.cn/content/1165931.shtml>.

nuclear assets against a decapitating strike by the US. US annual report to Congress on *Military and Security Developments Involving the People's Republic of China: 2019* remarked that the commingling could “complicate deterrence and escalation management during a conflict.” It warned that “a potential adversary attack against Chinese conventional missile force-associated Command and Control (C2) centres could inadvertently degrade Chinese nuclear C2 and generate nuclear use-or-lose pressures among China’s leadership”.²²

It is also worth noting that there also remain fundamental differences in how China and the US perceive nuclear escalation. The former remains sceptical about controlling nuclear escalation once nuclear weapons are used, whereas the latter assumes that nuclear escalation could be controlled in its planning for nuclear operations. In other words, China does not seem to have an ‘escalate to de-escalate policy’ like the US, wherein it plans to use nuclear weapons first to forestall defeat in a conventional military conflict. It may lead Washington DC to “overestimate the likelihood that Beijing would use nuclear weapons and underestimate the scale of a Chinese retaliatory nuclear strike.”²³ Such a difference in thinking can create greater instability during a crisis and contribute to an accidental nuclear deterrence breakdown.

The aggrandisement of China’s nuclear force could cause the US to follow a two-pronged approach: first, it is expected to put more pressure on Beijing to enter into a trilateral arms control agreement with Washington DC and Russia—most likely the New START (Strategic Arms Reduction Treaty). Since its withdrawal from the INF treaty, and with the ongoing talks about the New START extension, the US has insisted that China enters into a trilateral arms control agreement with Washington DC and Moscow.²⁴ Second, it might adopt a hedging strategy and invest in strategic bombers, nuclear attack submarines, command and control assets; it may bolster its alliances with Japan, South

22. Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China 2019*, 2019, p. 66.

23. Fiona S. Cunningham and M. T. Fravel, “Dangerous Confidence? Chinese Views on Nuclear Escalation”, *International Security*, vol. 44, no. 2, 2019, p. 64, doi:10.1162/isec_a_00359.

24. “Trump Still Wants Multilateral Arms Control”, Arms Control Association | The Authoritative Source on Arms Control Since 1971, 2021, at <https://www.armscontrol.org/act/2020-04/news/trump-still-wants-multilateral-arms-control>. Accessed on February 25, 2021.

Korea and Australia and build deeper military ties with the Philippines and India; lastly, it might increase its presence in Guam.

Beijing may increase its warhead count to MIRV its missiles, as each of them could carry up to ten nuclear warheads. Moreover, China also seems to have enough fissile material to facilitate expansion. The US annual report to Congress *Military and Security Developments Involving the People's Republic of China: 2020* has suggested that China's nuclear warhead stockpile would at least double in size as it expands and modernises its nuclear forces.²⁵ Additionally, it stated that the number of warheads on China's land-based intercontinental ballistic missiles is likely to increase to approximately 200 in the next five years. Such a move could indeed cause a shift away from Beijing's minimalist force posture. These numbers have been further accentuated by the more recent US DoD report of 2021.

Additionally, China is also expected to continue developing asymmetric capabilities to buttress its second strike, which includes ensuring survivability and penetrability in the face of the US challenge. These could include, for instance, greater manoeuvrability of the DF-21D missiles makes it difficult for the US BMDs to intercept them while enhancing the precision of their munitions makes it easier to target moving enemy vessels with them.²⁶ China's focus, on the other hand, will continue on developing high-quality nuclear capabilities at a minimal level necessary for sustaining national security.

There are growing concerns within the US that China may abandon its NFU.²⁷ However, the ambiguity in China's NFU policy could be attributed to its perceived threat that the US could use conventional weapons to attack their nuclear assets. Notwithstanding, China's limited ambiguity over its NFU may be ridden with risk as it could raise the US suspicions that China might abandon its no-first-use policy altogether in a crisis. It may cause the US to enhance the development of the new triad and plan for conventional pre-

25. Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China: 2020*, 2021, p. 85.

26. Thakur, "China Balks at U.S. Efforts for Nuclear Arms Talks", n. 19.

27. James M. Acton, "Debating China's No-First-Use Commitment: James Acton Responds", Carnegie Endowment for International Peace, last modified April 22, 2013, at <https://carnegieendowment.org/2013/04/22/debating-china-s-no-first-use-commitment-james-acton-responds-pub-51583>.

It is reported that Russia plans to assist China in developing a missile-attack early warning network and aiding the development of ground-based radars and potentially extending to space-based sensors.

emptive strikes against China's nuclear arsenal, thus "confirming Beijing's fears that Washington seeks absolute security at its expense." China may therefore find itself in the arms race that it sought to avoid through limited ambiguity over no-first-use."²⁸

Further, the US 2020 annual report to Congress suggested that China is seeking to keep at least a portion of its force on a Launch on Warning (LOW) posture, including investment in silo-based forces while building more survivable mobile platforms.²⁹ It is reported that

Russia plans to assist China in developing a missile-attack early warning network and aiding the development of ground-based radars and potentially extending to space-based sensors. China already possesses several ground-based significant phased array radars. These systems combined could support an early warning system for missiles. However, such a shift in the posture seems unlikely, as the existing status allows China to maintain a high moral ground on nuclear issues and put the US on the defensive.³⁰

It is worth noting that many within China are suspicious of any form of arms control agreement with the US or Russia. They argue that the leadership in Washington DC is scapegoating China to dissolve the existing US-Russia nuclear arms control agreement. In January 2020, the Chinese Foreign Ministry Spokesperson Geng Shuang argued, "The US constantly makes an issue of China on this to dodge and shift its responsibilities for nuclear disarmament. China is firmly opposed to that."³¹ Several in China

28. Fiona S. Cunningham and M. Taylor Fravel, "Assuring Assured Retaliation: China's Nuclear Posture and U.S.-China Strategic Stability", *International Security*, vol. 40, no. 2 (Fall 2015).

29. n. 25, p. 88.

30. Manpreet Sethi, "China's Contemporary Nuclear Debates: What's Brewing?", *The Sunday Guardian Live*, at <https://www.sundayguardianlive.com/opinion/chinas-contemporary-nuclear-debates-whats-brewing>. Accessed on February 25, 2021.

31. "Foreign Ministry Spokesperson Geng Shuang's Regular Press Conference on 22nd January, 2020", Embassy of the People's Republic of China in India, at <https://in.chineseembassy.org/eng/fyrth/t1735126.htm>. Accessed on February 25, 2021.

also argue that China's stockpile of 320 nuclear warheads is disproportionate to the US stockpile of 5,800 warheads. Many suggest that the US would have to cut down to a matching level in order to initiate any arms control dialogue.³² However, some hawkish voices, such as the editor-in-chief *Global Times*, Hu Xijin, has argued that, "China needs to expand the number of its nuclear warheads to 1,000 in a relatively short time and procure at least 100 DF-41 strategic missiles." Nonetheless, it is unlikely that China would dramatically increase its arsenal, nor the US would cut down its arsenal to match China's level. Thus, the talks of arms control remain unrealistic in the current times.

Any changes in the nuclear capabilities, doctrines or postures of the US and China inevitably disturb the strategic nuclear balance between India, China and Pakistan, and stimulate a chain of strategic rebalancing.

Finally, with regards to Southern Asia, the nuclear competition between China and the US pulls India and Pakistan into an offence-defence spiral as both these nuclear weapons are located in China's vicinity and have overlapping nuclear dyads: India faces a nuclear challenge from China, whereas Pakistan faces an Indian threat. Such a 'security trilemma', in which one state's attempts to defend itself against another state result in the insecurity of a third state. Thus, any changes in the nuclear capabilities, doctrines or postures of the US and China inevitably disturb the strategic nuclear balance between India, China and Pakistan, and stimulate a chain of strategic rebalancing. For instance, China's nuclear modernisation renders Indian nuclear assets vulnerable to pre-emptive strikes. As India explores its options to overcome strategic challenges posed by China, Pakistan will inevitably face a security dilemma and will seek to match up with its modernisation efforts, such as developing MIRV capabilities.

32. "China 'Happy' to Join Nuclear Talks if U.S. Cuts Arsenal to Matching Level", *South China Morning Post*, last modified July 8, 2020.

NUCLEAR-ARMED HYPERSONIC DELIVERY SYSTEMS—A CASE STUDY OF CHINA

GRANTH VANAİK

INTRODUCTION

The challenge that technology advancements will pose to nuclear deterrence has become a subject of great concern in recent times. These technologies, which may spawn advancements in accuracy, remote sensing, delivery, range, artificial intelligence, cyber capabilities and speed, could make nuclear weapons either more vulnerable or more secure, and hence affect nuclear deterrence in either an adverse or benign manner. Hypersonic delivery systems constitute one such emerging technology. According to some experts, hypersonic technology is an evolution, and not a revolution, given that it dates back to the Cold War era.¹ Ballistic missiles, for instance, are hypersonic in their exo-atmospheric phase. What is new, however, is making a missile fast and manoeuvrable through most of its flight time. So, speed (between Mach 5 and Mach 25) and manoeuvrability are the two characteristics of modern hypersonic systems. These delivery systems are

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1. Stephen Reny, "Nuclear-Armed Hypersonic Weapons and Nuclear Deterrence", *Strategic Studies Quarterly*, vol. 14, no. 4, 2020, pp. 47–68, at https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-14_Issue-4/SSQWinter2020Rev.pdf?ver=2020-05-27-132858-983. Accessed on July 22, 2021.

Many countries are investing in developing nuclear-armed hypersonic systems. China, for example, has been rapidly expanding its hypersonic capabilities and equipping itself with delivery systems to ensure the penetration of its missiles despite US BMD.

of various types, including the following: (a) boost-glide; (b) air-breathing; (c) gun-launched and (d) unmanned aerial vehicles.

The military utility of nuclear-armed hypersonic systems has been a significant focus of debate within the academic, strategic and political circles. Are they fruitful or are they futile? Certain scholars point out that they can increase the chances of survivability and hence be good for deterrence.² The difficulty of interception, combined with the severely compressed time for response and the limited time available to detect the launch, discriminate the target, and prepare

for countermeasure, can be useful in defeating missile defence.³ However, certain other scholars say they pose a danger to deterrence due to their features of ambiguity, which can give rise to misperception and inadvertent escalation.⁴

Many countries are investing in developing nuclear-armed hypersonic systems. China, for example, has been rapidly expanding its hypersonic capabilities and equipping itself with delivery systems to ensure the penetration of its missiles despite US BMD. It sees these systems as necessary for its nuclear deterrence. It is the second country to operationalise its hypersonic delivery systems, DF-17, tipped with DF-ZF HGV in 2020, following Russia, which operationalised its hypersonic delivery systems, the Avangard HGV,

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2. Nathan B. Terry and Paige Price Cone, "Hypersonic Technology: An Evolution in Nuclear Weapons?", *Strategic Studies Quarterly*, vol. 14, no. 2, 2020, pp. 74-93, at https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-14_Issue-2/Terry.pdf. Accessed on June 12, 2021.
 3. John T. Watts, Christian Trotti and Mark J. Massa, "Primer on Hypersonic Weapons in the Indo-Pacific Region", Atlantic Council, August 17, 2020, at <https://www.atlanticcouncil.org/in-depth-research-reports/report/primer-on-hypersonic-weapons-in-the-indo-pacific-region/>. Accessed on June 12, 2021.
 4. Joseph Dillon, "Hypersonic Weapons: Challenging the Hype", *The Security Distillery*, March 20, 2021, at <https://thesecuritydistillery.org/all-articles/hypersonic-weapons-challenging-the-hype>. Accessed on June 17, 2021.

in December 2019. Apart from this, China has also been developing several other platforms. What capabilities is China developing? How does it plan to use these? What would be its implications for India? Would it lower the nuclear threshold, increase misperceptions and ambiguities and lead to an expensive arms race?

The paper attempts to answer these questions. It begins by analysing hypersonic technology, its unique attributes and types. Secondly, it examines the need, utility, significance and challenges surrounding hypersonics. Third, it studies China’s hypersonic programme, and lastly, it analyses the implications for India and on strategic stability in the region, including arms control.

Hypersonic systems operate with the speed of ballistic missiles while incorporating the manoeuvrability of a cruise missile... hypersonic systems travel five times faster than the speed of sound.

HYPERSONIC DELIVERY SYSTEMS: A CONCEPTUAL UNDERSTANDING

Hypersonic systems operate with the speed of ballistic missiles while incorporating the manoeuvrability of a cruise missile.⁵ As mentioned earlier, hypersonic systems travel five times faster than the speed of sound. They are further categorised as: “hypersonic speed” (between Mach 5 and Mach 10) and “high-hypersonic speed” (between Mach 10 and Mach 25). Table 1 briefly explains the different speed regimes.

Table 1: Different Speed Regimes

Speed Regime	Mach Number	Speed in Km/hr	Application of Speed
Subsonic	< 0.8	< 980	Turbojet planes, commercial airlines
Transonic	0.8-1.2	980-1480	Jet aircraft, cruise missiles

5. “Hypersonic Weapon Basics”, Missile Defense Advocacy Alliance, May 30, 2018, at <https://missiledefenseadvocacy.org/missile-threat-and-proliferation/missile-basics/hypersonic-missiles/>. Accessed on June 23, 2021.

Supersonic	1.2-5.0	1480-6170	Jet Aircraft, cruise missiles, anti-missile systems
Hypersonic	5.0-10.0	6170-12,340	Re-entry vehicle, SRBMs, MRBMs, Hypersonic Cruise Missiles, Hypersonic Glide Vehicles, ICBMs
High-hypersonic	10.0-25.0	12,340-30,870	Re-entry vehicle, ICBMs, Advance Hypersonic Vehicles, Boost-glide vehicles
Ultrasonic	> 25.0	> 30,870	Space and Lunar re-entry vehicles

Source: Ajay Lele, “Hypersonic Weapons-IDS Occasional Paper No. 46”, Manohar Parrikar Institute for Defence Studies and Analyses, 2017, at https://idsa.in/occasionalpapers/op_46_hypersonic_weapons; Nancy Hall, “Mach Number”, Glenn Research Center, NASA, May 13, 2021, at <https://www.grc.nasa.gov/www/k-12/airplane/mach.html>. Accessed on May 18, 2021.

The majority of hypersonic delivery vehicles operate at speeds of between Mach 5 and Mach 10. They also enjoy enhanced manoeuvrability, making them difficult to intercept and defend against as compared to traditional missiles.⁶ This results in increased survivability. They are characterised not only by their speed and manoeuvrability, but also by their trajectory and target accuracy.⁷ These systems may be of various types, but the scope of this article is limited to a discussion of only two: (a) hypersonic glide vehicles (HGVs); (b) hypersonic cruise missiles (HCMs). They can be launched from land, air, and sea and can carry conventional and nuclear warheads (dual-capable systems).

Hypersonic Glide Vehicles (HGVs) are “boost-glide” systems that are rocket launched and take to hypersonic speeds in Earth’s lower orbit. They may reach an altitude between 25 and 62 miles.⁸ After reaching

6. Kris Osborn, “Hypersonic Weapons: Everything You Need to Know About the Ultimate Weapon”, *The National Interest*, The Center for the National Interest, July 22, 2017, at <https://nationalinterest.org/blog/the-buzz/hypersonic-weapons-everything-you-need-know-about-the-21637>.

7. Sergey Batsanov, and Kevin Miletic, “Pugwash Briefing Paper: Hypersonic Weapons Series #1- What Is Hypersonic Weapon?”, *British Pugwash*, The Pugwash Foundation, November 2, 2020 at <https://britishpugwash.org/report-pugwash-workshop-on-hypersonics-9-10th-dec-2019/>.

8. Richard M Harrison, Margot van Loon, and Mark A. Bucknam, “Strategic Primer - Hypersonic Weapons”, *American Foreign Policy Council*, June 28, 2019 at <https://www.afpc.org/publications/special-reports/strategic-primer-hypersonic-weapons>.

the lower orbit, they detach themselves from the rocket, attain a gliding equilibrium and glide along the top of the atmosphere (based on its aerodynamic features), unpowered towards a target, at speeds up to Mach 10 or more. It is imperative to note that the HGV is launched into the atmosphere through a rocket comparable to a ballistic missile. However, unlike ballistic missiles (ICBMs) that arc above the atmosphere in space and travel between Mach 17 and Mach 25,⁹ HGVs have an unpredictable flight path that does not follow a ballistic trajectory. They are highly manoeuvrable and can change their paths, making a significant area of territory vulnerable to an attack and difficult to intercept and defend against.¹⁰

Hypersonic Cruise Missiles (HCMs) are “air-breathing” systems, which operate using a supersonic combustion ramjet (Scramjet). A scramjet engine is an upgradation over the ramjet engine as it functions at hypersonic speeds and is capable of supersonic combustion.¹¹ These missiles fly at an altitude between 12 and 19 miles, where a rocket or a launch vehicle can accelerate the missile to Mach 3 or 4 and at this point the missile’s scramjet engine takes over to reach a speed of Mach 9 or Mach 10.¹² It is worth noting that HCMs have an advantage over rocket propulsion systems since operating within the Earth’s atmosphere gives them greater thrust efficiency and lighter weight.¹³ However, the trajectory is not the differential point between traditional cruise missiles and HCMs, as with HGVs. Both may follow nearly identical flight paths. The difference, in this case, lies in the speed regimes. HCMs can hit

9. James M. Acton, “Hypersonic Weapons Explainer”, Carnegie Endowment for International Peace, April 2, 2018, at <https://carnegieendowment.org/2018/04/02/hypersonic-weapons-explainer-pub-75957>.

10. Kelley M. Saylor, and Amy F. Woolf, “Defense Primer: Hypersonic Boost-Glide Weapons”, Congressional Research Service, December 1, 2020, at <https://crsreports.congress.gov/product/pdf/IF/IF11459>.

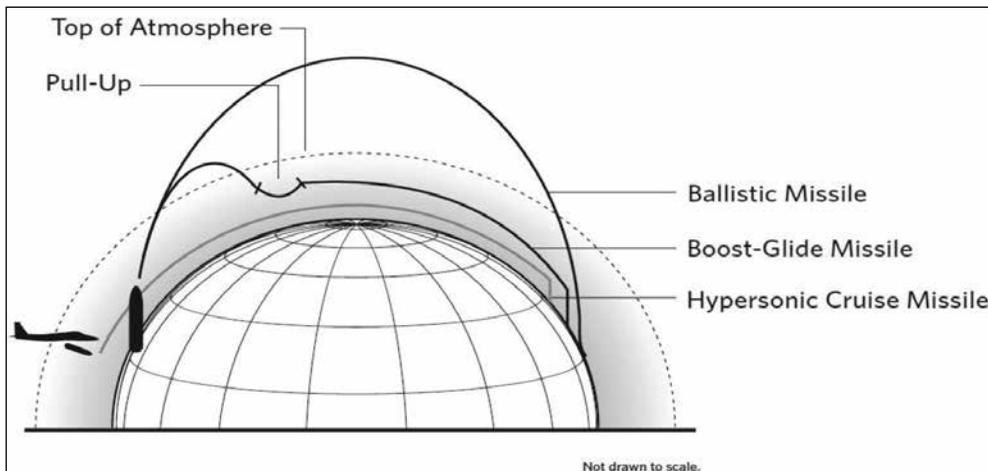
11. “ISRO’s Scramjet Engine Technology Demonstrator Successfully Flight Tested”, Indian Space Research Organisation, at <https://www.isro.gov.in/launchers/isro%E2%80%99s-scramjet-engine-technology-demonstrator-successfully-flight-tested>.

12. Timothy M. Persons, “Science & Tech Spotlight: Hypersonic Weapons.” GAO, September 16, 2019. <https://www.gao.gov/products/gao-19-705sp>.

13. Hans-Ludwig Besser, Dennis Göge, Michael Huggins, Alan Shaffer and Dirk Zimper. “Hypersonic Vehicles: Game Changers for Future Warfare.” *Transforming Joint Air Power: The Journal of the JAPCC*, no. 24, 2017, pp. 12-26, at <https://www.japcc.org/hypersonic-vehicles/>.

their targets faster, making them difficult to intercept and counter as against traditional missiles.¹⁴ HCMs have a longer range and can fly undetected at lower altitudes making them more stealthy than traditional cruise missiles that are prone to be detected.

Figure 1: Diagrammatic Representation of Trajectories of Ballistic Missiles, HGVs and HCMs



Source: James M. Acton, "Silver Bullet?: Asking the Right Questions About Conventional Prompt Global Strike." Washington, DC, USA: Carnegie Endowment for International Peace, 2013, at <https://carnegieendowment.org/2013/09/03/silver-bullet-asking-right-questions-about-conventional-prompt-global-strike-pub-52778>. Accessed on May 19, 2021.

Major powers like the US, Russia and China primarily focus their R&D on HGVs and HCMs, carrying both conventional and nuclear warheads.¹⁵ However, many of these countries are also researching hypersonic or electromagnetic railguns and hypersonic UAVs, which offer a significant technological advantage over existing systems.

14. Ian Williams, "Adapting to the Hypersonic Era." Nuclear Network. Project of Nuclear Issues, Center for Strategic and International Studies, November 17, 2020, at <https://nuclearnetwork.csis.org/adapting-to-the-hypersonic-era/>.
15. Michael T. Klare, "An 'Arms Race in Speed': Hypersonic Weapons and the Changing Calculus of Battle", Arms Control Today, Arms Control Association, June 2019, at <https://www.armscontrol.org/act/2019-06/features/arms-race-speed-hypersonic-weapons-changing-calculus-battle#endnote02>.

Technical Challenges of Hypersonic Systems

It is necessary to realise the technical, engineering and material challenges these hypersonic systems encounter when operating at high-speed regimes. These include having to withstand atmospheric heat and thermal management. At that speed, the exterior temperatures of these vehicles are incredibly high and can be more than 2200°C.¹⁶ Intense heat, coupled with gas dynamics, can cut off and affect communications. In addition, the high airflow temperature leads the particles to ionise and create an electrically charged plasma sheath, disrupting the communication of electromagnetic signals and resulting in difficulty in operating the system (navigation, manoeuvrability, among others).¹⁷ Thus, to manage this, new metal alloys and coatings with necessary material combinations are required to withstand the high temperatures while re-entering and manoeuvring at lower altitudes.

Flight control is another technical challenge. It is essential to keep the vehicle stable to cope with the highly dynamic lift and drag forces caused by G-force.¹⁸ This requires an improvement in the aerodynamic design to guarantee stability. At the same time, improvement in propulsion technology, which includes refinement of engine technology, is needed for scramjet operated HCMs.¹⁹ Cruise missiles powered by standard turbojets are incapable of reaching hypersonic speeds. Thus, it is necessary to operate the missiles with a scramjet or a highly advanced ramjet, which are delicate systems to operate since they become functional only within a specific range.²⁰ There is also a challenge of achieving accuracy in hitting the target.

16. Alex Gatopoulos, "Project Force: Hypersonic Weapons and the New Space Race", Al Jazeera, March 9, 2021, at <https://www.aljazeera.com/features/2021/3/9/project-force-hypersonic-weapons-and-the-new-space-race>.

17. Mark J. Lewis, "Global Strike Hypersonic Weapons", AIP Conference Proceedings 1898, 020005, AIP Publishing, November 15, 2017, <https://aip.scitation.org/doi/abs/10.1063/1.5009210>.

18. Mark McWhinney, "The Risks of Hypersonic Weapons." Project Ploughshares, December 3, 2020, at https://ploughshares.ca/pl_publications/the-risks-of-hypersonic-weapons/.

19. Timothy Andrew Barber, "A Survey of Gaps, Obstacles, and Technical Challenges for Hypersonic Applications", Master's Thesis, University of Tennessee, 2012 at https://trace.tennessee.edu/utk_gradthes/1131.

20. Sergey Batsanov and Kevin Miletic. "Pugwash Briefing Paper: Hypersonic Weapons Series #2-What technical challenges do Hypersonic Weapons raise?" British Pugwash. The Pugwash Foundation, November 2, 2020. <https://britishpugwash.org/report-pugwash-workshop-on-hypersonics-9-10th-dec-2019/>.

Scholars have argued that more than speed and manoeuvrability, the range and payload of HGVs and HCMs will define their utility in strategic and tactical contexts.

Hypersonic systems have a greater chance of missing their targets or impact points due to the high speeds they operate at across extended ranges.²¹

Other challenges include a lack of proper testing facilities, such as testing in wind tunnels and flight tests, ensuring funding for associated R&D (especially in developing countries) and limited simulation possibilities.²²

Utility of Hypersonics

Nations may pursue hypersonic technologies for a variety of reasons, including strategic and tactical security calculations, the state of current techno-military R&D and national pride.²³ The system promises a strategic and tactical edge in the speed, manoeuvrability of the trajectory and accuracy in reaching the target by evading detection. The military significance lies in compressed time for the adversary to react and decide on the interception. As a result, these delivery systems are a “game-changer” in terms of penetrability. Scholars have argued that more than speed and manoeuvrability, the range and payload of HGVs and HCMs will define their utility in strategic and tactical contexts (both defence and offence missions).²⁴

These systems may be used for enhancing the first strike or pre-emptive capabilities (strategic offensive missions); boosting second-strike capabilities (strategic defensive missions); increasing anti-access/area-denial capabilities (tactical defensive missions); and developing the ability to eliminate the targets while attempting to gain an operational superiority (tactical and strategic offensive missions).²⁵ The most likely targets would be high-value,

21. Barber, n. 19.

22. Roshan Khanijo and P.K. Chakravorty. “Hypersonic Vehicles and Their Impact on Military Operations and Strategic Stability—USI Occasional Paper No. 12”, United Service Institution of India, 2017, at https://usiofindia.org/wp-content/uploads/2019/04/12_Hypersonic_Vehicles_and_Their_Impact_on_Military_Operations_and_Strategic_Stability_Final.pdf.

23. Batsanov and Miletic, n. 20.

24. Ibid.

25. Ibid.

highly defended, time-sensitive assets such as air defence radars, fighter aircraft bases, aircraft carriers, military installations, road-mobile missiles, surface-to-air missiles, underground and maritime facilities, command and control, and hardened assets like laboratories and manufacturing sites, among others.²⁶ However, uncertainty over the utility and probable target will remain until expressed in the military doctrines. Until then, one can speculate on their possible roles and targets.

Whether these delivery systems are an evolution or a revolution in technology remains an ongoing debate in academia. Some scholars have argued that they represent a technological revolution, are

“unstoppable,”²⁷ and “phenomenally accurate,”²⁸ and hence advantageous. According to these scholars, such systems will be crucial for achieving superiority over adversaries in future warfare. On the other hand, some other scholars have questioned the uniqueness of the system and opine that they are just an evolution, a “gimmick,”²⁹ and is “hyped,”³⁰ and “overrated.”³¹ They have argued along these lines based on the history of this technology,

The most likely targets would be high-value, highly defended, time-sensitive assets such as air defence radars, fighter aircraft bases, aircraft carriers, military installations, road-mobile missiles, surface-to-air missiles, underground and maritime facilities, command and control, and hardened assets like laboratories and manufacturing sites, among others.

26. Klare, n. 15.

27. R. Jeffrey Smith, “Hypersonic Missiles Are Unstoppable. And They’re Starting a New Global Arms Race”, *The New York Times*, June 19, 2019, at <https://www.nytimes.com/2019/06/19/magazine/hypersonic-missiles.html>.

28. Elliot Negin, “Ask a Scientist: Calling Out the Hype Over Hypersonic Weapons”, *The Equation*. Union of Concerned Scientists, April 2, 2021, at <https://blog.ucsusa.org/elliott-negin/calling-out-the-hype-over-hypersonic-weapons/>.

29. Melanie Marlowe and Bryan McGrath, “Net Assessment: Hypersonic Weapons—Gimmick or Game Changer?”, *War on the Rocks*, August 21, 2020, at <https://warontherocks.com/2019/05/net-assessment-hypersonic-weapons-gimmick-or-game-changer/>.

30. Michael Unbehauen, “Hypersonic Weapons Hype?”, *Modern Diplomacy*, March 20, 2020, at <https://modern diplomacy.eu/2020/03/20/hypersonic-weapons-hype/>.

31. Kristin Huang, “Are Hypersonic Missiles a Game Changer? Not so Fast, Says Study”, *South China Morning Post*, January 19, 2021, at <https://www.scmp.com/news/china/military/article/3118221/are-hypersonic-missiles-game-changer-not-so-fast-says-new-study>.

which dates all the way back to the 1930s, and research undertaken over the years.³² They elaborate that these delivery systems do not change the status quo, as existing ballistic and cruise missiles are difficult to defend against and can hit targets more accurately.³³ Though the technology has existed for long, over the years, the methods to achieve target accuracy through speed and manoeuvrability have made hypersonic systems a cause of concern.

Defending Against Hypersonic Systems

Hypersonic systems present significant challenges and are difficult to defend against. Since the systems operate at high speeds, coupled with manoeuvrability and lower altitudes, they can easily penetrate a highly defended area, rendering any early-warning, air- or missile-defence systems ineffective. For instance, hypersonic delivery systems may challenge the layered missile defence systems (designed to intercept missiles in the exo-atmosphere) since they are manoeuvrable in their midcourse phase and travel at lower altitudes inside the Earth's atmosphere, making them difficult to intercept.³⁴ They can also change their target once launched, making larger territory vulnerable to an attack. This increases the probability of hypersonic systems successfully hitting a target and their survivability.. Moreover, the compressed timeline to intercept, distinguish and retaliate, shortens decision-making time, making strategic assets vulnerable and overwhelming command and control structures.

Besides, some of the most advanced missile defence systems, such as THAAD or S-400s, may only defend a comparatively small area. But the characteristic features of hypersonic systems may increase susceptibility to penetration.³⁵ The extensive kinetic energy, in addition to the warhead,

32. Ajay Lele, "Hypersonic Weapons—IDSA Occasional Paper No. 46", Manohar Parrikar Institute for Defence Studies and Analyses, 2017, at https://idsa.in/occasionalpapers/op_46_hypersonic_weapons.

33. Cameron Tracy, "Slowing the Hypersonic Arms Race: A Rational Approach to an Emerging Missile Technology", Union of Concerned Scientists, May 5, 2021, at <https://www.ucsusa.org/sites/default/files/2021-04/slowing-the-hypersonic-arms-race.pdf>.

34. S. Bugos and K. Reif, "Understanding Hypersonic Weapons: Managing the Allure and the Risks", Arms Control Association, September 2021, at https://www.armscontrol.org/sites/default/files/files/Reports/ACA_Report_HypersonicWeapons_2021.pdf.

35. Besser, n. 13.

poses yet another challenge.³⁶ Although very few countries have invested in developing countermeasures for hypersonics (such as space-based sensors and over-the-horizon backscatter radars), the difficulty in defending has continuously led to a need for a 360-degree defence system that can counter the manoeuvrability of hypersonic systems.³⁷ The future will determine whether hypersonic systems are truly defence penetrating panacea or are overrated, and whether the countermeasures are effective or not.

CHINA'S HYPERSONIC PROGRAMME

China is the second country to deploy hypersonic delivery systems capable of carrying nuclear and conventional warheads on field and has undertaken significant research on hypersonics. While one must understand that an accurate assessment of Chinese capabilities is quite difficult due to limited authentic information available in the public domain, it is evident that China is leading the hypersonic arms race, having conducted 20 times as many tests as the United States.³⁸ China's rapid modernisation of its capabilities and upgrading its Rocket Force (earlier Second Artillery) with state-of-the-art equipment is another dimension of President Xi's "China Dream", which envisions China completely developed and modernised by 2049, the 100th anniversary of the founding of PRC. China's hypersonic delivery system's programme has reached a stage where it falls between levels six and eight on the Department of Defence's Technological Readiness Level (TRL) scale.³⁹ This means that some of its prototype systems have been demonstrated (six), tested in a relevant environment (seven), and qualified to work in the required conditions (eight).⁴⁰

36. Richard H. Speier, "Hypersonic Missiles: A New Proliferation Challenge", RAND Corporation, March 29, 2018, at <https://www.rand.org/blog/2018/03/hypersonic-missiles-a-new-proliferation-challenge.html>.

37. Watts, n. 3.

38. Marc Selinger, "DoD's New Research Chief Eyes Faster Hypersonics Development", *Defence Daily*, March 6, 2018, at <https://www.defensedaily.com/dods-new-research-chief-eyes-faster-hypersonics-development/pentagon/>.

39. Peter Wood and Roger Cliff, "A Case Study of The PRC's Hypersonic Systems Development", Air University, September 2, 2020, at https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Other-Topics/2020-08-25%20CASI_Hypersonic%20Case%20Study_WEB.pdf?ver=2WiFcyYi1dquXp7kfG_8UA%3D%3D.

40. "Technology Readiness Levels in the Department of Defence (DoD)", 2010, at <https://api.army.mil/e2/c/downloads/404585.pdf>. Accessed on June 1, 2021.

China's development of ballistic and cruise missiles, manoeuvrable re-entry vehicles, MIRVs, and early warning systems indicates its intent to be technologically advanced.

Perceptions of Motivations and Threats

According to Chinese scholars, the current motivation for hypersonic technologies is a deep-seated desire to modernise in the footsteps of other major powers in the world. China's development of different types of ballistic and cruise missiles, manoeuvrable re-entry vehicles, MIRVs, and early warning systems indicates its intent to be technologically advanced. China's dream to overcome its harrowing past experiences (Century of Humiliation) and modernise rapidly has encouraged the hypersonic arms race with the US. Many scholars in China have often

recommended that the government invest extensively in developing the countries' own hypersonic systems, since they see American efforts in this direction as part of a revolution in the military affairs and aerospace industry.⁴¹ They opine that China must respond and has no reason to delay creating a technology that will be "a revolution and a breakthrough for future warfare."⁴²

China's second motivation comes from its security threats. At the global level, these are perceived from US missiles and missile defences. Tong Zhao of the Carnegie-Tsinghua Center for Global Policy points out that many experts in China have argued for China to research and develop hypersonic technology not only to understand it but also to find different ways to counter US hypersonic capabilities.⁴³ At the regional level, Japan, Australia and India's hypersonic development efforts also impact the region's strategic stability, though these matter little to China at this moment.⁴⁴

41. Tong Zhao, "Conventional Challenges to Strategic Stability: Chinese Perceptions of Hypersonic Technology and the Security Dilemma", in Adam N. Stulberg and Lawrence Rubin (eds.), *The End of Strategic Stability?: Nuclear Weapons and the Challenge of Regional Rivalries* (Washington DC: Georgetown University Press, 2018), pp. 174-202, at <https://www.jstor.org/stable/j.ctv75db5d.12>.

42. Wood, n. 39.

43. Zhao, n. 41.

44. Huang Panyue, "How about Japan's Real Strength in Hypersonic Weapon Field?", China Military, December 3, 2019, at http://eng.chinamil.com.cn/view/2019-12/03/content_9688517.htm; Ji Cheng, "Why Australia, US Work Together to Develop Hypersonic Cruise Missiles?" Edited by Liu Yuyuan, China Military, April 9, 2021, at http://english.chinamil.com.cn/view/2021-04/09/content_10019113.htm.

Third, China invests in hypersonics to boost its nuclear survivability. It wishes to make its stockpile safer and secure in order to sustain deterrence.⁴⁵ In addition, the penetration capability of the system can help evade the adversary's missile defences.⁴⁶ For the reasons mentioned above, China is conducting extensive research on hypersonics and is not shying away from flaunting its technological breakthroughs. Western scholars also attribute China's motivations to maintaining its superiority in the South China Sea.⁴⁷ They point out that rapid modernisation and R&D efforts in hypersonics have been primarily because of US ABM systems, such as THAAD in South Korea, which the US justifies as a means to countering the North Korean threat.⁴⁸ In addition, they see China's developments as a direct countermeasure to the US power projection in the South China Sea and Taiwan Straits in recent years due to the Freedom of Navigation exercises that it has carried out.⁴⁹

China is conducting extensive research on hypersonics and is not shying away from flaunting its technological breakthroughs. Western scholars also attribute China's motivations to maintaining its superiority in the South China Sea.

Western experts use China's Military Strategy of 2015 to directly quote its motivations and threat perceptions to protect its maritime assets by improving its long-range precision strike capabilities. For example, the document pointed out that "some of its offshore neighbours take provocative actions and reinforce their military presence on China's reef and islands that are illegally occupied" and

45. Wu Riqiang, "Living with Uncertainty: Modelling China's Nuclear Survivability." *International Security* vol. 44, no. 4, 2020, pp. 84-118, at https://doi.org/10.1162/isec_a_00376.

46. Li Bin, Sun Xiangli and Wu Riqiang, "Why Is China Modernising Its Nuclear Arsenal?", Carnegie International Nuclear Policy Conference 2015, Carnegie Endowment for International Peace, March 24, 2015, at <https://carnegieendowment.org/2015/03/24/why-is-china-modernizing-its-nuclear-arsenal-pub-57516>.

47. Andrew Davies, "Coming Ready or Not: Hypersonic Weapons", Australian Strategic Policy Institute, March 2021, at <https://www.aspi.org.au/report/coming-ready-or-not-hypersonic-weapons>.

48. Tate Nurkin, "China's Manoeuvrable Re-Entry Vehicles (MaRVs)", in *China's Advanced Weapons Systems: Research Report Prepared for U.S.-China Economic and Security Review Commission*, 177-200, Jane's by IHS Markit, 2018, at https://www.uscc.gov/sites/default/files/Research/Jane's%20by%20IHS%20Markit_China's%20Advanced%20Weapons%20Systems.pdf.

49. Connie Lee, "Motivations Behind China's Hypersonic Weapons Development", John Hopkins Sheridan Libraries, Dissertation, John Hopkins University, 2020, at <https://jscholarship.library.jhu.edu/handle/1774.2/62693?show=full>.

that “some external countries are busy meddling in South China Sea affairs.”⁵⁰ As a result of this approach, Beijing would gain superiority over forward bases and ships, allowing it to secure its maritime assets without getting detected.

According to a 2017 SIPRI study, the development of hypersonics is more “utilitarian”,⁵¹ since China sees these systems for their conventional and nuclear utility and may deploy them over medium-, intermediate-, or longer-range missiles to increase its penetration capabilities. Since 2014, China has extensively increased its R&D activities, first to know the technology and second, to gain advantage and deploy it in no time.

Hypersonic Research in China

Since the 1960s, China’s state-run laboratories have focussed on hypersonic flight as part of the ballistic and cruise missiles, though the work was then more theoretical.⁵² In the 1980s, it began research on the scramjet capabilities, and in the 1990s, substantial progress was made on the scramjet research as part of Project 921, China’s manned space programme.⁵³ However, a serious effort to work on hypersonics began only in the 2000s. The “Hypersonic Flight Vehicle Science and Technology Project” was initiated in 2006 under the National Medium-to-Long Term S&T Development Plan (2006-2020), when a coherent effort was made to research the hypersonics.⁵⁴ Several yearly publications came out from China during this period, outlining the research progress in the hypersonic field. Figure 2 points out the number of yearly publications from China on the word “hypersonic” from 2000 to 2020. This is around the same time the US started working on its Conventional Prompt Global Strike programme.

50. “China’s Military Strategy (Full Text)”, The State Council, the People’s Republic of China, May 27, 2015, at http://english.www.gov.cn/archive/white_paper/2015/05/27/content_281475115610833.htm.

51. Lora Saalman, “Factoring Russia into the US–Chinese Equation on Hypersonic Glide Vehicles”, SIPRI, January 2017, at <https://www.sipri.org/publications/2017/sipri-insights-peace-and-security/factoring-russia-us-chinese-equation-hypersonic-glide-vehicles>.

52. John Grady, “Panel: China Leading the World in Hypersonic Weapon Development” USNI News, March 14, 2019, At <https://news.usni.org/2019/03/14/panel-china-leading-world-hypersonic-weapon-development>.

53. Wood, n. 39, p. 7.

54. *Ibid.*, p. 7.

Many research papers were authored in the fields of aerospace and aircraft, weapons and military affairs.⁵⁵ The US CPGS programme and its destabilising effects are frequently debated in China. One expert elaborates that one-quarter of Chinese research has focused on defeating the US missile defence systems, while roughly one half concentrates on developing long-range capabilities.⁵⁶ Additionally, research has also been conducted on near-space attack systems, increasing HGV's manoeuvrability, managing heat and gas dynamics and improving the trajectories of present systems to expand their range.⁵⁷ These are only a handful of the many categories.

Figure 2: China's Yearly Publications on the term "Hypersonic"



Source: Author's compilation from "CNKI Database", at https://global.cnki.net/kns/brief/Default_Result.aspx?code=CIDX&kw=&korder=0&sel=1. Accessed on May 31, 2021.

Several institutions in China are monitoring the R&D of hypersonics. The CMC Science and Technology Commission, as per western literature, seems to have taken the project under its auspices and has been determining longer-

55. "CNKI Database", at https://global.cnki.net/kns/brief/Default_Result.aspx?code=CIDX&kw=&korder=0&sel=1. Accessed on May 31, 2021.

56. Lora Saalman, "China's Calculus on Hypersonic Glide", SIPRI, August 15, 2017, at <https://sipri.org/commentary/topical-backgrounder/2017/chinas-calculus-hypersonic-glide>.

57. Ibid.

term goals for developing hypersonics and other military technologies.⁵⁸ Table 2 highlights some of the significant institutions involved in hypersonic research, development and testing in China.

Table 2: Key Institutions Associated with Hypersonic Research in China

Name of Institution	Location	Work Undertaken
China Academy of Aerospace Aerodynamics	Beijing	Credited for the development of Starry Sky II hypersonic glide vehicle
China Academy of Launch Vehicle Technology	Beijing	Probable developer of HGV-tipped DF-17 MRBM and has undertaken development of several ballistic missiles and space vehicles
China Aerospace Science and Industry Corporation	Beijing	Producing the DF-ZF HGV
College of Aerospace Science and Engineering, National University of Defence Technology	Changsha, Hunan	Has two National Key Academic Departments undertaking research
Institute of Mechanics, Chinese Academy of Sciences	Beijing	Has several key laboratories that are researching hypersonics
State Key Laboratory for High-Temperature Gas Dynamics, Chinese Academy of Sciences	Beijing	Developing hypersonic wind tunnel for tests. Driving force in the implementation of JF12 wind tunnel
State Key Laboratory for Powder Metallurgy, Central South University	Changsha, Hunan	Announced a breakthrough in the ceramic coating for thermal management, which has been necessary for hypersonic vehicles

Source: Peter Wood and Roger Cliff, “A Case Study of The PRC’s Hypersonic Systems Development.” Air University, September 2, 2020, at https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Other-Topics/2020-08-25%20CASI_Hypersonic%20Case%20Study_WEB.pdf?ver=2WiFcyYi1dquXp7kfG_8UA%3D%3D.

58. Office of Secretary of Defence, “Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2020”, US Department of Defence, August 2020, at <https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF>.

China has primarily been facing a technical challenge of overcoming the thermal and heat management dynamics. To overcome it, China has kept a keen eye on other countries' hypersonic capabilities, including seeking opportunities for cooperation. For instance, Central South University in Changsha, Hunan, collaborates on hypersonic testing and material sciences with the University of Manchester from the UK. In 2017, both collaborated to develop a new ceramic coating material that is useful for hypersonic vehicles.⁵⁹ This addresses the technical challenges and improves the heat resistance on hypersonic vehicles. Although China states that this is for civilian use, the research undertaken can significantly benefit the military applications. Recently, many in the UK have questioned such collaborations with Chinese academic institutions, arguing that they may aid the Chinese military in developing stealth and advanced defence systems, threatening the national security of Western countries.⁶⁰

Hypersonic Wind Tunnel Testing Facilities

China uses many facilities to undertake its scale-model testing and has invested heavily in testing facilities that replicate the conditions for accurate assessment. China's Aerodynamics Research and Development Center claims to have 18 wind tunnels.⁶¹ China has two major facilities: the JF12 and JF22 hypersonic wind tunnels. These tunnels allow for better testing of hypersonic air flow, atmospheric heat and heat-resistant materials required for re-entry vehicles.⁶² The JF12 Hypersonic Shockwave Duplication wind tunnel is 265 metres long and is the world's largest hypersonic wind tunnel. Chinese have dubbed it as the

59. Angus McNeice, "Future of Hypersonic Flight Hot Thanks to China-UK Research", *China Daily*, July 10, 2017, at https://www.chinadaily.com.cn/world/2017-07/10/content_30061981.htm#:~:text=British%20and%20Chinese%20scientists%20have,high%20velocity%20planes%20and%20rockets.

60. David Scullion, "Are UK Dons Hopelessly Naive on China?: David Scullion", *The Critic Magazine*, February 11, 2021, at <https://thecritic.co.uk/are-uk-dons-hopelessly-naive-on-china/>.

61. Jeffrey Lin, and P.W. Singer. "A Look at China's Most Exciting Hypersonic Aerospace Programs." *Popular Science*, April 18, 2017. <https://www.popsci.com/chinas-hypersonic-technology/>.

62. Peter Wood and Alex Stone. "China's Ballistic Missile Industry", *China Aerospace Studies Institute*, May 11, 2021, <https://www.airuniversity.af.edu/CASI/Display/Article/2599627/chinas-ballistic-missile-industry/>.

‘Hypersonic Dragon’.⁶³ Researchers can replicate conditions at altitudes of 25-40 km and speeds from Mach 5 to 10. The tunnel can also simulate high temperatures up to 3226°C.

China’s latest large-scale operating wind tunnel is the JF22 hypersonic wind tunnel. It can test hypersonic speeds between Mach 7 and 30, which can last for approximately 130 milliseconds. Recent media reports point out that this will put China’s hypersonic testing at least ‘30 years ahead of the West.’⁶⁴ Additionally, China operates three more hypersonic wind tunnels—FD-02, FD-03, FD-07—capable of reaching speeds of Mach 8, Mach 10 and Mach 12, respectively. Furthermore, it operates the FD-21 wind tunnel, operating at speeds between Mach 10 and Mach 15.⁶⁵

Hypersonic Capabilities

Since 2014, China has conducted several tests on hypersonic vehicles. China has claimed that these tests were not directed against any specific country or target and were normal.⁶⁶ As per reports, there are currently many developed systems out of which one has been deployed, and many more are under development, summarised in Table 3. There is a significant ambiguity regarding China’s intention to outfit these systems with nuclear or conventional warheads. However, the focus here would be on nuclear-armed.

DF-ZF: Previously, WU-14, is an HGV that has been tested approximately nine times since 2014, out of which six were claimed to be successful.⁶⁷ The DF-ZF is said to be capable of flying at speeds between Mach 5 and Mach 10, has an approximate range between 1600-2400 km and is capable of

63. Anil Chopra, “China’s Aggressive Aerospace Push”, *Air Power Asia*, December 10, 2020, at <https://airpowerasia.com/2020/12/10/chinas-aggressive-aerospace-push/>.

64. Mark Hodge, “China Unveils Plan for 23,000mph Wind Tunnel ‘30 Years Ahead’ of the West”, *The US Sun*, May 31, 2021, at <https://www-the-sun-com.cdn.ampproject.org/c/s/www.the-sun.com/news/2989000/china-hypersonic-wind-tunnel/amp/>.

65. Kelley M. Saylor, “Hypersonic Weapons: Background and Issues for Congress”, Congressional Research Service, April 26, 2021, at <https://crsreports.congress.gov/product/pdf/R/R45811>.

66. “Hypersonic Tests Target No Specific Country”, *People’s Daily Online*, December 11, 2014, at <http://en.people.cn/n/2014/1211/c202936-8821063.html>.

67. Saylor, n. 65.

Table 3: China's Hypersonic Capabilities

	Name of the System	Range/Speed	Status
Current Developments	DF-ZF HGV	1600-2400 km	Deployed/Operational
	DF-17 MRBM	1800-2500 km	Deployed/Operational
	XINKONG-2	Mach 6	Underdevelopment
	CM-401 Hypersonic ASBM	Speed: Mach 4-6 Range: 9-180 miles	Underdevelopment
Possible Future Developments	DF-21 D MRBM	450-1550 km	Speculated for Development
	DF-26 IRBM	3000-4000 km	
	DF-31A ICBM	Over 11000 km	
	DF-41 ICBM	12000-15000 km	
	CH-AS-X-13 ALBM	3000 km	
	JL-2 SLBM	7200 km	

Source: Author's compilation from various online sources.

performing extreme manoeuvres that can evade missile defences.⁶⁸ It is expected to hit the targets anywhere in the world within an hour. The DF-17 MRBM is designed explicitly to carry it.⁶⁹ DF-ZF was publicly displayed in 2019 and has been operational since 2020, making it an essential part of China's penetration capability.

DF-17: This is a solid-fuelled and road-mobile MRBM. China conducted several tests on the DF-17, said to have rocket booster capabilities of the DF-16B SRBM, which is already operational.⁷⁰ The DF-17 is the first HGV-equipped tactical ballistic missile that is operational since 2020.⁷¹ It has a

68. Paul Bernstein and Dain Hancock. "China's Hypersonic Weapons", *Georgetown Journal of International Affairs*, January 27, 2021, at <https://gjia.georgetown.edu/2021/01/27/chinas-hypersonic-weapons/>.

69. Prakash Katoch, "Hypersonic Weapons", *Indian Defence Review*, June 16, 2020, at <http://www.indiandefencereview.com/news/hypersonic-weapons/>.

70. Ankit Panda, "Introducing the DF-17: China's Newly Tested Ballistic Missile Armed With a Hypersonic Glide Vehicle", *The Diplomat*, December 30, 2017, at <https://thediplomat.com/2017/12/introducing-the-df-17-chinas-newly-tested-ballistic-missile-armed-with-a-hypersonic-glide-vehicle/>.

71. Wood, n. 39.

Western scholars speculate that China might aim to equip its LRBMs with HGVs, thereby increasing the range of its first-strike capabilities.

range of about 1800-2500 km.⁷² This can easily help China protect its regional interests, specifically in the South China Sea and the Taiwan Straits. It will also enhance China's power projection strategy and penetration capability against its regional rivals such as India, Japan and South Korea, which are also developing hypersonic technology. Recently, rumours were circulating that the DF-17 was deployed near the Taiwan Straits to deter the

US from meddling in China's internal matters.⁷³

Considerations on other Ballistic Missiles: Western scholars speculate that China might aim to equip its LRBMs with HGVs, thereby increasing the range of its first-strike capabilities. Additionally, China may tip the DF-21D MRBM (range 450 to 1550 km) and DF-26 IRBM (range 3000 to 4000 km) with DF-ZF HGV to increase its long-range strike capabilities.⁷⁴ The DF-21D is operational as an anti-ship ballistic missile. China may also consider tipping DF-31A⁷⁵ (range over 11,000 km) or DF-41 (range between 12,000-15,000 km) ICBMs capable of reaching critical targets in the United States with HGVs.⁷⁶ Possibilities are that China may deploy a nuclear-armed HGV on a JL-2 SLBM, increasing the survivability of nuclear forces.⁷⁷ This will defeat the US missile defences, rendering them vulnerable. HGVs dual-use capability makes it more beneficial for the Chinese, as they can equip their nuclear missiles with conventional HGVs to increase their penetration capabilities at low trajectories. However, they also increase the risk of lowering the nuclear threshold.

72. "DF-17", Missile Threat - CSIS Missile Defence Project, June 23, 2020, at <https://missilethreat.csis.org/missile/df-17/>.

73. Liu Xuanzun, "Rumored PLA Deployment of DF-17 Hypersonic Missiles near Taiwan Straits Could Deter US Meddling in China's Internal Affairs: Analysts", *Global Times*, October 18, 2020, <https://www.globaltimes.cn/content/1203846.shtml>.

74. Saalman, n. 56.

75. Katoch, n. 69.

76. Dominika Kunertova, "Weaponized and Overhyped: Hypersonic Technology", Center for Security Studies, ETH Zurich, June 2021, at <https://css.ethz.ch/en/center/CSS-news/2021/06/weaponized-and-overhyped-hypersonic-technology.html>.

77. Bernstein and Hancock, n. 68.

Xingkong-2 (Starry Sky-II): This is a waverider hypersonic vehicle, reported to be still under trial phase.⁷⁸ The first known tests were done in August 2018 by the China Academy of Aerospace Aerodynamics. Waveriders are hypersonic aircraft designed using shock waves generated by their own flight as a lifting surface to improve their lift-to-drag ratio.⁷⁹ Waveriders can carry conventional or nuclear payloads and can also act as kinetic kill vehicle. It was carried by a solid-propellant rocket in the tests and, after separation, glided back to Earth at speeds reaching 7344 km/hr or Mach 6, displaying high manoeuvrability before landing back.⁸⁰ Chinese experts claim that Xingkong-2 will use a different flight pattern than the DF-17 MRBM. The difference is that the former has a fairing, whereas the latter does not.⁸¹ Some reports suggest that this system might be operational by 2025 as an advanced anti-ship missile.⁸²

Waveriders are hypersonic aircraft designed using shock waves generated by their own flight as a lifting surface to improve their lift-to-drag ratio. Waveriders can carry conventional or nuclear payloads and can also act as kinetic kill vehicle.

CM-401 Hypersonic Anti-Ship Ballistic Missile: In 2018, China Aerospace Science and Industry Corporation Limited showcased a new hypersonic ASBM at the 2018 Airshow China.⁸³ As per reports, it can reach a speed between Mach 4 and Mach 6, be launched into a near-space trajectory, and be capable of manoeuvrable flight throughout the course. Its range approximately lies between nine miles to just over 180 miles

78. Liu Xuanzun, "DF-17 May Not Sole Hypersonic Missile Program: Media", *Global Times*, December 1, 2019, at <https://www.globaltimes.cn/page/201912/1171896.shtml>.

79. Ajey Lele, "Hypersonic Weapons", in *Disruptive Technologies for the Militaries and Security*, 47-78 (Singapore: Springer, 2019), at <https://www.springer.com/gp/book/9789811333835>.

80. Steve Mollman, "China Just Tested a Hypersonic Weapon the US Can't Defend Against", *Quartz*, August 7, 2018, at <https://qz.com/1350327/china-tested-a-hypersonic-weapon-the-us-cant-defend-against/>.

81. Xuanzun, n. 78.

82. Bernstein and Hancock, n. 68.

83. Joseph Trevithick, "China Reveals Short-Range Anti-Ship Ballistic Missile Designed to Dodge Enemy Defenses", *The Drive*, November 5, 2018, at <https://www.thedrive.com/the-war-zone/24699/china-reveals-short-range-anti-ship-ballistic-missile-designed-to-dodge-enemy-defenses>.

categorising it as an SRBM. The company claims that CM-401 can conduct a terminal diving attack at extremely high velocity.⁸⁴ It can also deliver rapid and precise strikes on medium to large vessels, vessel formations and port targets. Its ability to evade the enemy defence and higher terminal speed make it a valuable addition to the Chinese military. CM-401 is also available for exports, however, the range is unknown at this time. Given the capabilities of this missile, one can speculate that Pakistan may wish to have it in their inventory to deter any possible threats from the Indian Navy.

Other Developments: There are speculations that China is developing an air-launched ballistic missile, closely resembling the DF-17.⁸⁵ A video had surfaced showing a Xian H-6N bomber of PLAAF carrying a payload on the bottom of its fuselage. Western experts designate it as CH-AS-X-13, which are nuclear-capable.⁸⁶ The missile has been tested since 2016 and is not expected to be operational until 2025, according to reports. However, there are speculations that the missile is somewhat like DF-21 MRBM. The missile with about a 3000 km range and a radius of 6000 km, the missile may easily reach Hawaii.⁸⁷ China has also been developing hypersonic UAVs for future ISR operations and electromagnetic railguns that can operate up to Mach 6 for its naval ships. Once operational, these guns will be used for anti-ships, long-range artillery bombardment and missile defence missions.⁸⁸ China has also developed a scramjet engine testbed, Lingyun-1, capable of testing

84. Liu Xuanzun, "CASIC Unveils New Anti-Ship Ballistic Missile, Providing Greater Deterrence against Aircraft Carrier Attacks", *Global Times*, November 6, 2018 at <https://www.globaltimes.cn/content/1126120.shtml>.

85. Mike Yeo, "Video Reveals Chinese H-6N Bomber Carrying Suspected Hypersonic Weapon", *Defence News*, October 19, 2020, at <https://www.defensenews.com/global/asia-pacific/2020/10/19/video-reveals-chinese-h-6n-bomber-carrying-suspected-hypersonic-weapon/>.

86. Ankit Panda, "Revealed: China's Nuclear-Capable Air-Launched Ballistic Missile," *The Diplomat*, April 18, 2018, at <https://thediplomat.com/2018/04/revealed-chinas-nuclear-capable-air-launched-ballistic-missile/>.

87. H.I. Sutton, "China's New Aircraft Carrier Killer Is World's Largest Air-Launched Missile", *Naval News*, November 1, 2020, at <https://www.navalnews.com/naval-news/2020/11/chinas-new-aircraft-carrier-killer-is-worlds-largest-air-launched-missile/>.

88. Jeffrey Lin and P.W. Singer, "China's Hypersonic Military Projects Include Spaceplanes and Rail Guns." *Popular Science*, June 26, 2018 at <https://www.popsci.com/chinas-hypersonic-work-speeds-up/>.

at Mach 6 and above, to research HCM technologies and thermal resistant materials and components.⁸⁹

These systems that are either operational or are under development provide China with the ability to increase its regional warfighting capabilities, ensure penetration capability against regional rivals and the US, provide strategic deterrence to Chinese forces and ensure a CPGS like that of the US. It will also increase China's global power projection. However, these may have severe implications for countries like India and arms control initiatives.

Arms Control

Nuclear-armed hypersonic delivery systems complicate arms control and non-proliferation efforts. Countries like China, which are leading in hypersonic R&D, do not see the advantage in limiting their progress. Tong Zhao notes that "China has a clear advantage over the US in terms of land-based medium- and intermediate-range missiles (ballistic and cruise missiles)" since the INF Treaty never constrained it.⁹⁰ Moreover, he says, "China acquired considerable experience in developing and operating such weapon systems, which makes China confident that it will be able to maintain this advantage in the future," pointing out that China may not restrain the future developments.

The growing threat posed by the US missile defence system, the existing lack of trust between the US and China, and the US's withdrawal from the ABM and INF Treaties all contribute to China's decision to abstain from arms control negotiations. Besides, experts say there are gaps between China's nuclear arsenal and that of US and Russia due to China's commitment to the principle of limited development of nuclear

89. Rajaram Nagappa, "Hypersonic Cruise Missiles: An Overview", International Strategic and Security Studies Programme, National Institute of Advanced Studies, November 24, 2020, at <http://issp.in/hypersonic-cruise-missiles-an-overview/>.

90. Tong Zhao, "Conventional Missiles, Missile Defence, and Strategic Stability: Chinese Perspective", in Patricia M. Kim (ed.), *Enhancing US-China Strategic Stability in an Era of Strategic Competition: US and Chinese Perspectives*, pp. 26-29, United States Institute of Peace, 2021, at <https://www.usip.org/publications/2021/04/enhancing-us-china-strategic-stability-era-strategic-competition>.

weapons and non-engagement in nuclear competition.⁹¹ Chinese Experts suggest that the US and Russia should take the lead in international nuclear disarmament.⁹² Therefore, the idea of a trilateral arms control framework has been declined, stating it as means of “coercion or blackmail.”⁹³ Therefore, from China’s perspective, any arms control on nuclear-armed hypersonic delivery systems will only be international, negotiated at the UN, that is more inclusive and equitable.⁹⁴ Until then, China will continue to develop arms unrestrained.

IMPLICATIONS FOR INDIA

Even though an accurate assessment of the threat is difficult due to information being limited, sometimes even inflated, China’s hypersonic delivery systems still have significant implications for India, which has only recently begun testing its hypersonic capabilities. Moreover, the asymmetrical military postures between India and China, India’s limited capabilities in hypersonics, and China’s rapid modernisation in hypersonics may significantly impact strategic stability.

China’s signalling of the deployment and use of nuclear-armed hypersonic missiles against India may raise insecurities for its nuclear assets and nuclear command and control. Compressed timelines to respond, combined with lack of countermeasures against hypersonics, will add to the country’s vulnerability since the ambiguities related to warheads and targets, added with a short duration (hardly minutes) to respond, can put the country at risk. India may be tempted to lower the nuclear threshold, posturing the nuclear forces to either launch on warning or launch under attack to enhance

91. Liping Xia, “China’s Nuclear Doctrine: Debates and Evolution”, Carnegie Endowment for International Peace, June 30, 2016, at <https://carnegieendowment.org/2016/06/30/china-s-nuclear-doctrine-debates-and-evolution-pub-63967>.

92. John Dotson, “Beijing Rejects Any Involvement in Nuclear Arms Limitation Talks”, The Jamestown Foundation, October 30, 2020, at <https://jamestown.org/program/beijing-rejects-any-involvement-in-nuclear-arms-limitation-talks/>.

93. Ibid.

94. Ibid.

deterrence,⁹⁵ hence increasing the chances of inadvertent escalation.⁹⁶ Thus, strategic miscalculations can occur in a crisis.

The confusion about whether the weapon carries a conventional or nuclear payload (warhead ambiguity), the delivery platform it operates on and the uncertainty of what target it was chosen to strike (target ambiguity) can lead to an escalation.⁹⁷ However, the counter analysis points out that hypersonics may not increase a country's first-strike capabilities, given the adversary already possesses a secure second-strike capability and it can effectively retaliate nevertheless.⁹⁸ This will also be the case with India and China, where established second-strike capabilities exist, and there can be an overwhelming retaliatory strike from India if China uses a nuclear-tipped hypersonic missile.

Another implication for strategic stability lies in the possibility of an expensive arms race in the region. Although China's motivation for developing hypersonics is primarily to counter the United States, the rapid modernisation will pose a security dilemma for India. This will make it necessary for India to take steps to secure itself. As a result, an action-reaction cycle of offence-defence capabilities will emerge. To counter the threats, India will have to develop countermeasures, such as space-based sensors and over the horizon backscatter radars to detect, discriminate and decapitate the incoming missile.⁹⁹ This will be expensive and eat into other heads as India is still completing its nuclear triad and associated capabilities.

However, this does not mean that India should be left behind in terms of technology. It must develop the capability to ensure the survivability of its nuclear forces. India is taking significant strides in developing hypersonic

95. Manpreet Sethi, "The Hype over Hypersonics", *The Hindu*, January 26, 2020, at <https://www.thehindu.com/opinion/op-ed/the-hype-over-hypersonics/article30659477.ece>.

96. John Borrie, Amy Dowler and Pavel Podvig, "Hypersonic Weapons: A Challenge and Opportunity for Strategic Arms Control", UNIDIR, February 14, 2019, at <https://unidir.org/publication/hypersonic-weapons-challenge-and-opportunity-strategic-arms-control>.

97. James M. Acton, *Silver Bullet?: Asking the Right Questions About Conventional Prompt Global Strike*. Carnegie Endowment for International Peace (Washington, DC, USA: Carnegie Endowment for International Peace, 2013) at <https://carnegieendowment.org/2013/09/03/silver-bullet-asking-right-questions-about-conventional-prompt-global-strike-pub-52778>

98. Terry and Cone, "Hypersonic Technology", n. 2.

99. Richard H. Speier, George Nacouzi, Carrie Lee, and Richard M. Moore, "Hypersonic Missile Nonproliferation: Hindering the Spread of a New Class of Weapons", RAND Corporation, September 27, 2017, at https://www.rand.org/pubs/research_reports/RR2137.html.

capabilities (Table IV). It has developed the Shaurya surface-to-surface ballistic missile (land version of K-15 missile), which can reach a speed of Mach 7.5, ranging from 700 km to 1000 km.¹⁰⁰ It is also jointly developing with Russia a hypersonic version of the cruise missile BrahMos, which can possibly be a variant of one of the hypersonic anti-ship missiles of Russia.¹⁰¹ The DRDO has recently tested the prototype of its air-breathing scramjet technology, the Hypersonic Technology Demonstrator Vehicle (HSTDV), in 2020, which travelled at six times the speed of sound.¹⁰² A lesser-known fact is the work of an Indian start-up, HTNP industries, developing India’s first HGV, HGV-202F, with an altitude of 44–100 km, with the speed range of upper hypersonic.¹⁰³ Its prototype was also displayed at Aero India held in February 2021.¹⁰⁴ There has been little publicly available information on development of the countermeasures.

Table IV: India’s Development of Hypersonic Systems

Name of System	Range/Speed/Altitude	Status
Shaurya Hypersonic Missile (K-15 variant)	Speed: Mach 7.5 Range: 700-1000 km	Tested and Deployed
BrahMos II HCM	Range: 600-1000 km Speed: Mach 7-Mach 8	Underdevelopment
Hypersonic Technology Demonstrator Vehicle (HSTDV)	Speed: Mach 6	Tested and Under Further Trials
HGV-202 F (HTNP Industries)	Altitude: 44-100 km Speed: Upper Hypersonic	Underdevelopment

Source: Author’s compilation from various online sources.

100. “India Successfully Test-Fires New Version of Nuclear-Capable Shaurya Missile”, *The Economic Times*, October 3, 2020, at <https://economictimes.indiatimes.com/news/defence/india-successfully-test-fires-new-version-of-nuclear-capable-shaurya-missile/articleshow/78460487.cms?from=mdr>.

101. V. K. Saxena, “Hypersonic Weapons - An Analysis”, Vivekananda International Foundation, April 10, 2019 at <https://www.vifindia.org/article/2019/april/hypersonic-weapons-an-analysis>.

102. “DRDO Successfully Flight Tests Hypersonic Technology Demonstrator Vehicle”, Press Information Bureau, September 7, 2020, at <https://pib.gov.in/PressReleasePage.aspx?PRID=1651956>.

103. “HGV-202F”, Home, at <https://htnp-industries.yolasite.com/>. Accessed June 5, 2021.

104. “HGV-202F: Private Firm Shows of Its Hypersonic Boost-Glide Vehicle at Aero India 2021”, Indian Defence Research Wing, February 8, 2021, at <https://idrw.org/hgv-202f-private-firm-shows-of-its-hypersonic-boost-glide-vehicle-at-aero-india-2021/>.

As a result, this demonstrates India's determination to leave no stone unturned in developing hypersonic capabilities. India must equip itself with the right technology to counter China that re-establishes mutually assured destruction (MAD) and nuclear deterrence. Nevertheless, India must not indulge in an expensive arms race that hampers current military modernisation and look for suitable opportunities to hold dialogue with China on nuclear weapons and hypersonics. It must pursue arms control and ensure greater regional stability while avoiding spiralling effects on other countries.

CONCLUSION

This paper has examined the current developments in hypersonic delivery systems, whether HGV or HCM, with their features of speed, manoeuvrability and ability to evade missile defences. Despite their advantages, they face technical challenges, such as thermal management, gas dynamics, and flight controls, which can impact their target accuracy. It is necessary to note that there are speculations on the utility and targets of such systems, as well as whether they are game-changers or just an evolution in technology. Their actual utility, however, can only be known once they are incorporated into the military doctrines. Until then, the ambiguities will continue to foster misperceptions and arms races.

Today, China is among the leaders in hypersonic technology. Its developments are focused on primarily countering the US threat, increasing the survivability and penetrability of its nuclear forces, and protecting its national interest to give China an edge in future conflicts. However, the continuous R&D and deployment point out that, despite the calls for arms control, China will not restrain from developing hypersonic systems anytime soon. Increasing Chinese capabilities, hence, will have implications for strategic stability with India. If China deploys them against India, it will make India's nuclear assets and command and control vulnerable, compel it to lower the nuclear threshold, amplify misperceptions and increase the chances of an arms race at a trade-off with current military modernisation.

While India's capabilities in hypersonic systems are limited, it has been developing them indigenously and with Russian assistance for military and civilian use. It must continue to develop the hypersonic capabilities, like major powers, to ensure MAD and nuclear deterrence. However, India must avoid an action-reaction cycle of an arms race and seek opportunities to pursue arms control and dialogue with China on nuclear weapons to ensure greater strategic stability in the region. Thus, it must tread carefully to counter the Chinese threat.

AEROSPACE POWER AS A DETERRENT

SANU KAINIKARA

In order to prosper, every nation must have sufficiently robust measures in place to protect and promote their fundamental interests and the myriad requirements that arise from this primary requirement. The current global security environment is extremely complex and competitive with political, economic, demographic and technological changes making it difficult to anticipate emerging challenges to the strategic politico-military stability of a nation. While national security has traditionally been a military concern, it has now evolved into the most complex policy issue for a government to deal with. For all governments, securing the country's borders is the most important task.

The need to ensure national security necessitates the development of appropriate security strategies as a fundamental requirement to ensure the prosperity of a nation. These strategies must encompass all elements of national power in a concerted manner to ensure that the desired end-state is achieved in the most resource-optimised manner. They must be able to link the effects created by the actions of individual elements of national power

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National security cannot be based solely on a single plan because of the inherent complexity of the global security environment. To deal with the evolving and complex challenges faced by sovereign nations perennially, appropriate strategies must be continually fine-tuned and developed.

to the broader 'Effect' required to achieve the desired national political objective. Therefore, development of strategies for the individual elements of national power requires a thorough understanding of national policy and Grand Strategy, the level at which individual strategies coalesce and support policy. Accordingly, national security strategies span a broad continuum from benign attempts to influence and shape the environment to the application of lethal force in the pursuance of absolute national security and the conduct of wars of national survival.

National security cannot be based solely on a single plan because of the inherent complexity of the global security environment. To deal with the evolving and complex challenges faced by sovereign nations perennially, appropriate strategies must be continually fine-tuned and developed. Although the term strategy has a military heritage, it is now common understanding that the art of strategy cannot be limited to the military and warfighting to ensure national security, but needs to include all elements of national power and must function during both peacetime and in war. This is known as the Grand Strategy, which controls and coordinates all elements of national power to achieve the desired national objectives. The desired objectives will always be political and delineated by the higher national policy.

Below the higher-level Grand Strategy, each of the elements of national power formulate strategies for the optimum employment of resources to achieve the desired end-state, individually or in conjunction with other elements. Accordingly, military strategy aims to optimise the employment of resources available to a commander to achieve the required objectives. It is concerned not only with wars, campaigns and battles, but also with the threat of force to achieve national objectives.

THE SPREAD OF MILITARY STRATEGIES

There are three fundamental factors that are irrefutable and always hold true with respect to military strategies. One, military strategies deal primarily with the theories, hypotheses and concepts that guide the employment of military forces rather than facts and scientific sureties. It is an art with built-in uncertainties and unknowns within its construction and can never be fully correct. Two, an appropriate military strategy can never be developed in isolation from broader

national security paradigms and is strongly influenced by the foreign and domestic policies of the government. As a corollary, military strategy needs to retain a minimum required flexibility to cater to policy changes at the strategic level of governance.

Three, even a cursory analysis of the history of security challenges reveals that no two situations are amenable to being contained by the implementation of the same strategy. In other words, military strategies must be dynamic, and strategists must be adept at recognising the changing circumstances and adapting the strategies to emerging challenges.

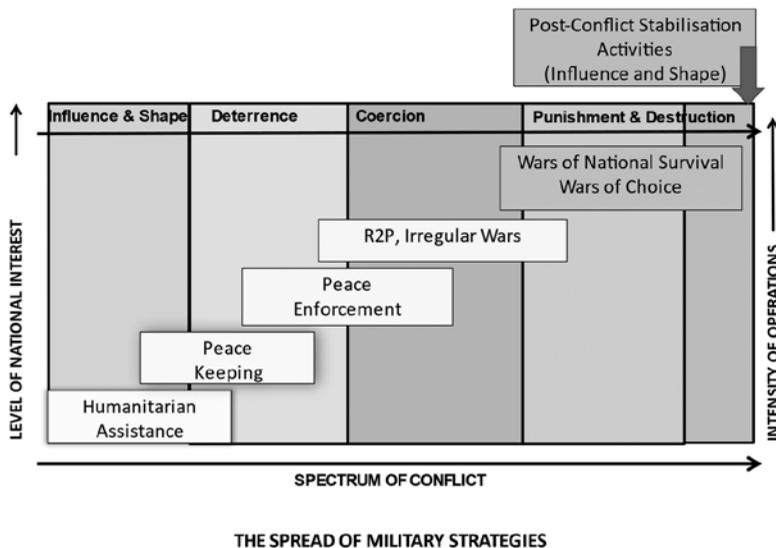
While the above factors are irrefutable, the concept of the employment of military forces and the understanding of the term conflict have changed dramatically in the last decade of the 20th century. There is a shift in the concept of conflict, which entailed the application of force through the employment of military or irregular forces, to a more broad definition that spans the entire gamut of operations ranging from delivering humanitarian assistance at the lower end, to conducting a war of national survival at the other end. As a result, military strategy has grown into a complicated art form to accommodate the wide range of actions undertaken by military

Military strategy has grown into a complicated art form to accommodate the wide range of actions undertaken by military forces. The spread of military strategies is very broad, but four overarching strategies can be distinguished— influence and shape, deterrence, coercion and punishment.

forces. The spread of military strategies is very broad, but four overarching strategies can be distinguished—influence and shape, deterrence, coercion and punishment. Each of these strategies can be expanded in a nuanced manner to examine the full details of employment of military forces within them.

Figure 1 depicts the spectrum of conflict superimposed on the four military strategies in a generic manner. The operations listed are only indicative and not exhaustive.

Figure 1: Spectrum of Conflict Superimposed on the Spread of Military Strategies



There are two fundamental factors that underpin a clear understanding of military strategies: one, there is an indelible connection between the spread of the four strategies mentioned and the spectrum of conflict; and two, the strategies are not linear progressions indicating the increasing use of force but that the spread is cyclical. The spectrum of conflict can be superimposed graphically on a linear spread of the strategies, and it will be seen that the indicative operations will be placed under the appropriate strategy. To

be noted is the fact that the indicative operations normally straddle two strategies. The strategies, to be viewed as a cycle, can be applied starting at any point in the continuum, but they must always end with the application of the strategy of influence and shape to direct the activities of elements of national power.

THE STRATEGY OF DETERRENCE

So, what is deterrence? Deterrence is an exercise in seduction and compulsion, using promises and threats, to ensure that a potential or actual adversary is dissuaded from pursuing actions detrimental to one's own interest. Deterrence aims to maintain the status quo vis-à-vis the security environment by ensuring that anyone challenging it would find it prohibitive in the cost that would have to be paid, thereby making the status quo more acceptable than any other situation. The credibility of a deterrent stance of a nation is dependent on two primary factors: the demonstrated capacity of the nation to deliver on threats and promises, and the national will to inflict unacceptable damage to any adversary or aggressor that questions or attempts to change the status quo. Thus, the credibility and success of a nation's deterrent posture is dependent on a balanced combination of resources and will.

Deterrence can be adopted as a centerpiece of a nation's security strategy, around which national capabilities are built and fostered. To be effective as the heart of national security, however, certain conditions must be met. First, the nation's response capabilities must be overwhelmingly superior to anything that the adversary could bring to bear, and the adversary must perceive them as such. Second, a nation must demonstrate the will to apply this great force at its command whenever it is necessary, i.e. great power must be buttressed by strong will to ensure the sanctity of the security requirements of the nation.

To preserve national security, countries have relied on the concept of deterrence for centuries, but it became an explicit strategy only in the 20th century. Most militarily powerful nations factored in some form or the other

of the concept of deterrence in the broader calculation of national security. The introduction of nuclear weapons in the post-World War II era brought in a completely new strategic dimension to the concept of deterrence, because of three major factors. One, there was no effective defence against a nuclear attack and therefore, the only way to counter it was to ensure that such an attack did not materialise. Two, nuclear retaliation by a nation that had already been attacked would be devastating; and three, the scale of destruction would in most cases outweigh any benefits that the initiating nation had originally anticipated. The concept of deterrence was embedded in mutual assured destruction (MAD) throughout the Cold War. Gradually, the threat of nuclear retaliation became a tool of deterrence, even against the possibility of a conventional attack.

There is an inherent simplicity to the concept of deterrence. In its simplest form, deterrence aims to inhibit or prevent someone from doing something that is contrary to one's own interests. Deterrence as a concept has a moralistic slant to it, which is based on the belief that peace is preferable than war and that all nations abide by accepted international norms. This is of course a simplistic view of the world and the complex interactions of sovereign nations. The primary purpose of deterrence is to avoid actual conflict by employing an appropriate combination of the elements of national power in order to persuade a potential adversary to not initiate any actions that are inimical to one's own interests. Its foundation is built on the belief that all entities subscribe to the idea that peace is always better than war. Steps of deterrence in the military sense are designed to provide a range of options that may be scaled up or down depending on the situation.

All sovereign states, irrespective of their size, capability and the threats they face, strive to ensure adequate national security. In formulating national security strategies, maintaining a deterrent posture as a cornerstone is always examined. While deterrence is a dynamic concept, it requires a complex analysis to determine who should deter whom from doing what, when and where. However, at the very basic level deterrence pre-supposes that all decisions at the strategic level of national security are made after a rational cost-benefit

analysis of the actions being contemplated. Any cost-benefit analysis is prone to external influences and therefore, deterrence as a fundamental national security strategy may not always work to the best effect.

The strategy of deterrence and the role of air power in its application must be examined with a practical caveat attached to them. In the past few decades, the conventional military forces of the more developed world have become overwhelmingly superior to those that are fielded by rogue-states and non-state entities who pose challenges and threats to international security. While the demonstrated superiority of these forces deterred these quasi-militaries from initiating any action for a period of time, it accelerated the process of the perfecting asymmetric warfare as the favoured method of conflict. This development necessitated a change in the approach of conventional forces to the conduct of conflict and diluted the effect of a deterrent posture as a security strategy. At the highest operational level, the conflict scenario is now extremely dynamic and one of a 'cat and mouse' game of counter and counter-counter moves and solutions.

The end of the Cold War and the break-up of the Soviet Union in the 1990s changed the perception of national security globally and led to a ripple effect that influenced national security strategies. The most dramatic change was felt in the concept of deterrence as a strategic security strategy. The context of national security had shifted to a rapidly destabilising and unstable world with the power distribution becoming widely dispersed between nation-states, quasi-states and transnational non-state entities. At both strategic and operational levels, deterrence strategy must be applied with great agility in today's worldwide security context.

There are two basic flaws in adopting deterrence as the primary basis for a national security strategy. The first is that the adversary's rationale for adopting a particular course of action is considered to be the same or fairly similar to one's own. It also presumes that the adversary would have a similar attrition tolerance and acceptance of physical and psychological damage to one's own. This is a complex analysis to make, since intangibles such as culture, religion, warfighting ethos, etc., would have to be factored into the

The ultimate aim of deterrence is to maintain the *status quo*. In a volatile strategic security environment, which is permanently in flux, maintaining the *status quo* requires adept manipulation of deterrent capabilities and dynamic adaptation of strategic security priorities.

calculation. Because the precision of such an analysis is insufficient to be depended upon wholly, strategic decisions cannot be fully based on it. The fact remains that what may be rational for one nation, may not be so for another. Effectiveness of deterrence is almost completely dependent on the perception of the adversary regarding the capabilities and intent of the deterring entity.

The second flaw is that deterrence as a concept is aimed at the cognitive domain of the adversary and therefore its effectiveness, especially in the near-term is extremely difficult to measure. The ultimate aim of deterrence

is to maintain the *status quo*. In a volatile strategic security environment, which is permanently in flux, maintaining the *status quo* requires adept manipulation of deterrent capabilities and dynamic adaptation of strategic security priorities. The strategic dexterity necessary to manipulate resources and match it to strategic priorities is very high and is normally beyond the capability of most democratic nations.

At the absolute base level analysis, deterrence, while a laudable concept, does not provide the necessary level of assurance that the desired national security objectives would be accomplished.

AIR POWER AS A DETERRENT CAPABILITY

Despite the obvious flaws in the concept, especially in the current shifting strategic environment where adversaries are diffused, deterrence continues to be a central concept in national security considerations. There is a global reluctance on the part of conventional military forces to apply lethal force when such an action might lead to unintended casualties and collateral damage, which invariably leads to detrimental political fallouts. The result is always a dilution of the impact of a deterrent strategy. However, the

unquestioned capacity to carry the war to the adversary at will and to inflict unacceptable damage to the adversary remains central to the effectiveness of deterrence.

The capacity to inflict such damage while limiting unnecessary collateral damage is built around the capability to carry out decisive, precision strikes at will over long distances. Precision, proportionality and discrimination are the three characteristics of air power that make it the ideal tool to enforce a deterrent strategy.

When deterrence is analysed as a process, it can be delineated into a series of related steps, most of the time successive and sometimes running parallel to each other. Logically these steps would begin with detecting emerging threats (intelligence); dissuading the potential adversary from initiating any action (credibility); deterring the adversary from initiating actions by ensuring that one's own capabilities that can be brought to bear are well-understood (perception); and defeating any action already initiated and destroy the adversary's capacity to initiate such moves in the future (applicability). The strategy of deterrence is therefore built on the four cardinal principles enumerated earlier in this section—intelligence, credibility, perception, and applicability—and air power contributes directly to all these steps.

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INTELLIGENCE

The term intelligence encapsulates the means and processes by which data is collected and interpreted, analysed and information so produced is disseminated to the appropriate agencies to enhance operational efficiency. There are two dimensions to the usefulness of intelligence in supporting the concept of deterrence. First, at the operational level it must provide relevant information that indicate the adversary's intentions, which should be monitored and interdicted if necessary. Second is at the strategic level

and more important in the long-term. An inherent capability to gather timely and accurate intelligence that can be interpolated with possible future scenarios to identify and neutralise issues that could become challenges into the future is necessary to successfully pursue deterrence. The contribution of intelligence to the success of deterrence revolves around it being accurate, well-analysed and disseminated in a timely manner. These are activities in which air power plays a critical role.

The increased availability of high altitude, long-endurance, armed and unarmed uninhabited aerial vehicles (UAV) have transformed air power's capacity for intelligence gathering. Capable of wide-area and narrow-field reconnaissance for extended periods, these UAVs represent a completely new dimension to detecting and monitoring adversary activities. Refinements in airborne ISR activities have particular impact on the strategy of deterrence, especially in the current environment of irregular warfare when adversaries tend to function from within the local civil population. The ability of airborne assets to monitor the movements of even a single individual from high in the skies for protracted periods of time, acts as a powerful deterrent to irregular adversaries.

CREDIBILITY

Deterrence is dependent on the combination of threats and incentives being credible, which in turn is the function of a balanced combination of capability and political will. Political will is the collective willingness of the nation to bear the costs—political, economic and moral—and accept the risks associated with asserting its will, to deter potential and actual adversaries. Credibility rides on the political will to create and maintain the necessary capabilities and the demonstrated will to use such capabilities to inflict unacceptable damage to potential adversaries. As a corollary, credibility of the strategy of deterrence is dependent on the adversary being convinced that the deterring nation is fully capable of, and willing to, inflicting fearsome punishment when necessary, through an optimum combination of capability and the political will to employ it.

Modern air power, facilitated by high-technology systems, can bring to bear precision, proportionality and discrimination in the application of lethal force or demonstrate such capabilities as a precursor to actual action. Carefully planned fire power demonstrations are exercises in such activities. These actions have the capacity to dislocate the psychology of the adversary and make it difficult for them to anticipate the manner in which air power would be employed, increasing the stress on their decision-making calculus—disorientating or even paralysing it. In contemporary irregular conflicts, the use of soldiers on the ground has become an unpalatable option because of their negative political connotations vis-à-vis support of the local population. The situation points to air power being the only option available to pursue the strategy of deterrence. Its reach and penetration combined with the attributes of precision and proportionality makes it ideal for use in environments where geographic and/or political barriers constrain the employment of surface military forces. The recently conducted Balakot strikes by the Indian Air Force is a case in point.

PERCEPTION

The success of a deterrent strategy hinges on the perception of the adversary. As a corollary, it becomes critically important to understand the adversary in terms of their vulnerabilities, values, centres of gravity and risk acceptance. Based on this knowledge the adversary must be targeted in the cognitive domain to influence their perception of one's ability to inflict damage, if and when necessary, to bolster deterrence. Success hinges on perception management. Further complicating the effectiveness of the concept of deterrence is the fact that in the threat of the application of military force, calculating what would be unacceptable loss and destruction for a particular adversary is extremely difficult.

The four very broad functions of air power—detect, decide, deter and defeat—can be employed in varying degrees and combinations to influence the perception of an adversary vis-à-vis deterrence. Air power's direct contribution to implementing the national security strategy of deterrence involves monitoring and analysing adversary activities and then deciding

on the optimum action to deter and defeat them. Signalling to the adversary that their value system and centres of gravity have been identified and can be targeted at will is a very potent tool of deterrence. Irregular forces, the most common adversaries in modern conflict, employ asymmetric strategy and tactics to exploit the vulnerabilities of a conventional military force. However, identifying their vulnerabilities and informing them that these vulnerabilities can be targeted with unacceptable damage emphasises the deterrent capabilities of air power.

APPLICABILITY

In recent times, identifying the culprits of numerous acts that disrupt national security equilibrium has grown increasingly challenging. Therefore, the debate regarding ‘whom to deter’ becomes increasingly poignant. Irregular forces that resort to the tactic of suicide bombing cannot normally be deterred because threats and even substantial damage or destruction of their infrastructure are inconsequential for these entities. However, deterrence can be pursued even if the actions only reduce the intensity of the threat posed by these irregular entities. The applicability of the concept of deterrence is dependent on the quantum of influence that can be brought to bear in a particular situation. The quantum by itself will be variable in a circumstantial manner.

Air power has the ability to escalate the threat of force to its actual use at will and in a graded manner, which is conducive to the application of deterrence. Further, air power’s on-call precision strike capabilities in combination with its airborne intelligence gathering capacity can be employed to send a powerful message to irregular forces—that they are being constantly monitored and that they can and will be targeted at will from the air and that there are no countermeasures to neutralise this. This introduces a disconcerting sense of vulnerability on potential insurgents, which acts as a deterrent.

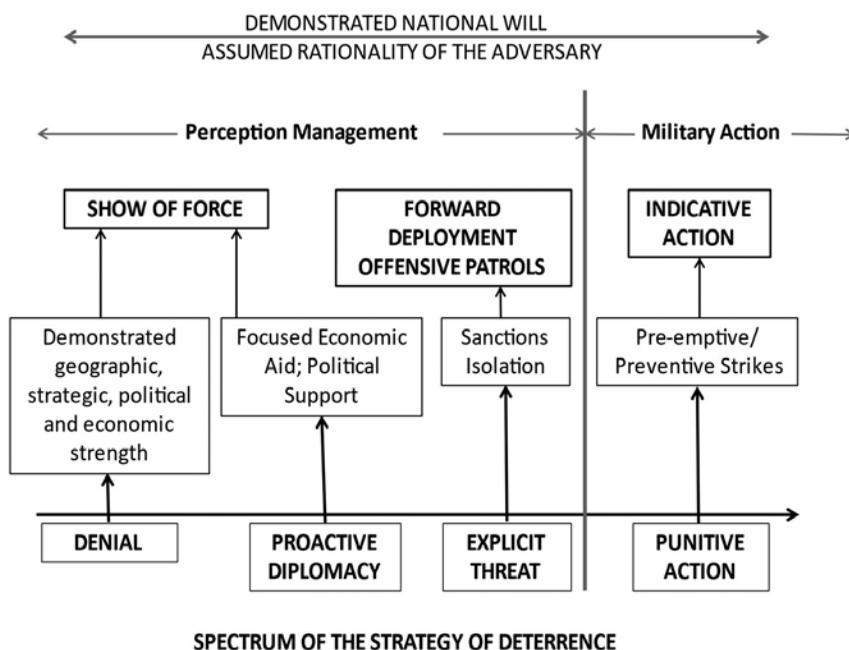
SPECTRUM OF THE STRATEGY OF DETERRENCE

The efficient implementation of the strategy of deterrence is dependent on two primary factors: the inherent and demonstrated will of the nation

to employ all elements of its national power to safeguard its national interests; and the presumed rationality of the adversary in analysing and understanding the consequences of adopting actions inimical to the interests of the deterring nation.

The concept of deterrence can be sub-divided into four stages or sub-spectrums in a linear manner, with each stage having increasing military involvement. The first stage is denial, followed by increasing the pressure on the recipient in the second stage of proactive diplomacy through a show of force, moving on to the third stage of creating an explicit threat through overt actions, and finally by carrying out punitive actions through the application of focussed force. At this stage, if the strategy is not producing the desired effects, it must be considered to have failed and must be abandoned for another strategy. The first three stages are all in the realm of perception management and the fourth is the actual application of force in a controlled manner.

Figure 2: Sub-Spectrums of the Strategy of Deterrence



Air power can create a very visible demonstration of the inherent power of a nation—through rapid provision of humanitarian assistance and airlift used for benign purposes. A show of force need not always be about the lethal capabilities of air power.

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Proactive Diplomacy. The next step of proactive diplomacy is normally engagement through the provision of focused economic aid and political support, as required, for a potential adversary. Such assistance could also involve military advice and assistance on matters of internal security in volatile regions and situations. The primary function of the military forces would continue to be force projection, but in a more intrusive manner, wherein providing training to foreign forces would also be an option. The provision of non-lethal air power capabilities such as ISR and airlift will create a two-pronged influence on the recipient nation—one on influencing national security dialogue and another on the doctrine and strategy being developed.

Explicit Threat. When the first two stages have failed to elicit the desired response, the deterrent posture would have to be expanded to indicate and demonstrate resolve. Explicit threat in this case is not only to be conveyed through diplomatic channels, but also by the forward deployment of forces and the conduct of offensive patrols. These actions are intended to bolster the enforcement of sanctions and if necessary, of more restrictive no-fly zones.

Denial. Deterrence through denial is the hardest of the sub-spectrums to achieve, especially for ‘middle power’ nations. Denial needs fully demonstrated geographic, economic, political and strategic strength of a very high order to be effective. Even a perceived weakness in any of these cardinal factors will almost immediately collapse the deterrence capacity of a nation. Denial requires an open show of force, which is well-suited for air power capabilities. Air power can create a very visible demonstration of the inherent power of a nation—through rapid provision of humanitarian assistance and airlift used

Air power is ideally suited and could be considered the mainstay for such actions mainly because of its ability to overcome national boundaries and geographical obstructions without having to create semi-permanent physical presence in the recipient nation.

Punitive Action. Deterrence moves from the realm of perception management to military action when punitive actions are undertaken. However, punitive actions are merely indicative of what could follow, a foretaste, a formal and open warning to recalcitrant adversaries to demonstrate the intent of the deterring nation. Such actions can either be pre-emptive or preventive, depending on the evolving circumstances. Precision, proportionality and discrimination inherent in air power strike capabilities make it the first-choice weapon to carryout punitive action. This is emphasised by the fact that surface forces would have to physically violate geographic borders to carry out such actions, which would normally be politically untenable.

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CONCLUSION

All military strategies that are derived from national security strategies will have to factor in the vital and critical contribution that air power makes to ensure the relevance and success of these strategies. In a whole-of-government approach to national security, based on effects-based strategies, the role of air power as an enabling, enveloping and protecting element of national power has become ingrained. In the acceptance of the strategy of deterrence as a major building block in the pursuit of national security objectives in an ever-changing world—where threats are more amorphous than ever before, and response options are often constrained—air power with its infinite agility and flexibility will be a prized capability.

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DEVELOPMENT OF LETHAL AUTONOMOUS WEAPON SYSTEMS AND THEIR IMPLICATIONS

AMITABH MATHUR

INTRODUCTION

Modern warfare is increasingly witnessing the use of covert swarms of miniature spy drones, unmanned ground and seaborne vehicles, sentry robots and missiles with decision-making powers. Though currently most of these weapons are being controlled by human operators, evolving penetration of Artificial Intelligence (AI) in weapon systems is making the paradigm shift to Lethal Autonomous Weapon Systems (LAWS), which would have their decision-making capabilities in the processes of scanning the environment, detecting threats, identifying targets and launching attacks on their own.

AI-driven autonomy has already become the new reality of warfare. As Artificial Intelligence, machine learning, and deep learning evolve, the rapid acceleration in computing power, memory, big data, and high-speed communication is not only creating innovation, but it appears that the weaponisation of AI is inevitable. “Autonomous weapons select and engage targets with hardly any human intervention. *Though fully autonomous weapons do not exist as yet*, an increasing number of countries are now engaged in developing or deploying near-autonomous systems.”¹ In contrast to nuclear

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1. “Worried about the autonomous weapons of the Future?”, at <https://thebulletin.org/2021/04/worried-about-the-autonomous-weapons-of-the-future-look-at-whats-already-gone-wrong/>. Accessed on October 15, 2021.

‘Autonomous’ systems are much more advanced and complicated than the conventional ‘automatic’ or ‘automated’ systems because they can operate in dynamic, unstructured and open environmental circumstances.

weapons, where governments lead in discovery, development and deployment, AI advancements and related technologies are driven by private firms and university researchers. Moreover, unlike in Nuclear Warfare, where second-strike capability has resulted in a stalemate, we have not been able to identify an analogous plateau in AI so far.

‘Autonomous’ systems are much more advanced and complicated than the conventional ‘automatic’ or ‘automated’ systems because they can operate in dynamic, unstructured and open environmental circumstances. Autonomous

weapons could be armed with anything between the conventional payloads like tanks, guns, bombs, submarines, electronic warfare jammers, and strategic payloads like missiles capable of carrying chemical weapons agents and biological and even nuclear weapons. More autonomous weapons would mean more opportunities for failure. AI systems require huge amounts of labelled data to train the system. Moreover, the AI algorithms need to be exposed to different environments, as, unlike humans, they cannot learn just from a few instances.

Autonomous systems are divided into three sub-categories based on human involvement: *Human-in-the-Loop Weapons*, where the weapons identify targets and attack them only with a human command. *Human-on-the-Loop Weapons*, where the weapons identify targets and launch attacks force under the manual supervision of an operator who can override the weapons’ actions; and *Human-out-of-the-Loop Weapons*, in which weapons are capable of identifying targets and launching attacks force without any human input or interaction.

The morality of using these weapons under international humanitarian law has generated a fierce global debate, primarily because such weapons are vulnerable to errors and hackers. Moreover, the legality of autonomous

weapons is critical because their deployment would change how we fight a war. This debate centres on whether these weapons, as independent actors, can adhere to the ethical and moral laws that govern modern conflicts.

The first section of this paper examines the emerging threats from unmanned aerial combat vehicles, which have been currently used in conflicts with incidents worldwide, highlighting their developments and use trajectory. The second section discusses the challenges for air defence systems that will be used to defend the territories. The third section looks at the emerging threat of Lethal Autonomous Weapons Systems, wherein AI has the opportunity of being integrated into many legacy weapon systems. The subsequent section discusses the legal implications confronting the challenges for the formulation of treaties for those weapons systems where the integration of AI is being implemented with reduced human involvement. The fifth section carries out an environment scan for India. The final section suggests the development of weapons for non-contact warfare for India.

Integrating AI technology into weapon systems makes the paradigm shift to use smaller and cheaper but faster and more precise weapons assuring higher kill probabilities without endangering own troops.

DAWN OF DRONE WARS—THE NEW BATTLEFIELD

As weapons technology advances, humans are moving further and further away from the battlefield. An AI-equipped drone can spot, validate and destroy a target at far distances in a few hundredths of a second. The 1980s revolutionary convergence of technologies brought communications, high-resolution cameras, video and image processing, high-speed computing power, complex algorithms and higher memory capacity into lightweight payloads of UCAVs, thereby significantly compressing the OODA loop. Integrating AI technology into weapon systems makes the paradigm shift to use smaller and cheaper but faster and more precise weapons assuring higher kill probabilities without endangering own troops. Missile equipped

drones are the mainstay of most anti-terrorist operations. Non-state actors are increasingly using these platforms. As a result, air defence systems are increasingly being developed to shoot them down.

The drone is typically a “Quad-Copter” with four propellers fitted vertically and made up of composite plastics and fabrics. They are highly manoeuvrable and carry flexible payloads. They are capable of tree-top flying and can be pre-programmed to hit a target remotely. However, winds and weather affect their flight. Their potential advantages of inherent stealthy operation (in terms of noises, radar and visual signatures) make them ideal for military operations in urban terrain. On the other hand, UCAVs typically have the structure of an aeroplane with wings and fuselage and do not hover.

Currently, a drone-based weapon usually requires several people to operate it. However, advances in artificial intelligence and autonomy would invert that relationship, where one human would supervise many robotic vehicles while they work cooperatively to accomplish a task. Hence, the shift to drone swarms made up of cooperative, autonomous robots that react to the battlefield at machine speed will allow militaries to field forces that are larger in number, faster and better-coordinated than would be possible with humans alone.

Nations do not always showcase their advanced technology. Therefore, given the recent incidents cited below, there is a need to review whether autonomous weapons can be relied upon to decide (on their own) when and whom to kill, as state and non-state actors are increasingly using the weapons.

ISRAEL

Israel demonstrated the first use of UCAV capability during the 1982 Bekaa Valley conflict with Syria. Syrian radars were activated to intercept Israeli drone’s probe attack, which gave away their locations. Consequently, Israeli fighter aircraft destroyed them. Moreover, the Syrian aircraft that gave the fight was rendered defunct by electronic jamming. As a result, Syria lost 82 fighters, while Israel lost only one.

INDIA

The drone attack on the IAF base at Jammu in the wee hours of June 27, 2021, has highlighted that the drones made with Commercial-Off-The-Shelf (COTS) components can be easily weaponised and are now readily available in the country,² prompting the induction of a robust counter-drone capability.³

LIBYA

According to a report by the Libya expert panel of the UN, in 2020, a Turkish autonomous weapon—the STM Kargu-2 drone “hunted down and remotely engaged” retreating soldiers loyal to the Libyan General Khalifa Haftar. The Kargu-2 is a “loitering” drone that can use an autonomous mode with swarming capabilities, using machine learning-based object classification to select and engage targets. The UN report hints, though not explicitly, that the drones were used autonomously using their artificial intelligence capabilities. The use of such drones highlights the need to define the so-called lethal autonomous weapons. It was a challenge for the experts to investigate and ascertain the verification mode used by the STM Kargu-2 drone.

AZERBAIJAN

“The destruction by armed Unmanned Combat Aerial Vehicles (UCAVs) in Azerbaijan-Armenia conflict last year has brought these systems to the centre stage of threat analysis. Both sides have made extensive use of UCAVs. Armenia used UCAVs for intelligence and surveillance, whereas Azerbaijan used Turkish supplied Baykar Makina Bayraktar TB2 tactical UCAVs. Like the 1982 Israeli approach, Azerbaijan also used an old AN-2 aircraft as a feint by converting it into a drone as bait for the Armenians in this South Caucasian

2. Air Vice Marshal Manmohan Bahadur VM (Retd), “UCAVs: India’s Weak Link In Modern Warfare?”, June 12, 2021, at <http://www.indiandefensenews.in/2021/06/uavs-indias-weak-link-in-modern-warfare.html>. Accessed on November 11, 2021.

3. Air Chief Marshal S Krishnaswamy (Retd), “India needs drone detection systems”, June 29, 2021, at https://indianexpress.com/article/opinion/columns/drone-detection-system-jammu-airfield-bomb-attack-7380116/?utm_source=newzmate&utm_medium=email&utm_campaign=opinion&tqid=1_O7Mng4EV8ByENgIw5PSrqwPXpVJC5KPqXBa3qzxA. Accessed on November 15, 2021.

If a developed nation deploys a ‘manned-unmanned team’—where manned fighter aircraft remain afar and control a swarm of tied UCAVs called ‘loyal wingmen’—a tactical advantage can be created deep inside enemy territory, thereby changing the air supremacy paradigm.

conflict.” Azerbaijan’s Turkish-made Bayraktar TB2 armed UCAVs and Israeli AI-enabled loitering ‘suicide drones’ could identify and then destroy targets by hard kill using small munitions to attack the weakest point armoured infantry vehicles, artillery pieces and surface-to-air missiles with impunity. These weapons outweighed the Armenian Air Defence mainly due to their small radar cross-section. It had an overwhelming psychological impact and forced Armenia to settle for peace on humiliating terms. Armenian ground soldiers were seen bewildered by UCAV strikes in the Azerbaijanian released videos. For the first time, perhaps, UCAVs had helped a country defeat conventional enemy forces and armour. Unlike manned fighter aircraft, drones are regulated under the Missile Technology Control Regulations, attempting to limit their proliferation.⁴ Therefore, Azerbaijan utilised a loophole in the regime by using AN-2, where the rules do not explicitly prohibit the conversion of inhabited aircraft into drones.

An AI-enabled drone would have the capability to decide whether or not to kill a human. Thus, cheap and expendable UCAVs could detect and destroy land forces. If a developed nation deploys a ‘manned-unmanned team’—where manned fighter aircraft remain afar and control a swarm of tied UCAVs called ‘loyal wingmen’—a tactical advantage can be created deep inside enemy territory, thereby changing the air supremacy paradigm.

AFGHANISTAN

The US retaliation to the ISIS-K suicide bomber attack at Kabul Airport, which claimed the lives of 13 American soldiers, highlights the lethality of

4. Benzamin Fogel, Andrew Mathewson, “The next frontier in drone warfare? A Soviet-era crop duster”, February 10, 2021, at <https://thebulletin.org/2021/02/the-next-frontier-in-drone-warfare-a-soviet-era-crop-duster/> Accessed on November 15, 2021.

automated weapons and how things could go wrong, causing international embarrassment to even superpowers. On August 29, 2021, US intelligence identified a car as a potential attack vehicle carrying explosives to Kabul airport. The car was tracked using Reaper drones and eliminated by a Hellfire Missile, both remotely controlled. Since video feeds have to ricochet among military commanders spread out worldwide, they are often delayed by several seconds. The car stopped at a secluded spot, but few civilians had gathered around it by then. However, the intelligence assessment that the encounter was to take place at a secluded spot went awry, probably due to communication transmission delays, and the missile eventually struck the car, killing ten Afghan civilians as collateral damage.⁵ In the future, Reaper and other drones will be equipped with advanced AI, which will let the machine decide when and perhaps whom to kill.

AI-enabled drones are now being used to kill civilian targets also. The November 27, 2020, killing of Iran’s top nuclear scientist Mohsen Fakhrizadeh has demonstrated the brazen use of AI weapons by Israeli Mossad.

PALESTINE, NIGERIA AND MEXICO

So far, drones do not appear to impact the conflict dynamics in Israel and Palestine drastically. However, its use by non-state actors points out how hard it will be to put the unmanned aerial genie back in the bottle. Over the past two decades, several non-state forces from Boko Haram in Nigeria to drug cartels in Mexico have also acquired drones.⁶

5. David H Freedman, “US Is Only Nation with Ethical Standards for AI Weapons. Should We Be Afraid?”, September 15, 2021, at <https://www.newsweek.com/2021/09/24/us-only-nation-ethical-standards-ai-weapons-should-we-afraid-1628986.html>. Accessed on November 15, 2021.

6. Thomas Gaulkin, “Drones add little to rocket-filled Israel-Palestine skies, but represent growing global threat”, May 20, 2021, at <https://thebulletin.org/2021/05/drones-add-little-to-rocket-filled-israel-palestine-skies-but-represent-growing-global-threat/>. Accessed on November 1, 2021.

IRAN AND IRAQ

AI-enabled drones are now being used to kill civilian targets also. The November 27, 2020, killing of Iran's top nuclear scientist Mohsen Fakhrizadeh has demonstrated the brazen use of AI weapons by Israeli Mossad, wherein an AI-assisted gun was mounted on a Nissan pickup vehicle that was remotely controlled from 1000 miles away. The precision of AI-based tools is demonstrated by facial recognition technology, ensuring that only the scientist was eliminated and his wife and guards remained unharmed. In contrast to an aerial drone, the robotic machine gun using scan, identification and targeting algorithms can be deployed anywhere without drawing any attention. Recently, three explosive-laden quadcopters were used to target the residence of Iraqi Prime Minister's Mustafa al-Kadhimi in an assassination attempt. Kadhimi narrowly survived, but photos released of his home revealed the destructive capabilities of such devices.⁷ AI has enormous potential in perceiving images, speech or patterns by churning big data that humans may not perceive.

TAKEAWAYS FOR INDIA

The first important takeaway for India is that small forces/nations can develop asymmetric advantages with low-cost UCAVs.

The second important takeaway for India is that the drones and UCAVs will expand the battlespace, forcing the adversary to commit additional air defence resources.

The third important takeaway is that time becomes critical for the warring side under attack from UCAVs.

"The future drone war would be won by the best algorithm and ability to anticipate and respond quickly to a threat, not just by whoever could put a bird in the air".⁸ Drones are not tomorrow's weapons, but today and the country that achieves the technological edge in AI will win.

7. Tom O'Connor and Naveed Jamali, "Could the Next 9/11 Be Caused By Drones?", September 11, 2021, at <https://www.newsweek.com/could-next-9-11-caused-drones-1647249>. Accessed on September 12, 2021.

8. Seth J. Frantzman, "Drone Wars: Pioneers, Killing Machines, Artificial Intelligence, and the Battle for the Future", June 22, 2021, at https://www.amazon.in/Drone-Wars-Pioneers-Artificial-Intelligence/dp/1642936758/ref=sr_1_1?dchild=1&keywords=the+drone+wars&qid=1625555275&sr=8-1. Accessed on November 2, 2021.

Therefore, **the fourth vital takeaway** is that “artificial intelligence (AI) and autonomy would increasingly play a crucial role for both the attacker and the defender. The challenge for the defender is the extremely short lead time to engage the armed drones, and for the attacker, to avoid collateral damage by accurately distinguishing between warfighters and civilians. In this fast decision-making cycle, a man in the loop would delay the response, resulting in unnecessary killings or the target escaping.” Under these circumstances, human control is increasingly becoming compromised in human-machine interactions.

CHALLENGES FOR THE AIR DEFENCE WEAPONS SYSTEMS

Militaries have used air defence systems for decades against missile and airborne threats. It is estimated that at least 89 countries operate air defence systems. Modern air defence systems can handle a large number of threats simultaneously, which cannot be done manually. Hence, over a period of time, the character of human-machine interaction in it has rapidly decreased the quality of human supervision in specific targeting decisions. Moreover, with cognitive functions increasingly delegated to machines, the human operators find it challenging to understand the targeting decisions made by complex computer systems. Many policymakers have indicated that they favour humans to remain in control over the lethal force. However, when things go wrong, the individual human operators at the bottom of the chain of command frequently bear responsibility for structural failures—focussing on “human error” diverts attention away from a critical review of how the automated and autonomous technology structure the application of force.

Appropriate human control needs to be ensured over specific targeting decisions, as they play an important role in the international discussion on regulating autonomous weapons systems. Under the international humanitarian law stipulated by Geneva Conventions, the military obligations apply specifically to the battlefield decisions rather than weapon systems development.

A study of current air defence systems sheds light on three significant real-life challenges to human-machine interaction, which have arisen due to the automated and autonomous features. The following three challenges will determine how well humans can effectively control the specific situations that rely on autonomous targeting in the existing air defence systems.

- *Targeting decisions are opaque.* The sheer complexity of the internal working of the systems has resulted in a situation where only a few users can understand the algorithms behind the software they use. Nevertheless, failures of high-profile air defence systems also suggest that human operators are not always aware of known system weaknesses. Another difficulty that operators face is automation bias and over-trust. Human operators may blindly trust the reliability and accuracy of the information they see on their screens and may not question the machine's algorithmic targeting parameters.

This trust resulted in the shooting down of a Royal Air Force Tornado fighter jet over Kuwait in 2003 by Allied Forces. The human operators need a more balanced approach; that they must have the ability to know when to trust the systems and when to question their outputs.

- *Operators can lose situational awareness.* As more automated and autonomous features are integrated into the critical functions of air defence systems, the role of human operators has changed. Rather than actively controlling the weapons systems, they have now shifted to just monitoring their operations. Effectively, the machines now perform the bulk of the decision making involved in operating an air defence system, not just the motor and sensory tasks. As a result, human operators are increasingly either overloaded or underloaded with tasks vis-à-vis those delegated to the machine, as they have sometimes lost situational awareness, particularly in high-stress combat situations where human operators are unable to question system outputs and to make logical deliberations about whether specific targets are appropriately chosen. The 1988 downing of an Iranian Air Flight with 290 passengers and crew by a US Navy warship, Vincennes, illustrates how the human

operators amid combat can misinterpret computer outputs and make fatal mistakes. A 1992 Newsweek investigation revealed that senior personnel on the ship were unfamiliar with or uncomfortable operating the AEGIS's combat system.

- *War is already too fast.* Improvements in the speed and manoeuvrability of modern weaponry continue to reduce the time available to the human operators to decide when to authorise the use of force. A recent example is the misfortune of a Ukraine International Airlines jet. A civilian plane carrying 176 passengers and crew members was shot down near Tehran's airport in January 2020, just minutes after it took off. Iran attributed the incident to human error, citing that the missile defence system had not been re-calibrated and operated after being repositioned at a new site. Operating without complete situational awareness of Iranian airspace at the time, the plane was wrongly identified as an incoming American cruise missile. As a result, the operators of the Tor-M1 had only 10 seconds to decide whether or not to fire. The issue highlights the almost impossible demands imposed by the shortage of time for critical deliberation in high-stress combat scenarios.

EMERGING CHALLENGES TO AIR DEFENCE SYSTEMS

Two important issues need to be addressed while evaluating an air defence system.

Role of a human operator: Autonomous weapons design should ideally allow commanders and operators to exercise human judgment over using force appropriately. As stated in an August 2018 US government white paper, "*'appropriate'* is a flexible term that expresses the fact that there is no fixed, one-size-fits-all level of human judgment that can apply to every context. The definition of what is '*appropriate*' can differ across weapon systems, domains of warfare, types of warfare, operational contexts, and even across varied weapon system functions." Further, "human judgement over the use of force" doesn't require manual human "control" but somewhat broader human engagement in decisions regarding the use of a weapon, including

The training, tactics, techniques, procedures and doctrine need to be available, periodically revised and used by the system operators and commanders to correctly understand the functioning, capabilities and limitations of the system's autonomy in realistic operational situations.

how, when, where, and why. This employment includes a human decision that the weapon will be used “with appropriate care and as per the law of war, applicable treaties, weapon system safety rules, and applicable rules of engagement.”⁹ The training, tactics, techniques, procedures and doctrine need to be available, periodically revised and used by the system operators and commanders to correctly understand the functioning, capabilities and limitations of the system's autonomy in realistic operational situations. It is also required that the weapon's human-machine interface be “ready to understand for

the trained operators” for enabling them to make informed decisions in using these weapons.

Weapons review process: There is a need to test the software and hardware of all systems, including lethal autonomous weapons. This effort ensures they function as designed against adaptive adversaries, engage near-real-time, and conform to the commander and operator intentions. However, if it cannot do so, additional human operator inputs may be sought before continuing the engagement or termination. In addition, the system must be robust enough against the loss of control of the system to unauthorised parties.¹⁰ In addition, any changes to the system's operating after the system has been fielded would need re-testing and re-evaluation to ensure that its safety features and ability to operate as intended have been retained.”¹¹

Therefore, **the fifth takeaway** is the need to establish a review and refine the process for weapon utilisation so that the human-machine interface

9 Ingvild Bode and Tom Watts, “Bulletin of the Atomic Scientists—Worried about the autonomous weapons of the Future? Look, at what is already gone wrong”, April 21, 2021, at <https://thebulletin.org/2021/04/worried-about-the-autonomous-weapons-of-the-future-look-at-whats-already-gone-wrong/>. Accessed on October 15, 2021.

10. Ibid.

11. Ibid.

is in perfect synchronism with the operator's capabilities.

LETHAL AUTONOMOUS WEAPON SYSTEMS (LAWS)

This section highlights the Lethal Automated Weapons System's definition and the legal implications that hamper the imposition of control treaties and regulations of these weapon systems.

"LAWS are a particular class of weapon systems that use sensor suites and computer algorithms to independently identify a target and employ an onboard weapon system to engage and destroy the target without manual human control of the system". Although these systems are not yet in widespread deployment, it is believed they would enable military operations in communications-degraded or denied environments in which traditional systems may not be able to operate.

There is no universally agreed definition of lethal autonomous weapon systems in international fora. However, the US Department of Defense Directive (DODD) 3000.09 document primarily discusses the role of the human operator concerning target selection and engagement decisions rather than in the technological sophistication of the weapon system.¹² "DODD 3000.09 defines LAWS as "weapon system(s) that, once activated, can select and engage targets without further intervention by a human operator. The directive does not cover "autonomous or semi-autonomous systems for cyberspace operations; unarmed, unmanned platforms; unguided munitions; munitions manually guided by the operator (e.g., laser- or wire-guided munitions); mines; and unexploded explosive ordnance", nor does it subject them to its guidelines."¹³

The development of autonomous weapons technology and current international discussions of LAWS impact military budgets, operational concepts, treaty-making and the future of war.

12. Jeffery S Thurnher, "The Law that applies to Autonomous Weapon Systems", January 18, 2013, at <https://www.asil.org/insights/volume/17/issue/4/law-applies-autonomous-weapon-systems>. Accessed on October 17, 2021.

13. Ibid.

The development of autonomous weapons technology and current international discussions of LAWS impact military budgets, operational concepts, treaty-making and the future of war. Thus, the perception of threats, the economic situation, the priorities on the society level, and technology can become the drivers or the inhibitors of defence spending.

INTERNATIONAL DISCUSSIONS OF LETHAL AUTOMATIC WEAPON SYSTEM

No nation is allowed to choose methods and means of warfare with unlimited freedom. Article 36 of the 1977 Additional Protocol to the 1949 Geneva Conventions—colloquially referred to as a ‘weapon review’, ‘legal review’ or ‘Article 36 review’.¹⁴ The conduct of Article 36 review is essential to determine whether the adoption of new technologies might cause any significant concern from a humanitarian perspective and ensure that states’ armed forces can conduct hostilities according to their international obligations. These existing laws of armed conflict generally focus on traditional weapons and regulate certain objectionable weapons such as poisonous gases, blinding lasers, chemical, nuclear and biological weapons and landmines, etc.; still, these regulations currently do not cover autonomous weapons, particularly with the ability to kill humans. Several years after Article 36, which highlighted meaningful human control, was introduced, there has been no consensus on what makes human control meaningful.

The exponential growth of robotic technologies, and autonomous technologies, notably presents some challenges to the international community, which needs to adopt the International Humanitarian Law (IHL) for automated weapons. “Since 2014, the US, through the United Nations Convention on Certain Conventional Weapons (UN CCW), has held international discussions on LAWS.”¹⁵ Many countries agree in

14. Vincent Boulanin and Maaïke Verbruggen, “SIPRI —Article 36 Reviews Dealing with the Challenges posed by Emerging Technologies” July 15, 2021, at https://www.sipri.org/sites/default/files/2017-12/article_36_report_1712.pdf. Accessed on October 20, 2021.

15. Office for Disarmament Affairs, United Nations, “The Convention on Certain Conventional Weapons” December 21, 2001, at <https://www.un.org/disarmament/the-convention-on-certain-conventional-weapons/>. Accessed on November 19, 2021.

principle to retain human responsibility in using weapon systems to ensure the use of autonomous weapons systems in compliance with International Humanitarian Law, with two main concerns. First, how to define human control over the use of force, and second, how to measure such control to ensure that humans, not the machines, ultimately control the use of force. “In 2017, these discussions progressed from an informal ‘meeting of experts’ to a formal ‘Group of Governmental Experts (GGE) tasked with examining technological, military, ethical, and legal dimensions of LAWS. In 2018 and 2019, the GGE has considered proposals by states parties to issue political declarations about LAWS and proposals to regulate them.”¹⁶

“In addition, approximately 30 countries and 165 non-governmental organisations have called for a pre-emptive ban on LAWS due to ethical concerns, including concerns about operational risk, accountability for use, and compliance with the proportionality and distinction requirements of the law of war”.

Policymakers should analyse the precedents set by the use of highly automated air defence systems and other existing weapons systems with automated or autonomous features in their targeting functions (such as active protection systems, counter-drone systems, and loitering munitions) and how these weapons are altering the equations between humans and technology. Much too often, incrementally integrating more and more autonomous features into weapon systems is presented as either an inevitable development of technological progress or a reaction to what the adversaries are doing.

Therefore, **the sixth takeaway** for India is to take the lead in formulating treaties and international laws to regulate the development, use, and trade of these systems.

16. Office for Disarmament Affairs, United Nations, “Background on LAWS in the CCW”, December 21, 2001, at <https://www.un.org/disarmament/the-convention-on-certain-conventional-weapons/background-on-laws-in-the-ccw/>. Accessed on November 20, 2021.

CHALLENGES IN THE FORMULATION OF A TREATY

“The US was one of thirty-five signatories to the Missile Technology Control Regime (MTCR), which controls exports of missiles or drones that could carry 500-kilogram payloads more than 300-kilometre.”¹⁷ Later, the US began to re-examine the self-imposed exile the MTCR was placing it in, as China and others sought to sell to US customers. In addition, Iran, China, and some other countries were not signatories of the agreement and could skirt it.

Three reasons make it challenging to formulate an AI treaty, similar to those that ban biological and chemical weapons and anti-personnel landmines.

First, it is no easy task to identify the risks of AI in the Military.

Second, it might take a long time for governments to formulate an AI arms control treaty. By the time a treaty is put into effect, any international negotiation eventual outcomes may become obsolete and out of tune with technological reality due to rapid advancements in AI technology. Additionally, since AI has military and commercial applications, the private sector may resist regulatory efforts on military AI.

Third, a new arms control agreement is unlikely in the near future given the current political order, which is marked by heightened tensions among China, the United States, Russia and the EU over a range of many issues.

THREATS IN THE NEIGHBOURHOOD

This section discusses the changing threat perception and stages of development to carry out an environment scan in our neighbourhood.

China

China’s capability development. China’s modernisation has been underway since the 1980s. Modernisation would turn PLA into a world-class military by 2035. The ‘active defence’ strategic guideline approved by Deng Xiaoping

17. Seth J. Frantzman, “Drone Wars: Pioneers, Killing Machines, Artificial Intelligence, and the Battle for the Future”, June 22, 2021 at https://www.amazon.in/Drone-Wars-Pioneers-Artificial-Intelligence/dp/1642936758/ref=sr_1_1?dchild=1&keywords=the+drone+wars&qid=162555275&sr=8-1

has been picked up by Xi Jinping and given slightly adjusted goals. China has initiated National Security Law (2015),¹⁸ National Intelligence Law (2017), the New Generation Artificial Intelligence Development Plan and Civil-Military Fusion to enable compliance and synchronisation across all agencies.

China had planned that her AI industry be “inline” with the most advanced countries by 2020. By 2025, China aims to reach a “world-leading” level in some AI fields. Finally, by 2030, China seeks to become the world’s “primary” AI innovation centre.¹⁹ These benchmarks map three strategic phases of AI development. Moreover, the progress in AI will lead to a shift from today’s informative warfare to future intelligentised warfare using AI. The key development areas are as follows:

- **Informatisation.** This is essentially digitisation wherein PLA will control the flow of information. Also, disrupting the enemy’s access to information can change the course of the conflict.
- **Intelligentisation.** This builds upon informatisation using artificial intelligence and machine learning. AI can help PLA SSF reduce the time taken to decide and improve the response times during the pre-war and early conflict phases using space, cyber, electronic and psychological warfare. PLA Army (PLAA) has concentrated on military robotics and unmanned ground vehicles, which could be used for logistics. The PLA Navy (PLAN) is experimenting with unmanned surface vessels that may operate with some autonomy and is reportedly developing autonomous submarines. The PLA Air Force (PLAAF) operates advanced unmanned systems with limited autonomy that could be upgraded to include greater autonomy while exploring options for manned-unmanned teaming. The PLA Rocket Force (PLARF) may leverage use cases in remote sensing,

18. Javin Aryan, “How China aims to augment its military strength using AI” August 18, 2021, at <https://www.orfonline.org/expert-speak/how-china-aims-to-augment-its-military-strength-using-ai/>. Accessed on September 15, 2021.

19. Nicholas D Wright, “Artificial Intelligence, China, Russia, and the Global Order Technological, Political, Global, and Creative Perspectives”, Air University Library Air University Press, October 2019, at https://www.airuniversity.af.edu/Portals/10/AUPress/Books/B_0161_WRIGHT_ARTIFICIAL_INTELLIGENCE_CHINA_RUSSIA_AND_THE_GLOBAL_ORDER.PDF. Accessed on November 29, 2021.

China is investing in the cyber domain using advances in the civilian domain, ranging from facial recognition to speech recognition software that uses AI for tracking individuals.

targeting, and decision support, and its missiles may be augmented to become more “intelligentised” in their capabilities, incorporating higher levels of automation to facilitate operations.²⁰

- **Military-Civil Fusion.** This is a national development strategy initiated in the 1990s wherein technological developments in the civil sphere will be leveraged to help military developments. For example, China is investing in the cyber domain using advances in the civilian domain, ranging from facial recognition to speech recognition software that uses AI for tracking individuals.

- **Information Superiority.** With increased focus on developing and deploying advanced technologies for tactical and strategic advantage, the 5G rollout would cover a range of domains from telemedicine, military communications to UCAV swarms, border security and integration with Beidou. The 6G and beyond would cover the THz spectrum for applications such as communication, ISR, targeting, countermeasures and precision guidance. Trials are underway for quantum encryption in military communications, wherein a string of photons will be positioned ahead of the data, which allows the deceiver to decrypt. Still, it will be disrupted if communications are intercepted en route.
- China has been actively developing and producing UAV/UCAVs, primarily to gain air superiority in anti-access/area-denial strategies.

Pakistan

China and Pakistan mutually share their rivalry with India. Since the 1962 India-China War, China’s strategy has been to keep Pakistan independent and powerful and thus to make India defensive on two fronts. Pakistan is in China’s economic and military shadows. Notwithstanding the Turkish

20. Elsa B Kania, “AI Weapons’ in China’s Military Innovation”, April 2020, at https://www.brookings.edu/wp-content/uploads/2020/04/FP_20200427_ai_weapons_kania_v2.pdf. Accessed on November 29, 2021.

supply of UCAVs to Pakistan, there is a possibility that these capabilities would soon find their way from China to Pakistan.

The seventh takeaway for the country is to innovate and develop counter weapons to tackle new threats. Though the Iraq war has demonstrated that missiles armed with conventional weapons were effective terror weapons, the induction of UAVs and UCAVs represents a significant step in the augmentation of manned flights. They are cheaper to mass-produce, eliminate some risk to humans, are generally more accurate, have helped reduce the sensor to shooter time and do not mind flying into a “no-win’ situation.

Hence, a suitable counter weapon system needs to be developed. The nature of the threat defines the type of forces that are needed. As threats evolve, they need to be reassessed.

For this reason, military institutions and governments periodically re-evaluate their priorities and optimise assets to tackle those threats and support their strategic vision. Future threats to UCAV technology are most certainly being developed today. However, maintaining the full range of capabilities to tackle a threat might not always be an option due to the scarcity of resources. Therefore, governments and force planners have to establish a strategy and force that reflects the reality. Otherwise, the strategy might collapse when faced with the first challenge.

DEVELOPMENT OF WEAPONS TO COUNTER MODERN THREATS— NON-CONTACT WARFARE

India is strategically located in both continental Asia and the Indian Ocean region and with two nuclear-armed neighbours. With the prevailing conditions in our western and northern borders, the most critical security

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The next challenge facing the country will be the conduct of non-contact warfare.²¹ The changing character of warfare post the advent of informationisation and the ability to integrate surveillance and reconnaissance platform with the kill chain performing their tasks at standoff ranges will replace the concept of ‘massing of force’ to ‘massing of effects’. Distance is no longer an obstacle on the battlefield. It meets the inherent requirement for non-contact joint firepower attacks in informatised war with the ability to avoid detection and attribution.

Though missile defence does not guarantee fail-safe operations, a robust, effective missile defence system to cater for multiple target interception capabilities would help in buying time and blunt the political efforts of the adversary. India has to stretch its capabilities in multiple spheres to counter threats like short-range ballistic missiles (SRBM), Intermediate-Range Ballistic Missiles (IRBM), Intercontinental Ballistic Missiles (ICBM), hypersonic weapons, cruise missiles, manned aircraft, artillery shells, drones by achieving a triad of missile launch capability through the defence in depth. Multiple defensive layers, with system elements working together synergistically, are key to an effective defence. The layered approach provides multiple opportunities to engage the warheads from detection in the boost phase till re-entry phase, thus reducing the burden on any single layer of defence. In addition, the Anti-space ballistic missile capability will take care of space vulnerability. A system of systems enabling Exquisite ISR (Intelligence, Surveillance and Reconnaissance) is the key to multidomain awareness. AI-empowered ISR makes it possible to locate, track, and target various enemy weapons systems, raising the possibility of striking strategic targets. India’s prowess in writing software in AI applications has come to the fore. In 2020, India overtook the US as the principal source by accounting for 30 per cent of

21. Vivek Verma, *Non-Contact Warfare—An Appraisal of China’s Military Capabilities*. Delhi, India: Pentagon Press LLP, 2020, at <https://usiofindia.org/publication/cs3/non-contact-warfare-an-appraisal-of-chinas-military-capabilities/>. Accessed on November 1, 2021.

all ‘commits’ or contributions of AI codes in the public repository GitHub, the code-sharing platform owned by Microsoft.

The eighth takeaway is to develop own capability to produce Lethal Automated Weapon Systems. While new weapons are being developed, military history provides examples of classes of weapons having both a dramatic and lasting impact upon warfare.

Though air power has advantages in terms of precision and man in the loop, the guns, missiles and UCAVs offer the advantages of delivering destructive payload over distances even in the face of unfavourable air situations. Hence, the induction of Automated Lethal Weapons would improve the military effectiveness of our country and contribute immensely to our military power. Moreover, any country which takes the lead in the formulation of standards shall pave the way for indigenous development, reap associated economic interests and is in a strong position to negotiate.

Therefore, India needs to start developing standards for Lethal Automated Weapon Systems in consultation with academia, armed forces, certification agencies and manufacturing industries. Once the ecosystem has been formalised, such systems’ development, testing, and fielding should be undertaken.²²

CONCLUSION

The advances in artificial intelligence and machine autonomy are profoundly transforming the nature of warfare. The world is dynamic and is constantly changing. History confirms that man and his weapons are ever-evolving. Studies show that the growth of the world’s population has resulted in rapid urbanisation. The growth of UAVs and UCAVs to augment manned aircraft to counter these threats is inevitable. Artificial Intelligence will help process a flood of information from various platforms resulting in two fundamental advantages: speed and range. “Lethal autonomous weapon systems (LAWS) use sensors and computer algorithms extensively

22. Subir Roy, “Writing artificial intelligence code for the world—out of India”, November 26, 2021, at <https://www.moneycontrol.com/news/opinion/writing-artificial-intelligence-code-for-the-world-out-of-india-7763641.html>. Accessed on November 27, 2021.

to independently identify a target and autonomously deploy a weapon to engage and destroy the target without manual human intervention or control. Though not yet widely deployed, they would soon enable military operations in communications-degraded or denied environments where traditional systems are unable to operate.”²³

AI systems are vulnerable to flawed data inputs, which can cause unintended consequences. However, the battlefield advantages of AI-driven ISR and autonomous systems could shrink the time available for decision-makers to manage the crisis. “The current generation of more-or-less autonomous weapons has created demands for more human control over the lethal force.”²⁴

As yet, there are no concrete answers to the ethical and legal concerns surrounding autonomous weapons deployment. Nevertheless, politically and militarily, India must recognise the several advantages that autonomous weapon systems can bring, especially given the country’s unique security situation. Therefore, they must face the challenges by keeping pace with these developments and developing such systems. Simultaneously, India should actively participate and contribute to the international debate on autonomous weapons.

23. “Defense Primer: US Policy on Lethal Autonomous Weapon Systems” December 01, 2020 at <https://sgp.fas.org/crs/natsec/IF11150.pdf>. Accessed on October 01, 2021.

24. Henry Brighton, “Introducing Artificial Intelligence: A Graphic Guide (Graphic Guides)”, May 3, 2012, at https://www.amazon.in/Introducing-Artificial-Intelligence-Graphic-Guide/dp/1848312148/ref=sr_1_1?dchild=1&keywords=introducing+artificial+intelligence&qid=1625555444&sr=8-1 & Brighton, Henry (2015-09-02T22:58:59). *Introducing Artificial Intelligence: A Graphic Guide (Introducing...)*. Icon Books Ltd. Kindle Edition. Accessed on October 15, 2021.

CHINA'S NAVAL STRATEGY TOWARDS THE INDIAN OCEAN UNDER XI JINPING

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China is gradually emerging as a maritime great power' (MGP)¹ in the twenty-first century under President Xi Jinping. It is building a two-ocean navy—a Pacific Ocean fleet and an Indian Ocean fleet. Since China is an East Asian power and the proximate threat that China may face is in the East Asian theatre, the Pacific fleet acquires primary importance in China's naval strategy. Although the Indian Ocean is a secondary preference for China, the Ocean is becoming a linchpin for China's new global naval reach. China's 2015 Defence White paper declares "open seas protection" as a new naval strategy of the People's Liberation Army Navy (PLA Navy/PLAN), which primarily deals with the Indian Ocean region (IOR). With massive investments under the Belt and Road Initiative (BRI) across the Indian Ocean region, China's Indian Ocean strategy can be seen as an effort to protect its economic interests, while also projecting its power across maritime Asia. China has recently been deploying submarines and platform ships through the Indian Ocean, however, the aircraft carrier is going to be the mainstay of China's Indian Ocean fleet. Indeed, without projecting Chinese naval power across the Indian Ocean, Xi Jinping's aim of becoming a 'maritime great power' will remain a dream only.

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1. In various Chinese documents, the term 'maritime great power' (MGP) and 'true maritime power' are interchangeably used but the meaning and context are the same.

Though China has tried to get overland connectivity to the Indian Ocean through Pakistan and Myanmar, this will not help it to overcome the vulnerabilities, such as the 'Malacca Dilemma'. As a result, getting access rights to ports in the littoral countries has been the only option for China.

China's Indian Ocean strategy is fundamentally different from its near-seas (East and South China Seas) strategy, because it doesn't face any direct threat from the Indian Ocean. The Southeast Asian archipelago divides the two oceans, the Pacific and the Indian, acting as both a protective barrier and a vulnerability for China. Unlike the near seas, the Indian Ocean belongs to the far seas area and the distance allows adequate time for China to prepare against a threat from the Indian Ocean. Its major concerns are as follows: first, the Southeast Asian archipelago restricts direct access to the Indian Ocean. Though China has tried to get overland connectivity to the Indian Ocean through Pakistan and Myanmar, this will not help it to overcome the vulnerabilities, such as the 'Malacca Dilemma'. As a result, getting access rights to ports in the littoral countries has been the only option for China, which it seeks to build through friendly relationships with them. Second, the rise of India as a predominant naval power in the IOR is considered as a major threat to Chinese interests in the IOR. As Mearsheimer argues, China, as a rising state to the great power status in East Asia will ensure that no state in Asia can threaten it,² and hence views India as a potential rival in its great power ambition. The threat is accentuated by India's advantages over China in a conflict over a land border dispute that India could extend the skirmishes into the Indian Ocean, where India has a geographic advantage over China, and has the potential to disrupt the Chinese SLOCS passing through the Indian Ocean. Third, the US Navy might take advantage of China's vulnerability in the Indian Ocean to exert leverage in conflicts within the Pacific. The US might act alone or in concert with India to disrupt China's dependence on the sea route for its economic survival. So, China's strategy towards the Indian

2. John J. Mearsheimer, "Better to be Godzilla than Bambi", *Foreign Policy*, no. 146, Jan.-Feb. 2005, pp. 47-48

Ocean is a combination of its threat perception and expansionism, i.e. developing strategies to overcome the threat by neutralising India's dominant position in the IOR and balancing the US' comparative advantage vis-à-vis China in the Indian Ocean, as well as expanding its power beyond the East Asian theatre.

Today the Indian Ocean has become a critical artery for China's energy lifelines, with more than 80 per cent of oil and gas passing through the Indian Ocean to China from the Middle East and Africa.

China is also dependent on the east-west trade route connecting the Pacific to the Atlantic through the Indian Ocean, one of the busiest trade routes in the world which carries Chinese industrial products to Europe. Any threat to this critical trade link, whether from the dominance of rival powers or from regional instability and lawlessness, would have a critical effect on the economic growth of China, impacting the Chinese Communist Party's legitimacy to administer the state. To secure its energy and trade interests, China had earlier adopted a 'string of pearls' strategy, or some scholars referred to it as 'places not bases' strategy.³ This was done to reinforce Chinese presence into the region and to convey the message that China keeps an eye on the developments in the Indian Ocean. China's concern was that the US naval bases in the Indian Ocean and India's naval prowess might jeopardise its strategic interests in the Indian Ocean. China's strategy has been to maintain the Indian Ocean region as free as possible, however, its major concern is an Indian dominance in association with a superpower of the Indian Ocean waters. Since Xi Jinping came to power in 2013, Beijing has been trying to expand its naval presence into the Indian Ocean in order to emerge as a formidable naval power in the region.

According to the US Congressional Research Service report of March 2021, the Chinese Navy has been transformed over the last 25 years into a much more modern and capable force, a formidable military force within China's near-seas region, and

China's strategy has been to maintain the Indian Ocean region as free as possible, however, its major concern is an Indian dominance in association with a superpower of the Indian Ocean waters.

3. Michael McDevitt, "Becoming a Great 'Maritime Power': A Chinese Dream", Centre for Naval Analysis, Virginia, June, 2016.

it is conducting a growing number of operations in more-distant waters, including the broader waters of the Western Pacific, the Indian Ocean, and waters around Europe.⁴ Moreover, China has become the largest Navy in the world in terms of battleships, with 360 by the end of 2020, compared to the US Navy's 297, and is projected to have 400 battleships by 2025, and 425 by 2030, while the US will still have less than 300 ships during this period.⁵ The US Department of Defense's 2020 annual report suggests that PLA's objective is to become a "world-class" military by 2049—a goal first announced by General Secretary Xi Jinping in 2017.⁶

XI JINPING AND CHINA'S NAVAL STRATEGY

Although the MGP is associated with the Xi administration, former Chinese leader Hu Jintao first enunciated it in his work report at the 18th National Congress of the Chinese Communist Party in November 2012, when he stated China's ambition to become a "strong maritime power."⁷ It was, indeed, a response to the demand by many military leaders and strategic analysts for an active foreign policy commensurate with China's economic strength as well as improved military capability.⁸ This was heightened after 2008 when China successfully conducted Beijing Olympics, and also became the second largest economy in the world in 2010 in terms of GDP, surpassing Japan and behind only the US.⁹ However, Hu was reluctant to endorse such demands as he feared that it would have a destabilising impact on China's "peaceful development."¹⁰ Throughout the 2000s, PLA Navy had sought expanding

4. CongressionalResearchService, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress", March 9, 2021, at <https://fas.org/sgp/crs/row/RL33153.pdf>. Accessed on March 31, 2021.

5. Ibid.

6. Department of Defence, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2020", Government of the United States of America, at <https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF>. Accessed on April 18, 2021.

7. "Full text of Hu Jintao's report at 18th Party Congress", November 27, 2012, at http://www.china-embassy.org/eng/zt/18th_CPC_National_Congress_Eng/t992917.htm. Accessed on April 13, 2021.

8. Zhou Fangyin, "Between assertiveness and self-restraint: understanding China's South China Sea policy", *International Affairs*, vol. 92, no. 4, 2016, pp. 869-90.

9. Feng Zhang, "China's long march at sea: explaining Beijing's South China Sea strategy, 2009–2016", *The Pacific Review*, vol. 33, no. 5, 2019, pp. 757-87.

10. M. Taylor Fravel, "China's strategy in the South China sea." *Contemporary Southeast Asia*, vol. 33, no. 3, 2011, pp. 292-319.

its wings far into the SCS and the Indian Ocean, including island-building proposals, but failed to get approval from the top on the grounds that the time was not yet right.¹¹ However, that moment came in 2013, when the PLA Navy, received approval from the new President Xi following a leadership transfer.¹² When Xi Jinping took power in 2013, he modified Deng Xiaoping's dictum of 'keeping low profile' foreign policy with the term 'striving for achievement' during the Central Conference on Periphery Diplomacy held in the same year.¹³ Further, he undertook reforms in the organisation of the PLA and urged it to "sharpen its combat readiness to fight and win the next war", with an emphasis on converting China into a maritime great power.¹⁴ The 2012 Chinese defense white paper had emphasised the importance of the maritime domain in Chinese strategic thinking and stated that the most likely scenario of conflict will occur at sea.¹⁵ As such, the maritime domain became the new strategic theatre, as Xi stated in his address to the Political Bureau of the Communist Party of China Central Committee's study session in July 2013, "We need to do more to take interest in the sea, understand the sea, and strategically manage the sea, and continually do more to promote China's efforts to become a maritime power."¹⁶

Xi's MGP strategy is more assertive and comprehensive with the goal of transforming China into an 'unparalleled' great power by 2050. For him, the true maritime power concept "is being used to embolden China's economic philosophy and, in conjunction with other national-security goals, to project a vision of future national greatness."¹⁷ During his speech to the 19th Party

11. Zhang, n. 9.

12. Jane Perlez, "The prospect of Philippine thaw slows China's plans in the South China Sea", *The New York Times*, September 24, 2016, at <https://www.nytimes.com/2016/09/25/world/asia/philippines-south-china-sea.html>. Accessed on April 12, 2021.

13. Ling Wei, "Striving for achievement in a new era: China debates its global role," *The Pacific Review*, vol. 33, no. 3-4, 2020, pp. 413-37.

14. You Ji, *China's Military Transformation* (Hoboken, NJ: Wiley-Blackwell, 2015).

15. Ibid.

16. Ryan D. Martinson, "Jinglue Haiyang: The Naval Implications of Xi Jinping's New Strategic Concept", *China Brief*, vol. 15, no. 1, 2015, at <https://jamestown.org/program/jinglue-haiyang-the-naval-implications-of-xi-jinpings-new-strategic-concept/>. Accessed on April 16, 2021.

17. James R. Holmes and Toshi Yoshihara, "China's Navy: A Turn to Corbett?", *U.S. Naval Institute Proceedings*, December 2011, pp. 42-46, at <https://www.usni.org/magazines/proceedings/2010/december/chinas-navy-turn-corbett>. Accessed on April 15, 2021.

Congress in October 2017, Xi outlined requirements for the PLA to become a mechanised force by 2020, a fully modernised force by 2035, and a “world-class” force by 2050.¹⁸ He pointed out that “building a maritime power was an integral part of China’s socialist undertaking because the importance of the sea had become more apparent with respect to developing the national economy, improving ecosystems, and competing for international politics.”¹⁹ In his “China Dream” of rejuvenating the Chinese Nation, Xi emphasised making China a “moderately prosperous nation” and a “true maritime power” with a strong navy by the time the Chinese Communist Party (CCP) celebrates its centennial in 2021, and a fully developed nation (unparalleled great power) by about 2050, around communist China’s 100th anniversary (2049).²⁰

There are both offensive and defensive aspects to China’s expansionist naval policy in the far seas. Its offensive nature has originally been explained in the 2013 *Science of Military Strategy*, which stated that future guidance to China’s navy will “elevate offense from the campaign and tactical levels to the strategic level.”²¹ It further says, China “cannot wait for the enemy to attack,” but rather should engage in “strategic attack activities.”²² Indeed, the “open seas protection” strategy is the last stage of PLAN’s gradual expansion from the coastal navy into a blue water navy capable of undertaking missions in faraway regions. Like many global maritime powers of the erstwhile period, China has modernised its naval force commensurate with its economic progress. The 2015 white paper underlines its commitment to “develop a modern maritime military force structure commensurate with its national security and development interests,” and the PLAN has been tasked to

18. Xi Jinping, “Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era”, Speech Delivered at the 19th National Congress of the Communist Party of China, China Daily Online, October 18, 2017, www.chinadaily.com.cn/china/19thcpconationalcongress/2017-11/04/content_34115212.htm. Accessed on April 15, 2021.

19. Kejin Zhao and Hao Zhang, “Projecting Political Power: China’s Changing Maritime Strategy”, *The Chinese Journal of International Politics*, vol. 12, no. 4, 2019, pp. 229-61.

20. “Structuring the Chinese Dream”, *China Daily*, January 25, 2014, at http://usa.chinadaily.com.cn/opinion/2014-01/25/content_17257856.htm Accessed on April 8, 2021.

21. Shou Xiaosong (ed.), *Science of Military Strategy*, (Beijing: Military Science, 2013), p. 107.

22. *Ibid.*, p. 216.

“safeguard its national sovereignty and maritime rights and interests, protect the security of strategic SLOCs and overseas interests, and participate in international maritime cooperation, to provide strategic support for building itself into a maritime power.”²³

THE INDIAN OCEAN IN CHINA’S NAVAL STRATEGY

President Xi’s announcement of the 21st Century Maritime Silk Road in 2013 helped China in expanding its foothold into the maritime littorals of Asia and Europe by winning contracts and building infrastructures. This will ensure better strategic cooperation with the littoral countries, making China a legitimate stakeholder in the security affairs of the IOR. Undoubtedly, the more Chinese investments in the areas of maritime infrastructures such as ports, rail-road connectivity, and industrial parks along the littorals, the larger the Chinese naval presence that will be required to protect such assets. Hence, the need for a strong naval presence in the IOR. As a result, safeguarding the security of China’s overseas interests has become one of the major responsibilities of PLAN.²⁴ Though the objective of the new strategy is to protect China’s sea lines of communication (SLOC) and MSR investments associated with the Indian Ocean region, however, it will invariably project its power across the region.

With the “open seas protection” strategy, China has expanded its “strategic frontier” from near seas to the far seas, where China would be willing to commit military forces in pursuit of goals seen to be in the country’s national interests.²⁵ Since the area of operation of the “open seas protection” strategy is the Indian Ocean, Beijing would bring in more naval power into the region. This might conflict with India’s national security interests pertaining to the Indian Ocean which New Delhi considers its strategic backyard.

China’s Indian Ocean naval strategy is not only about protecting its MSR investments or securing its SLOCs but, more importantly, it is also about

23. *China’s Military Strategy 2015*, The State Council Information Office of the People’s Republic of China, Beijing, May 2015, at <http://eng.mod.gov.cn/Database/WhitePapers/index.htm>. Accessed on April 12, 2021.

24. *Ibid.*

25. David Shambaugh, “The insecurity of security: The PLA’s evolving doctrine and threat perceptions towards 2000”, *Journal of Northeast Asian Studies*, vol. 13, 1994, pp. 3-25.

While China's current capacities are insufficient for a full spectrum dominance of the Indian Ocean, but as and when the western Pacific becomes normal and a conflict-free zone, China will surely divert its resources towards Indian Ocean dominance.

projecting power across maritime Asia. Ever since it turned to the maritime domain as a result of dissipating threats from the former Soviet Union, it had set its eyes on the Indian Ocean as part of its expansionist propensity. China's first overseas naval expedition was to the Indian Ocean in November 1985, under the direction of the then PLAN commander Liu Huaqing and was backed by the political leadership.²⁶ Throughout its naval modernisation period, it considered the Indian Ocean water as a "buffer zone"—an area that should not be controlled by any other power until China becomes stronger to expand its influence.²⁷ China is now pursuing

the goal of filling the 'buffer zone' and seeks to establish its dominance, thereby diminishing Indian and the US power in the Indian Ocean region. While China's current capacities are insufficient for a full spectrum dominance of the Indian Ocean, but as and when the western Pacific becomes normal and a conflict-free zone, China will surely divert its resources towards Indian Ocean dominance.

With the mandate of overseas operations to protect Chinese interests, PLAN has increased its naval deployment in the far seas which include the northern Indian Ocean and the western Pacific Ocean, which some PLA sources refer to as the "two oceans region."²⁸ This is in line with the third stage of naval expansion of Liu Huaqing's time-honored island chain strategy, which emphasised that by 2020 China's naval capability should be mature enough to project its power between the

26. Christopher D. Yung, Ross Rustici, Isaac Kardon and Joshua Wiseman, "China's Out of Area Naval Operations: Case Studies, Trajectories, Obstacles, and Potential Solutions", *China Strategic Perspectives*, No. 3 (Washington, D.C.: Institute for National Strategic Studies, National Defense University Press, 2010).

27. Yves-Heng Lim "The Driving Forces behind China's Naval Modernization", *Comparative Strategy*, vol. 30, no. 2, 2011, pp. 105-20.

28. Jennifer Rice and Erik Robb, "The Origins of 'Near Seas Defense and Far Seas Protection'", *CMSI China Maritime Reports*, February 13, 2021, at <https://digital-commons.usnwc.edu/cmsi-maritime-reports/13>. Accessed on September 15, 2021.

areas of second and third island chains.²⁹ To project its power across the maritime domain covering the deep western Pacific and the Indian Ocean, which also become part of the third island chain, China necessarily requires at least three aircraft carriers. China has planned to acquire a minimum of three aircraft carriers by 2025, so that it can deploy at least one, the first Liaoning carrier, into the Indian Ocean.³⁰ If it gets six carriers, as some reports suggest, then it may deploy two aircraft carriers in the Indian Ocean, making China a formidable military power in the region.³¹

PLAN must have the capability to conduct continuous far sea operations against other major sea powers at all levels of ships in order to project sustained power. The PLA Navy has had an unprecedented naval expansion since the 2000s.

NAVAL CAPABILITY

PLAN must have the capability to conduct continuous far sea operations against other major sea powers at all levels of ships in order to project sustained power. The PLA Navy has had an unprecedented naval expansion since the 2000s “that far exceeds the buildup in any other navy in the post-World War II era.”³² It had 216 ships in 2005 that increased to 333 in 2020, built 117 new ships in 15 years period (Figure 1). According to the US Office of the Naval Intelligence (ONI), China is on the cusp of marginalising the US’ predominant naval position in the Indo-Pacific region.³³ The ONI study shows that given the increasing PRC shipbuilding capacity and capabilities, it is likely that the PLAN surface force could approach 450 hulls and 99 total submarines by 2030.

29. Alexander Chieh-cheng Huang, “The Chinese Navy’s Offshore Active Defense Strategy”, *Naval War College Review*, vol. 47, no. 3, 1994.

30. *Global Times*, “China’s 3rd aircraft carrier expected to launch in 2021: Reports”, January 17, 2021, at <https://www.globaltimes.cn/page/202101/1213074.shtml>. Accessed on May 31, 2021.

31. Christopher Colley, “A Future Chinese Indian Ocean Fleet?”, *War on the Rocks*, April 2, 2021, at <https://warontherocks.com/2021/04/a-future-chinese-indian-ocean-fleet/>. Accessed on July 31, 2021.

32. James E. Fanell And Scott Cheney-Peters, “Defending Against a Chinese Navy of 500 Ships”, *Wall Street Journal*, January 19, 2017, at <https://www.wsj.com/articles/defending-against-a-chinese-navy-of-500-ships-1484848417>. Accessed on July 31, 2021.

33. Office of Naval Intelligence (US), “The PLA Navy: New Capabilities and Missions for the 21st Century”, 2015, at <https://www.oni.navy.mil/News/China-Publication/>. Accessed on August 31, 2021.

Figure 1: Numbers of Certain Types of Chinese and US Ships since 2005

Year of DOD report	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 change from 2005
Ballistic missile submarines	1	1	1	1	2	2	2	2	3	3	4	4	4	4	4	4	+3
Nuclear-powered attack submarines	6	5	5	5	6	6	5	5	5	5	5	5	5	5	6	6	0
Diesel attack submarines	51	50	53	54	54	54	49	48	49	51	53	57	54	47	50	46	-5
Aircraft carriers	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	+2
Cruisers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	+1
Destroyers	21	25	25	29	27	25	26	26	23	24	21	23	31	28	33	32	+11
Frigates	43	45	47	45	48	49	53	53	52	49	52	52	56	51	54	49	+6
Corvettes	0	0	0	0	0	0	0	0	0	8	15	23	23	28	42	49	+49
Missile-armed coastal patrol craft	51	45	41	45	70	85	86	86	85	85	86	86	88	86	86	86	+35
Amphibious ships: LSTs and LPDs	20	25	25	26	27	27	27	28	29	29	29	30	34	33	37	37	+17
Amphibious ships: LSMs	23	25	25	28	28	28	28	23	26	28	28	22	21	23	22	21	-2
Total of types above (does not include other types, such as auxiliary and support ships)	216	221	222	233	262	276	276	271	273	283	294	303	317	306	335	333	+117
China Coast Guard ships	n/a	185	240	248	255	n/a											
Total U.S. Navy battle force ships (which includes auxiliary and support ships but excludes patrol craft)	291	282	281	279	282	285	288	284	287	285	289	271	275	279	286	296	+5
Total U.S. Navy battle force ships compared to above total for certain Chinese ship types	+75	+61	+59	+46	+20	+9	+12	+13	+14	+2	-5	-32	-42	-27	-49	-37	-112

Source: "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress", Congressional Research Service, Washington, DC, September 9, 2021, p. 8, at <https://sgp.fas.org/crs/row/RL33153.pdf>. Accessed on July 31, 2021.

The Chinese naval inventory includes advanced destroyers and attack submarines in large numbers, due to the PLAN's primary mission of 'active offshore defence' in the near seas. China's naval modernisation drive, which was launched in the late 1990s, has resulted in the replacement of older ships with new and technologically advanced larger ships, as well as the installation of modern weapon systems.³⁴ Destroyers are PLAN's frontline surface combatant strike groups, and China has commissioned six new classes of destroyers since the 2000s. Major inventory additions include Type 052D Luyang III-class guided-missile destroyers, the Type 054C Luyang II-class guided-missile destroyers, the Type 054A Jiangkai III-class guided-missile frigates, and the Soviet-built Sovremenny-class destroyers.³⁵ These vessels are equipped with the indigenous YJ-18 A or YJ-62 anti-ship cruise missile (ASCM) and the HN-2 land-attack cruise missile (a variant of the Russian Kh-55 missile). Type-052C also carries several Chinese built HHQ-9 surface-to-air missiles (SAM), housed in vertical launch systems (VLS).³⁶ In 2017, the Chinese Navy emerged as the world's largest navy, with more warships and submarines than the United States, however, the American fleet remains superior qualitatively, and it is spread much thinner.³⁷

With the incorporation of 'open seas protection' in China's naval strategy, the blue water naval capability has progressed exponentially. The new inventories were aimed at enhancing China's blue-water naval capabilities, and PLAN has now become a more blue-water force than it was before.³⁸ For instance, China commissioned or launched 44 surface ships throughout 2016–17, of which 26 are bluewater-capable.³⁹ Between 2014 and 2018, China launched more submarines, warships, amphibious vessels, and auxiliaries

34. Richard Bitzinger, "Modernising China's Military, 1997-2012", *China Perspective*, vol. 8, no. 4, 2011, pp. 7-15.

35. James E. Fanell, "Asia Rising: China's Global Naval Strategy and Expanding Force Structure," *Naval War College Review*: vol. 72, no. 1, 2019, pp. 11-45.

36. *Military Balance*, IISS, London, 2021, p. 252.

37. Steven Lee Myers, "With Ships and Missiles, China Is Ready to Challenge U.S. Navy in Pacific", *The New York Times*, August 29, 2018, at <https://www.nytimes.com/2018/08/29/world/asia/china-navy-aircraft-carrier-pacific.html>. Accessed on July 31, 2021.

38. Koh Swee Lean Collin, "China-India Rivalry at Sea: Capability, trends and challenges", *Asian Security*, vol. 15, no. 1, 2019, pp. 5-24.

39. *Ibid.*

than the combined navies of Germany, India, Spain and the United Kingdom.⁴⁰ China commissioned 18 ships into its fleet in 2016 alone and another 14 were inducted in 2017 (Figure 2). On the other hand, US Navy had commissioned only 5 and 8 ships respectively during the same period. In 2018, China launched the world's largest destroyer, Type 055 class destroyer with a displacement capacity of over 11,000 tonnes, demonstrating its technical capability in building advanced systems and its blue-water naval capability.⁴¹ The Type 055 class destroyer is expected to perform major command and control functions in far seas operations and will likely serve as the primary escort of China's aircraft carrier strike groups in blue-water operations.⁴² China has launched five such destroyers which are under various stages of operational requirements.⁴³ China launched its second aircraft carrier, indigenously-built Type-001A Shandong, in April 2017, which underwent maiden sea trials the following June, and was commissioned in December 2019.⁴⁴ The *Shandong* can operate up to 36 Shenyang J-15 fighters, a Chinese copy of the Sukhoi Su-33, as well as several helicopters.⁴⁵ It uses a ski-ramp to launch aircraft, and participated in its first drill in the South China Sea in May 2021.⁴⁶ The first, *Lioning*, is originally a Soviet cruiser carrier, retrofitted by China and launched in 2012, with which PLAN has become a true two-

40. "How is China modernizing its navy?", *CSIS China Power*, at <https://chinapower.csis.org/china-naval-modernization/>. Accessed on August 31, 2021.

41. Rick Joe, "All You Need to Know About China's New Stealth Destroyer", *The Diplomat*, June 8, 2018, at <https://thediplomat.com/2018/06/all-you-need-to-know-about-chinas-new-stealth-destroyer/>. Accessed on July 31, 2021.

42. "China set to showcase game-changing warship at navy parade", *The Week*, April 19, 2019, at <https://www.theweek.in/news/world/2019/04/19/china-set-showcase-game-changer-warship-at-navy-parade.html>. Accessed on July 31, 2021.

43. Franz-Stefan Gady, "China's Navy Commissions First-of-Class Type 055 Guided Missile Destroyer", *The Diplomat*, January 13, 2020, at <https://thediplomat.com/2020/01/chinas-navy-commissions-first-of-class-type-055-guided-missile-destroyer/>. Accessed on July 31, 2021.

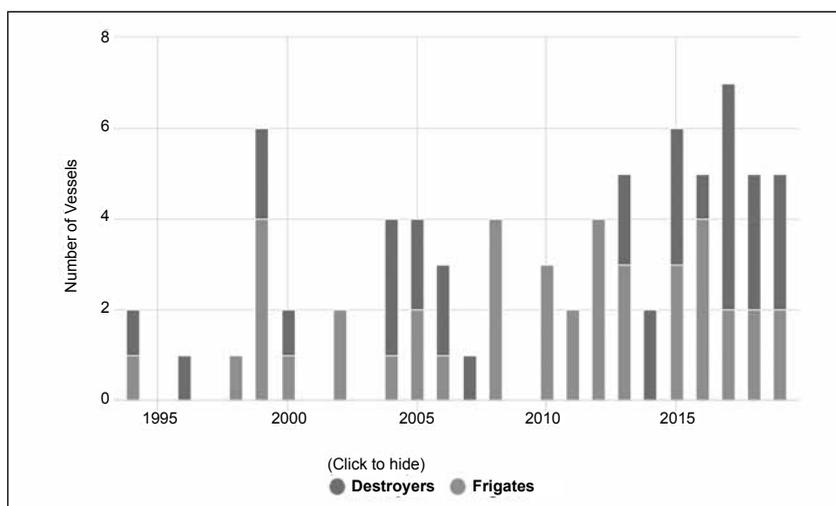
44. "China's 1st indigenous aircraft carrier to be combat-ready by 2020: Report", *Business Standard*, October 27, 2020, at https://www.business-standard.com/article/international/china-s-1st-indigenous-aircraft-carrier-to-be-combat-ready-by-2020-report-120102701577_1.html. Accessed on July 26, 2021.

45. Greg Waldron, "Beijing commissions its second aircraft carrier", *Flight Global*, December 18, 2019, at <https://www.flightglobal.com/defence/beijing-boosts-its-carrier-power-with-shandong-commissioning/135830.article>. Accessed on August 31, 2021.

46. "China's 2nd aircraft carrier group holds 1st drill in 2021 in S. China Sea, 'training for combat preparedness' ", *Global Times*, May 2, 2021, at <https://www.globaltimes.cn/page/202105/1222578.shtml>. Accessed on August 26, 2021.

carrier navy.⁴⁷ A third, larger vessel is also under construction, and Beijing’s long-term carrier plan has generated considerable concern across the region. China had even mulled building a nuclear-powered carrier, but has put on hold the project, due to budgetary and technical constraints.⁴⁸ With this expected force level, it is believed that China would be able to project its power beyond the second island chain by 2030, and would satisfy the force required to meet Xi’s goal of rejuvenation of the Chinese Nation by 2049.

Figure 2: Annual Number of Destroyers and Frigates Commissioned into the PLAN



Source: “How is China modernising its navy”, *CSIS China Power*, September 1, 2021, at <https://chinapower.csis.org/china-naval-modernization/>

Warships play an important role in projecting one’s power in distant locations simply “because they are there.”⁴⁹ Ken Booth contends that “warships can have deleterious effects on foreign policies, they can shape or undermine

47. “Aircraft carrier Liaoning’s latest voyage lays down foundation for enhanced night combat”, *Global Times*, August 8, 2021, at <https://www.globaltimes.cn/page/202108/1230896.shtml>. Accessed on August 20, 2021.

48. Minnie Chan, “Chinese Navy Set to Build Fourth Aircraft Carrier, but Plans for a More Advanced Ship Are Put on Hold”, *South China Morning Post*, November 28, 2019, at <https://www.scmp.com/news/china/military/article/3039653/chinese-navy-set-build-fourth-aircraft-carrier-plans-more>. Accessed on August 26, 2021.

49. Ken Booth, *Navies and Foreign Policy* (London, UK: Croom Helm, 1977), p. 85.

China focuses on sustained naval operations in the Indian Ocean waters and has deployed destroyers, submarines, corvettes and may spare one aircraft carrier exclusively for the Indian Ocean operation.

a country's efforts in unpredictable and uncertain ways."⁵⁰ He adds, "To the extent that a government perceives itself to be vulnerable in the naval context, or identifies hostile naval intentions and capabilities on the part of the adversaries, so warships can be an important factor in defining the threat."⁵¹ Essentially a navy constitutes a fungible instrument of foreign policy, facilitating the pursuit of a country's national interests abroad. At the same time, "a key determinant of naval force projection is sustainability, which is related to the concept of geographical reach. It is the ability to maintain naval forces on station

under various operational circumstances, including in the presence of the enemy and under demanding operational environmental conditions."⁵² To achieve blue water status, navies must have sustained operation capabilities in terms of "sufficient size, seaworthiness, range, and endurance to operate at distances from their home base and in the specific operational environments that their missions require."⁵³ China focuses on sustained naval operations in the Indian Ocean waters and has deployed destroyers, submarines, corvettes and may spare one aircraft carrier exclusively for the Indian Ocean operation.

Launched with an anti-piracy objectives in the Indian Ocean region, China has continuously deployed its naval ships, platforms and submarines, since its first operation in 2008. Even though piracy and armed robbery have decreased as a result of sustained escort operations by various navies, China continues to make its naval presence throughout the year in the waterbody. The Task Force that China sends to the Indian Ocean for anti-piracy operations will have a minimum of three ships: a guided-missile destroyer, a missile frigate and a supply vessel, and spent 3-4 months for the escort operations in the

50. Ibid.

51. Ibid.

52. Collin, n. 38.

53. Ibid.

Indian Ocean.⁵⁴ Also, China sends a minimum of three task forces to the Indian Ocean region every year since 2009.⁵⁵ According to former Indian Navy Chief Admiral Sunil Lamba, “at any given time there are six to eight PLAN warships in the northern Indian Ocean”, which are “permanently present and they have three to four survey vessels or hydrographic vessels.”⁵⁶ In 2017, 14 ships were deployed for antipiracy operations in the Indian Ocean, and between 2015 and 2019, there were six submarines China deployed for the same purpose.⁵⁷ China has multiple objectives in its deployment of naval ships to the Indian Ocean: certain deployments are training exercises for the crew in the far seas area, others are for non-traditional security purposes, while some are to give political signals to its adversaries. For instance, it dispatched a fleet of two Type 052D destroyers, a 054A frigate, and a 071 dock landing ship to the Indian Ocean in February 2018 as part of the ‘Blue 2018 A’ exercise, which was held amid the political stalemate going on in the Maldives.⁵⁸ The contingent spent a week in the eastern Indian Ocean and was purportedly aimed at warning against a possible Indian military involvement in the political crisis in Male.

China established its first overseas naval base in Djibouti in 2017 to provide logistical support for PLAN deployed in the Indian Ocean region.⁵⁹ China claims that it has no plan to keep Djibouti base as a real military base as China is against

54. Ibid.

55. Ibid.

56. *Hindustan Times*, “Keeping a Close Eye on Chinese Presence in the Indian Ocean,” says Admiral Lanba”, March 13, 2019.

57. Ibid.

58. “China Deploys Warships in Indian Ocean”, *The Hindu*, February 20, 2018, at <https://www.thehindu.com/news/international/china-deploys-warships-in-indian-ocean/article22808463.ece>. Accessed on September 15, 2021.

59. Charlotte Gao, “China Officially Sets Up Its First Overseas Base in Djibouti”, *The Diplomat*, July 12, 2017, at <https://thediplomat.com/2017/07/china-officially-sets-up-its-first-overseas-base-in-djibouti/>. Accessed on March 31, 2021.

hegemonism and imperialism. However, the recently completed infrastructure modernisation at the Obock naval base suggests that it can be used for military purposes.⁶⁰ Currently, the base can accommodate an aircraft carrier, a minimum of four nuclear-powered attack submarines, and at least two large destroyers.⁶¹ In fact, since the 2000s, there has been a debate among Chinese strategists about the necessity to set up logistical supply bases far away from China for missions PLAN must conduct to protect SLOCS and also to support China's globalised economy.⁶² The need for building a naval base in the Indian Ocean was demonstrated in the writings of military scholars such as Col. Dai Xu who stated that China "needs to develop overseas bases as a logistical extension of the PLAN mission to the Gulf of Aden and as a necessity to safeguard [China's] commercial interests and world peace."⁶³ He further opined that those would, "not require the long-term stationing of large military equipment or large-scale military units...but they should be suitable for comprehensive replenishment."⁶⁴ China had looked upon various locations to set up its naval base in the IOR such as Port Salalah in Oman, Aden in Yemen, Karachi and Gwadar in Pakistan, Port Victoria in Seychelles, Colombo, Hambantota, and Trincomalee in Sri Lanka, the Maldives, Chittagong in Bangladesh and Sittwe in Myanmar.⁶⁵ Djibouti was chosen for its strategic location; it hosts military bases of other countries, allowing China to negate the criticism of imperialism and hegemonism. Moreover, it is situated at the busiest trade route connecting the Indian Ocean and the Mediterranean Sea.⁶⁶

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60. Sam LaGrone, "AFRICOM: Chinese Naval Base in Africa Set to Support Aircraft Carriers", USNI News, April 20, 2021, at <https://news.usni.org/2021/04/20/africom-chinese-naval-base-in-africa-set-to-support-aircraft-carriers>. Accessed on September 12, 2021.
 61. H I Sutton, "Satellite Images Show That Chinese Navy Is Expanding Overseas Base", *Forbes*, May 10, 2020, at <https://www.forbes.com/sites/hisutton/2020/05/10/satellite-images-show-chinese-navy-is-expanding-overseas-base/?sh=7a0118a68691>. Accessed on April 9, 2021.
 62. Jean-Pierre Cabestan, "China's Military Base in Djibouti: A Microcosm of China's Growing Competition with the United States and New Bipolarity", *Journal of Contemporary China*, vol. 29, no. 125, 2020, pp. 731-47.
 63. Daniel J. Kostecka, "Places and Bases: The Chinese Navy's Emerging Support Network in the Indian Ocean", *Naval War College Review*, vol. 64, no. 1, 2011, pp. 59-78.
 64. *Ibid.*
 65. Loro Horta, "China Turns to the Sea: Changes in the People's Liberation Army Navy Doctrine and Force Structure", *Comparative Strategy*, vol. 31, no. 5, 2012, pp. 393-402.
 66. Richard Ghiasy, Fei Su and Lora Saalman, "The 21st Century Maritime Silk Road Security implications and ways forward for the European Union", SIPRI, Solna, Sweden, p. 28, at <https://www.sipri.org/sites/default/files/2019-10/the-21st-century-maritime-silk-road.pdf>. Accessed on March 31, 2021.

CHALLENGES FOR CHINA'S NAVAL DOMINANCE IN THE INDIAN OCEAN

In terms of China's military dominance of the Indian Ocean, however, it faces structural problems. Firstly, geography plays a critical role in China's naval strategy and its ambition for dominance of the Indian Ocean. The Southeast Asian archipelago works as a barrier to the Chinese navy's access to the Indian Ocean waters; it has to cross any of the three narrow straits, the Malacca, the Sunda, and the Lombok, where it could be interdicted by rival navies.⁶⁷ This problem was amply explained by former Chinese President Hu Jintao in his 'Malacca dilemma' concept, as he declared that "certain major powers were bent on controlling the strait," and called for the adoption of new strategies to mitigate the perceived vulnerability.⁶⁸ However, so far its vulnerability has not been resolved, rather it has aggravated with more powers such as the United Kingdom, France, and Australia deploying their naval assets in the region. With the AUKUS pact signed between the US, Australia and the United Kingdom in September 2021, Australia is going to be a formidable challenger in the eastern Indian Ocean region with the would-be acquired nuclear-powered attack submarines.⁶⁹

Second, the Indian Ocean will always be a secondary preference in Chinese naval strategy; its primary preference has been the near seas covering the Bohai, the Yellow, East China and the South China Seas.⁷⁰ China's 2015 Defence White Paper stipulates that concerning the Indian Ocean the PLAN has majorly two objectives: to safeguard the security of China's overseas interests and to maintain strategic deterrence and counterattack.⁷¹ Before expanding its naval dominance into the Indian Ocean it has to establish first its control in the near seas by marginalising the US, which is highly unlikely

67. David Brewster, "The Changing Balance of Power in the Indian Ocean: Prospects for a Significant Chinese Naval Presence", in David Michel and Ricky Passarelli (eds.), *Sea Change: Evolving Maritime Geopolitics in the Indo-Pacific Region*, Stimson Centre, pp. 71-80, 2014.

68. Ian Storey, "China's 'Malacca Dilemma'", *China Brief*, vol. 6, no. 8, at <https://jamestown.org/program/chinas-malacca-dilemma/>. Accessed on September 2, 2021.

69. Abhijit Singh, "India is not a bystander in the AUKUS Saga", *The Hindu*, September 25, 2021.

70. Zack Cooper and Allen Shearer, "Thinking clearly about China's layered Indo-Pacific strategy", *Bulletin of the Atomic Scientists*, vol. 73, no. 5, 2017, pp. 305-11.

71. *China's Military Strategy 2015*, n. 23.

in the near future. In this respect, China's strategy would be to ensure that no rival power dominates the Indian Ocean until China has full consolidation of the near seas, and it would do so by obtaining unfettered access across the Indian Ocean waters.

Third, even though the Chinese navy is the largest one in the world, its capability for a full spectrum military dominance of the Indian Ocean is doubtful, despite the fact that it is vying for six aircraft carriers by 2030.⁷² The requirement for a full-fledged two ocean-going fleets, into the Pacific and the Indian Oceans, centered around aircraft carrier, is unlikely to reach fruition any time soon.⁷³ Its strategic force lacks depth both in terms of quantity and quality to project power as a counterforce beyond the second island chain.⁷⁴ China operates a small number of nuclear-powered attack submarines (SSNs) and nuclear-powered ballistic missile submarines (SSBNs); most of China's submarines are non-nuclear-powered attack submarines.⁷⁵

Fourthly, since the Indian Ocean is far away from China, it necessarily requires military bases, alliances and partners. Even though China has set up its first overseas base in Djibouti, but it is not an actual military base rather a "logistical support facility" for the PLAN, "mainly used to provide rest and rehabilitation for the Chinese troops taking part in escort missions in the Gulf of Aden and waters of Somalia, UN peacekeeping and humanitarian rescue."⁷⁶ It has improved the facilities at the base, however, making it fully operational during a crisis is

72. Yves-Heng Lim, "China's rising naval ambitions in the Indian Ocean: Aligning ends, ways and means", *Asian Security*, vol. 16, no. 3, 2020, pp. 396-412; David Brewster, *India and China at Sea: Competition for Naval Dominance in the Indian Ocean* (New Delhi: Oxford University Press, 2018).

73. Hu Bo, *Chinese Maritime Power in the 21st Century: Strategic Planning, Policy and Predictions*, (London, Routledge, 2020); You Ji, "China's Emerging Indo-Pacific Naval Strategy".

74. Lim, "China's rising naval ambitions in the Indian Ocean, n. 72; Christopher D. Yung, Ross Rustici, and Scott Devary and Jenny Lin, "'Not an Idea We Have to Shun': Chinese Overseas Basing Requirements in the 21st Century", *China Strategic Perspectives*, No. 7, Institute for National Strategic Studies (Washington, DC: National Defense University Press, 2014), at <https://ndupress.ndu.edu/Portals/68/Documents/stratperspective/china/ChinaPerspectives-7.pdf>. Accessed on August 31, 2021.

75. Congressional Research Service, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress", March 9, 2021, at <https://fas.org/sgp/crs/row/RL33153.pdf>. Accessed on March 31, 2021.

76. Jean-Pierre Cabestan, "China's Military Base in Djibouti: A Microcosm of China's Growing Competition with the United States and New Bipolarity", *Journal of Contemporary China*, vol. 29, no. 125, 2020, pp. 731-47.

doubtful due to the US naval presence in the region with two bases in the western Indian Ocean: the US' Fifth fleet at Manama and the base at Diego Garcia. Besides, except for Pakistan and Myanmar, no other countries are close partners of China, making it more difficult to use their resources against India or the US.

Finally, India's naval prowess is being considered as a major challenge for China to establish its military dominance in the Indian Ocean. As a resident naval power, India has a significant geographical advantage over China's 'distant power dilemma'.⁷⁷ Also, China sees progressing Indo-US strategic partnership as a major obstacle in its naval expansionism in the Indian Ocean region.⁷⁸ American scholar Ashley Tellis has succinctly put it that China's acquisitions of various air, naval and missile capabilities will allow it to project its power beyond the "second island chain" into the Indian Ocean, the Persian Gulf and the Mediterranean Sea, but sees a major challenge in a strong Indo-US partnership in the Indian Ocean.⁷⁹

IMPLICATIONS FOR INDIA

Despite such constraints on Chinese naval dominance in the Indian Ocean, its larger presence in the Indian Ocean is still a concern for New Delhi. India's concerns about China's forays into the Indian Ocean revolve around its expanding blue-water naval capabilities, especially submarines, and port access across the region. As navies carry foreign policy objectives while making friendly port calls when sailing in distant waters, deployment in the adjacent waters is being viewed as a threat for a hostile nation. The regular physical presence of rival navies, particularly

77. Distant power dilemma means that a distant superior power cannot be effective against a local power in a regional theatre. The US is facing the same problem against China in an East Asian theatre. Similarly, during the Falkland war Britain had the same problem in the initial period of the conflict, but Argentina was not at all a regional naval power so it was not able to sustain its local power advantage.

78. Joshy M. Paul. "US and India: Emerging Offshore Balancing in Asia", *India Review*, vol. 18, no. 3, 2019, pp. 221-42.

79. Ashley Tellis, "Protecting American Primacy in the Indo-Pacific", Testimony before the U.S. Senate Armed Services Committee, April 25, 2017, at <https://carnegieendowment.org/2017/04/25/protecting-american-primacy-in-indo-pacific-pub-68754>. Accessed on March 31, 2021.

With sustained naval deployment in the water body and easy access at ports for naval ships along the littoral areas, the Chinese navy would effectively become a regional navy.

those with submarines in one's backyard, is indeed a challenge for the local power. In recent years, China has sailed its submarines through the Indian Ocean and paid port calls in Pakistan and Sri Lanka.⁸⁰ Deploying submarines in the Indian Ocean in the guise of anti-piracy operations is a concern for India because of its stealthy character. Importantly, the submarines can dock at China-owned ports in various locations across the Indian Ocean, as had been seen in a Song class submarine docked at the Hambantota port of Sri Lanka in October 2014.⁸¹ Once inside the Indian Ocean, it doesn't need to return to China for refuelling and resupply, allowing for sustained PLAN deployment in the region. China's strategy is to negate India's geopolitical primacy and operational influence of the Indian Navy in the Indian Ocean, rendering India's 'net security status' redundant.

Besides, China's closer ties with the regional countries such as Pakistan, Myanmar, and Sri Lanka could hurt India's interest in the region. China is also planning to set up a major hub port in Tanzania that can also be used for military purposes. With sustained naval deployment in the water body and easy access at ports for naval ships along the littoral areas, the Chinese Navy would effectively become a regional navy. China might adopt the same 'harassment' tactics it employs in the South China Sea against India, which would lead to friction between naval ships of the two countries in the Indian Ocean.

80. H I Sutton "Chinese Navy Submarines Could Become A Reality In Indian Ocean", *Forbes*, January 26, 2020, at <https://www.forbes.com/sites/hisutton/2020/06/26/chinese-navy-submarines-could-become-a-reality-in-indian-ocean/?sh=54c2d1b954a6>. Accessed on March 31, 2021.

81. Abhijit Singh, "Deciphering China's Submarine Deployments in the Indian Ocean Region", IDSA Commentary, July 8, 2015, at https://www.idsa.in/idsacomments/DecipheringChinasSubmarineDeploymentsintheIndianOceanRegion_asingh_080715. Accessed on March 31, 2021.

CONCLUSION

As the 2015 defence white paper stipulates, PLAN's official policy towards the Indian Ocean is to safeguard the security of China's overseas interests; and to maintain strategic deterrence and counter attack.⁸² However, to protect the BRI investments in the Indian Ocean littoral states of around \$150 billion, the Chinese Navy will become a legitimate stakeholder in the security of the Indian Ocean region. With the BRI investments in ports and allied infrastructures in the littoral area spanning from Singapore to South Africa, and the many island states in the Indian Ocean, the Chinese navy will

get easy access to these ports during peace time, and some of them may be used for military purposes when China faces a crisis. China has strategically invested in countries who can be friendly to them while some are inimical to its rivals. For instance, Pakistan and Myanmar are expected to work as the best hedge against India, while Bandar Abbas in Iran and the port of Aden in Yemen could be used in the event of a US-China confrontation in the western Pacific. Similarly, as China continues its naval presence in the Indian Ocean throughout the year for the protection of MSR assets, PLAN ships could be called upon by the littoral countries when they face security challenges, especially for humanitarian assistance; generally, the Indian navy is being called upon for such assistance in the IOR. This shows that one of the major objectives of China's naval expansionism is to neutralise the Indian Navy's 'net security provider' position in the IOR.

PLA Navy will also work as a deterrent force in the Indian Ocean to prevent an adverse impact if a crisis broke out in the western Pacific. China's counter attack strategy in the western Pacific is to inflict unacceptable damage on the

China has strategically invested in countries who can be friendly to them while some are inimical to its rivals. For instance, Pakistan and Myanmar are expected to work as the best hedge against India, while Bandar Abbas in Iran and the port of Aden in Yemen could be used in the event of a US-China confrontation in the western Pacific.

82. *China's Military Strategy 2015*, n. 23.

enemy forces who try to encroach on Chinese territorial waters or prevent Chinese ships in the Chinese 'controlled' waters—SCS and ECS. China may adopt the same strategy against other states if they disrupt Chinese SLOCs in the Indian Ocean or rivals getting assistance from the Indian Ocean littoral countries. It will be difficult for China to sustain a strategy of dominating the Indian Ocean but it will keep deploying nuclear submarines and aircraft carriers in the region for deterrence and counter attack purposes. Its current objective is that no rival power should dominate the Indian Ocean, while it enjoys unfettered access across the waterbody. However, once its East Asian problem is settled, it will definitely seek dominance of the Indian Ocean. India should prepare itself for such a future scenario.

FRANCE'S INDO-PACIFIC STRATEGY IN 2021: CHARACTERISTICS, CAPABILITIES, CHALLENGES AND OPPORTUNITIES

MAHIMA DUGGAL

INTRODUCTION

The Indo-Pacific has quickly become a focal point in global geopolitics as a singular strategic space that is not only central to global economic activity and energy security, but also to rising power fissures, geopolitical competition and preserving the rules-based order. The rise of China in the Indo-Pacific has, over the past few years, been accompanied by its unilateral, aggressive actions that challenge the status-quo, throwing the region into flux. The emerging US-China great power competition has tested the strength of the regional security architecture, with China posing a challenge to the regional maritime trading order. Economically too, with a third of the total global trade passing through the region, it has quickly become of central concern to all the international actors dependent on it. As a result, much as Europe's geopolitical fissures once drew global powers to its sphere, extra-territorial states are increasingly drawn to the

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France was the first EU member nation to publish an Indo-Pacific strategy paper in 2018, marking the region as a clear priority in its foreign policy outlook under the leadership of President Emmanuel Macron.

Indo-Pacific's orbit—and its frictions—whether due to economic, geopolitical, geo-strategic, or environmental concerns. While European powers are not traditional security actors in the Indo-Pacific, they have increasingly sought to think strategically about the region. France,¹ Germany,² the Netherlands³ and the UK⁴ have all featured Indo-Pacific strategies as a part of their foreign policy formulations. Most recently, the EU released a preliminary Indo-Pacific strategy, that is expected to be formally adopted in September 2021.

Amongst these external actors, France was the first EU member nation to publish an Indo-Pacific strategy paper in 2018, marking the region as a clear priority in its foreign policy outlook under the leadership of President Emmanuel Macron. In 2019, France's interest in the region was codified in key government papers, such as, France's Defence Strategy in the Indo-Pacific (by the French Ministry for the Armed Forces) and the French Strategy in

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1. Ministère de l'Europe et des Affaires étrangères, *The Indo-Pacific region: A priority for France*, (Paris: Directorate for Asia and Oceania, France Diplomacy, updated April 2021), at <https://www.diplomatie.gouv.fr/en/country-files/asia-and-oceania/the-indo-pacific-region-a-priority-for-france/>.
 2. Federal Foreign Office of Germany, *Germany-Europe-Asia: Shaping the 21st Century Together: The German Government Adopts Policy Guidelines on the Indo-Pacific Region* (Berlin: Federal Foreign Office, September 1, 2020), at <https://www.auswaertiges-amt.de/blob/2380514/f9784f7e3b3fa1bd7c5446d274a4169e/200901-indo-pazifik-leitlinien--1--data.pdf>.
 3. Ministry of Foreign Affairs, *Indo-Pacific: Guidelines for strengthening Dutch and EU cooperation with partners in Asia*, AVT/BZ-201002-011A (The Hague: Ministry of Foreign Affairs, November 2020), at <https://www.government.nl/binaries/government/documents/publications/2020/11/13/indo-pacific-guidelines/Indo-Pacific+Guidelines+EN.pdf>. Also see Sebastian Strangio, "Following France and Germany, the Netherlands Pivots to the Indo-Pacific", *The Diplomat*, November 18, 2020, at <https://thediplomat.com/2020/11/following-france-and-germany-the-netherlands-pivots-to-the-indo-pacific>.
 4. HM Government, *Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy*, CP 403 (London: APS Group on behalf of the Controller of Her Majesty's Stationery Office, March 2021), at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975077/Global_Britain_in_a_Competitive_Age_the_Integrated_Review_of_Security__Defence__Development_and_Foreign_Policy.pdf.

the Indo-Pacific (by its Ministry for Europe and Foreign Affairs).⁵ Since then, Paris has led the charge in promoting and shaping the EU's vision for engagement with the region. It has, in other words, come to act as a bridge between Europe and the Indo-Pacific.

This paper outlines the fundamental tenets of France's Indo-Pacific strategy and, by extension, its approach towards China. Are Paris' objectives driven primarily by economic or strategic concerns? It analyses the recently released update on France's Indo-Pacific

strategy to explore how French presence has evolved since 2018 in terms of diplomatic engagement and military activity.⁶ The paper briefly looks at France's response to the formation of Australia-UK-US (AUKUS) alliance to argue that the Franco-Indian partnership will hold added importance in coming times. Furthermore, it questions the role of the augmented French presence in the region and the efficacy of stepping up diplomatic and military engagement in restraining Chinese aggression. It explores whether France's approach is sustainable and how it could develop further in the coming times.

For France, the Indo-Pacific is not merely a geopolitical construct but a geographical reality. It perceives itself as an "island-state" of the Indo-Pacific due to its comparatively extensive territorial and military presence in the region.

FRANCE IN THE INDO-PACIFIC: A LOCAL OR EXTERNAL POWER?

For France, the Indo-Pacific is not merely a geopolitical construct but a geographical reality. It perceives itself as an "island-state" of the Indo-Pacific due to its comparatively extensive territorial and military presence in the region. France's connection with the region is unique in that it is the only European nation with territories spanning the Indian and Pacific Oceans, from the eastern coast of Africa to the South Pacific and off the western coast of Central America (see Table 1). These territories—namely, Mayonette, Scattered Island, La Réunion,

5. Ministère des Armées, *France's Defence Strategy In the Indo-Pacific* (Paris: Délégation à l'information et à la communication de la défense, 2019), https://apcss.org/wp-content/uploads/2020/02/France-Defence_Strategy_in_the_Indo-Pacific_2019.pdf; Ministère de l'Europe et des Affaires étrangères, *The Indo-Pacific region*, n. 1.

6. Ministère de l'Europe et des Affaires étrangères, *La stratégie de la France dans l'Indopacifique*, n. 6.

Vanuatu, New Caledonia, Wallis & Futuna, French Polynesia, Clipperton Islands and French Antarctic and Sub-Antarctic territories—are home to over 1.6 million French citizens. Strategically, they provide France with the world's second largest exclusive economic zone (EEZ) after only the US, stretching 11 million square kilometres; this makes up 93 per cent of France's total EEZ. Notably, 14 per cent of French exports and 17 per cent of its total imports (barring armaments) are traded with the Indo-Pacific region; as of 2017, France holds foreign direct investment (FDI) stocks worth €108 billion. With the global economic centre of gravity shifting from the Atlantic to the Pacific, the Indo-Pacific has become critical to France's trade interests.⁷ Not only is it home to six of the world's biggest economies (members of the G20)—Australia, China, India, Indonesia, Japan and South Korea—but its maritime trade routes linking Europe to the Pacific Ocean (via the Indian Ocean and Southeast Asia). France's economic engagement has been steadily growing over time to €320 billion in direct investment in 2018 (a 75 per cent increase from 2008), providing a market for one-third of non-EU French exports and supporting over 7000 French companies.⁸ Apart from the region's growing economic share in world trade, Paris also recognises its vitality in terms of biodiversity and climate change.

Table 1: French Presence in the Indo-Pacific

<i>Territory/Country</i>	Number of French Nationals	EEZ (in square kilometres)
<i>Mayotte-Reunion-Scattered Islands</i>	1,100,000 inhabitants	1,026,037 sq. km
<i>French Antarctic and Sub-Antarctic Territories</i>	-	2,070,343 sq. km
<i>New Caledonia</i>	282,000 inhabitants	1,457,032 sq. km
<i>Wallis & Futuna</i>	12,000 inhabitants	263,422 sq. km
<i>French Polynesia</i>	276,000 inhabitants	4,852,122 sq. km

7. Ministère de l'Europe et des Affaires étrangères, *The Indo-Pacific region*, n. 1.

8. Ministère de l'Europe et des Affaires étrangères, *The Indo-Pacific region*, n. 1; Pierre Morcos, "France: A Bridge between Europe and the Indo-Pacific?", Center for Strategic and International Studies, April 1, 2021, at <https://www.csis.org/analysis/france-bridge-between-europe-and-indo-pacific>.

<i>Clipperton</i>	-	438,048 sq. km
<i>China</i>	Over 30,000 nationals	-
<i>India</i>	10,000 - 30,000 nationals	-
<i>Australia</i>	10,000 - 30,000 nationals	-
<i>Japan</i>	10,000 - 30,000 nationals	-

Source: Compiled by the author based on data from the French Ministry for the Armed Forces

Such connections justify France’s presence as a ‘resident’ Indo-Pacific state and have become a starting point for France’s strategy towards the region. Importantly, the vast spread of France’s territories in the region has mandated a rather broad geographical definition of the Indo-Pacific, making it a more apt geographical construct to represent French interests compared to ‘Asia-Pacific’. Notably, France is the only European state with a natural role in the region, effectively serving as a bridge connecting Europe and the Indo-Pacific.

The China Factor

While these diversified geographical and economic connections are central to France’s drive to be recognised as a local actor in the Indo-Pacific, its strategy is contextualised by the regional geopolitical tensions. France’s pivot towards the Indo-Pacific, and attempts to shape the regional norms and order, is drawn staunchly on China’s growing presence. With 57 years of diplomatic ties, both states share a global strategic partnership with high-level strategic, economic and human exchanges dialogues.⁹ In their 1997 and 2010 Sino-French Statement, both countries established a new framework for bilateral cooperation for the 21st century. They pledged to collaborate in building a multi-polar political and economic order that is prosperous, stable, secure and balanced.¹⁰ They also sought to jointly tackle shared

9. Ministère de l’Europe et des Affaires étrangères, *France and China: Bilateral Relations*, (Paris: Directorate for China, France Diplomacy, March 2019), at <https://www.diplomatie.gouv.fr/en/country-files/china/france-and-china/>; “China, France pledge to strengthen comprehensive strategic partnership”, Embassy of the People’s Republic of China in Libya, November 4, 2010, at <http://ly.china-embassy.org/eng/zggk/t768622.htm>.

10. “China and France aim to build a long-term full partnership”, Ministry of Foreign Affairs of the People’s Republic of China, accessed July 21, 2021, at https://www.fmprc.gov.cn/mfa_eng/ziliao_665539/3602_665543/3604_665547/t18031.shtml

challenges—including terrorism, disarmament, nuclear non-proliferation and multi-trade—and “oppose any attempt to dominate international affairs.”¹¹ However, in recent years, particularly in light of the geopolitical upheavals caused by the pandemic, France-China relations have been more tense.

In 2019, Xi’s visit to Europe saw French President Emmanuel Macron lead a united European front in pushing China to address issues like unfair trade practices, restricted market access for European corporations, slow pace of opening up, lack of transparency and human rights issues, which were identified as obstacles to the France-China relationship (and more broadly, the Europe-China partnership).¹² While China is important to French economic interests—especially in the tourism sector—economic tensions, political frictions and human rights infringements feature more prominently in their bilateral dynamics. This is also evident in several of Macron’s public statements, in which he openly criticises Beijing and portrays a growing willingness to stand up to China. For instance, in a press conference post an EU summit in March 2019, against the background of a heating US-China trade war, Macron concluded that the “time of European naïveté” vis-à-vis China was over,¹³ while calling on the EU to view China first through a geopolitical and strategic lens, rather than prioritising trade ties. Macron has also cautioned European partners regarding China’s financing and investment practices, particularly under President Xi’s flagship Belt and Road Initiative (BRI),¹⁴ while calling for a more coordinated European approach so as to prevent China from continuing to take advantage of the EU’s internal divisions.

11. Ibid.

12. Eleanor Albert, “Are China-France Relations in Trouble?”, *The Diplomat*, May 3, 2019, at <https://thediplomat.com/2019/05/are-china-france-relations-in-trouble/>; Rick Noack and James McAuley, “France’s Macron visits China to talk fairer trade and the future”, *Washington Post*, January 8, 2018, at https://www.washingtonpost.com/news/worldviews/wp/2018/01/08/frances-macron-visits-china-to-talk-fairer-trade-and-the-future/?utm_term=.6e580a1a6d71

13. Michael Peel, Victor Mallet and Miles Johnson, “Macron hails ‘end of Europe naïveté’ towards China”, *Financial Times*, March 22, 2019, at <https://www.ft.com/content/ec9671ae-4cbb-11e9-bbc9-6917dce3dc62>

14. John Irish, “Macron warns of Chinese risk to African sovereignty”, *Reuters*, March 12, 2019, at <https://www.reuters.com/article/us-djibouti-france-idUSKBN1QS2QP>

The COVID-19 pandemic only added further strain to Paris-Beijing ties. China's aggressiveness was evident as European states battled the pandemic, especially with regards to its wolf warrior diplomatic tactics which saw Beijing attempt to frame itself as a 'global saviour' while abrasively criticising and promoting 'fake news'.¹⁵ In a tone reminiscent of Russian-style information manipulation, France has borne witness to derisive and snide tweets by the Chinese Embassy (with a staggering 8700 posts since the page's opening).¹⁶ In fact, France was forced to express official "disapproval" of "public stances" by Chinese representatives.¹⁷ More recently, in a sign of escalating diplomatic tensions, Chinese social media insults directed at a French academic who criticised China prompted Paris to issue a strong warning that it was not a "doormat" and would not tolerate "threats and intimidation."¹⁸ Such instances have not only raised political frictions, but also worsened the French public's perception of China. Essentially, France's changing dynamics with Beijing as well as its physical presence in what is quickly becoming a region central to global geopolitical balance has made France particularly cognisant of the importance of the Indo-Pacific axis.

The Central Tenets of Paris' Indo-Pacific Strategy

Macron's more hawkish position on China has been accompanied by a bolder foreign policy—and its pivot to the Indo-Pacific is predicated on this strategy. Paris' Indo-Pacific strategy, driven by a vision for a "stable,

15. A buzzword, 'fake news' is often confused with the several types of misinformation, disinformation and hoaxes. Here, 'fake news' is used as a comprehensive term, defined as fabricated information intentionally designed to mislead or manipulate.

16. Etienne Soula, "France Gets a Taste of Beijing's 'Wolf Warrior' Diplomacy", Alliance for Securing Democracy, GMF, April 21, 2020, at <https://securingdemocracy.gmfus.org/france-gets-a-taste-of-beijings-wolf-warrior-diplomacy/>

17. Ministère de l'Europe et des Affaires étrangères, "Communiqué issued by M. Jean-Yves Le Drian, Minister for Europe and Foreign Affairs", Directorate for China, France Diplomacy, April 14, 2020, at <https://www.diplomatie.gouv.fr/en/country-files/china/news/article/communique-issued-by-m-jean-yves-le-drian-minister-for-europe-and-foreign>.

18. Sébastien Seibt, "Wolf warriors and a 'crazed hyena': French researcher 'not intimidated' after clash with China envoy", *France 24*, March 23, 2021, at <https://www.france24.com/en/europe/20210323-wolf-warriors-and-a-crazed-hyena-french-researcher-not-intimidated-after-clash-with-china-envoy>; Asia Nussbaum and William Horobin, "French Minister Slams China's Threats and Intimidation", *Bloomberg*, March 23, 2021, at <https://www.bloomberg.com/news/articles/2021-03-23/france-s-beaune-slams-china-s-threats-and-intimidation>

While Paris' strategy continues to highlight the need for constructive high-level dialogue with China, it also displays a clear shift in weightage to other partners based on shared values and interests.

law-based, multipolar order," seeks to envision France as an "inclusive and stabilising power."¹⁹

To realise this vision, France identifies five key objectives for its Indo-Pacific defence strategy:²⁰

- To ensure and defend France's sovereignty, territorial integrity, the protection of its nationals and its EEZ.
 - To contribute to the safety of common spaces by promoting military and security cooperation.
 - To preserve access to common areas amidst intensifying strategic competition and unstable military environment.
- To help maintain strategic stability and military balance of power through international action via multilateralism.
 - To anticipate and respond to the security risks posed by climate change.

The strategy is reinforced by four pillars.²¹ *First*, to initiate stronger action in responding to regional challenges, such as maritime security, terrorism and organised crime. *Second*, to strengthen France's strategic partnerships with like-minded regional partners India, Japan, Australia, South Korea, Indonesia and Singapore. While Paris' strategy continues to highlight the need for constructive high-level dialogue with China, it also displays a clear shift in weightage to other partners based on shared values and interests. *Third*, to play a greater role in regional organisations to promote multilateralism. The Association of Southeast Nations (ASEAN) and its derivative bodies, like the ASEAN Defence Ministers' Meeting-Plus (ADMM+), the Indian Ocean Rim Association (IORA), the Pacific Islands Forum (PIF),

19. Ministère de l'Europe et des Affaires étrangères, *The Indo-Pacific region*, n. 1.

20. Ministère de l'Europe et des Affaires étrangères, *La stratégie de la France dans l'Indopacifique*, n. 6, p. 55.

21. Ministère de l'Europe et des Affaires étrangères, "United States - Visit by Jean-Yves Le Drian - speech at the Carnegie Endowment for International Peace," Directorate for the United States, France Diplomacy, July 14, 2021, at <https://www.diplomatie.gouv.fr/en/country-files/united-states/events/article/united-states-visit-by-jean-yves-le-drian-speech-at-the-carnegie-endowment-for>.

and the Pacific Community (SPC) feature prominently under this agenda; issue-specific forums like the Heads of Asian Coast Guard Agencies Meeting (HACGAM), the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP), and the Secretariat of the Pacific Regional Environment Programme (SPREP) are also included in France's focus on the region. While Paris is already a part of these bodies as a full-fledged or dialogue partner (it is a founding member of the SPREP), it aims to deepen its contributions and engage more broadly with these bodies. *Fourth*, through increased participation in regional forums and deepened bilateral frameworks, Paris aims to promote cooperation in commonalities (like climate change, biodiversity, blue economy, healthcare, digital technology, and high-quality infrastructure and connectivity). Within this context, France is committed to advancing engagement with the Indo-Pacific via the EU, particularly through collaboration in sustainable development and stability, under an extension of the EU-Asia Connectivity Strategy.

FRANCE'S PARTNERSHIPS IN THE INDO-PACIFIC

Since 2018, these four tenets of France's Indo-Pacific strategy have been amply visible in its foreign policy decision-making and conduct. In other words, the Indo-Pacific has become an area of priority for Paris; its commitment to the region is visible in the significant and tangible progress that France has made in its strategic engagement with key partners.²²

An India-centred Vision?

France's vision (and geographical definition) for the region dovetails well with that of India, with New Delhi serving as a central pillar in its regional

22. Ministère de l'Europe et des Affaires étrangères, *France's Partnerships in the Indo-Pacific*, (Paris: Ministry for Europe and Foreign Affairs, April 2021), <https://www.diplomatie.gouv.fr/en/photos-publications-and-graphics/publications/article/france-s-partnerships-in-the-indo-pacific-apr-2021>.

outreach. First, both states emphasise the need for a multipolar regional order forged through inclusiveness and continued engagement with China. By comparison, US and Japan's 'free and open Indo-Pacific' (FOIP) strategy relegates inclusiveness to a secondary goal; inclusivity was only accorded equal importance in more recent Quadrilateral Security Dialogue (Quad) statements under Biden. Second, unlike the US, Japan and Australia, for whom the Indo-Pacific comes as an extension of the Pacific, France accords equal weightage to the Indian Ocean. Bilaterally, both states have come to share a strong, strategic and broad-based partnership spanning sectors like defence (VARUNA naval exercises), defence procurement (see Figure 1),²³ nuclear power,²⁴ space,²⁵ climate change and renewable energy,²⁶ maritime security, infrastructure development,²⁷ blue economy and cooperation within regional and global forums. India is not only a market for French military hardware (most prominently the Rafale jets) but also a low-cost base for manufacturing for export to the rest of the Indo-Pacific.²⁸ Both are co-chairs of the International Solar Alliance (ISA) and support each other in the IORA and Indian Ocean Commission (IOC); France recently agreed to join India's Indo-Pacific Oceans Initiative (IPOI), which seeks to bring together regional powers in an inclusive format focused on common interests.²⁹

23. Shishir Gupta, "On Rafale and deadly Panther choppers, India gets a huge offer from France", *Hindustan Times*, January 10, 2021, at <https://www.hindustantimes.com/india-news/france-offers-to-shift-panther-chopper-assembly-line-to-india-rafale-too-101610181121676.html>

24. PTI, "India-France making 'satisfactory progress' on nuclear power plant pact: Government", at *Economic Times*, January 3, 2019, <https://economictimes.indiatimes.com/industry/energy/power/india-france-making-satisfactory-progress-on-nuclear-power-plant-pact-government/articleshow/67368750.cms?from=mdr>

25. Doug Messier, "France, India Space Cooperation to Focus on Climate and Human Spaceflight", *Parabolic Arc*, October 1, 2020, at <http://www.parabolicarc.com/2020/10/01/france-india-space-cooperation-to-focus-on-climate-and-human-spaceflight/>.

26. Saurabh Chaturvedi, "France's Total agrees to acquire 37.4% of India's Adani Gas", *Market Watch*, October 14, 2019, at <https://www.marketwatch.com/story/frances-total-agrees-to-acquire-374-of-indias-adani-gas-2019-10-14>.

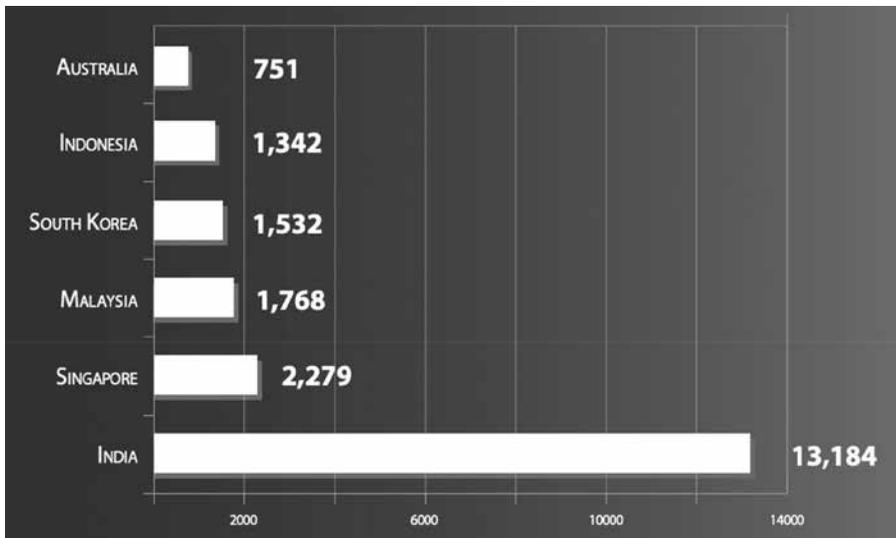
27. PTI, "India, France sign two agreements to boost cooperation in Railway", *Financial Express*, March 11, 2018, at <https://www.financialexpress.com/infrastructure/railways/india-france-sign-two-agreements-to-boost-cooperation-in-railway/1094458/>

28. Salvatore Babones, "Why France Has a Much Better India Strategy Than America", *Foreign Policy*, February 1, 2021, at <https://foreignpolicy.com/2021/02/01/france-india-better-strategy-than-america/>

29. PTI, "India, France explore ways to strengthen cooperation in Indo-Pacific", *Business Standard*, April 13, 2021, at https://www.business-standard.com/article/economy-policy/india-france-explore-ways-to-strengthen-cooperation-in-indo-pacific-121041301175_1.html

France also backs India’s candidacy for a permanent UNSC seat,³⁰ and both the countries coordinated their strategies as they acted as successive UNSC Presidents in July and August 2021.³¹

Figure 1: Main Partners of France in the Asia-Pacific as Regards to Armaments in millions of euros (2008-2017)



Source: *French Ministry for the Armed Forces*

Based on such synergy, France has sought to build its alliances in the region around India. In 2020, both launched a trilateral with Australia to form a Paris-Delhi-Canberra axis with three areas identified for joint action: maritime security, protecting marine resources and environment (through joint projects under the ISA), and enhanced cooperation under multilateral forums (including IORA, IOC and the G20 ahead of India’s presidency in 2023).³² Although currently limited, this “outcome-oriented” grouping has

30. Express News Service, “France backs India candidature for permanent UNSC seat: Florence Parly”, *Indian Express*, September 11, 2020, at <https://indianexpress.com/article/india/france-backs-india-candidature-for-permanent-uns-council-7383349/>.

31. Emmanuel Lenain, “France and India’s successive presidencies are a force for good in UN Security Council”, *Indian Express*, July 1, 2021, at <https://indianexpress.com/article/opinion/columns/france-and-indias-successive-presidencies-are-a-force-for-good-in-un-security-council-7383349/>.

32. Ministère de l’Europe et des Affaires étrangères, *France’s Partnerships in the Indo-Pacific*, n. 22.

Franco-Japanese special strategic partnership has found increased convergence under Paris' pivot to the Indo-Pacific...

In June 2019, they established a roadmap for an Indo-Pacific partnership covering four areas: maritime security, climate change, quality infrastructure and healthcare.

extensive potential for practical cooperation,³³ such as in exploring a 'China+One' strategy for supply chain resilience, defence manufacturing and technologies, intelligence-sharing, infrastructure-building, military exercises and politico-diplomatic ventures.³⁴

Similarly, the Franco-Japanese special strategic partnership³⁵ has found increased convergence under Paris' pivot to the Indo-Pacific, which Tokyo championed under former President Shinzo Abe. In June 2019, they established a roadmap for an Indo-Pacific partnership covering four areas: maritime security, climate change, quality infrastructure and healthcare.³⁶ As part of this elevated relationship, both states have

already initiated joint military exercises and joint development projects, including those in Southeast Asia.³⁷ In January 2021, France held a joint workshop with India and Japan on maritime security and digital connectivity;³⁸ this marked the first step in Paris' effort to gradually

33. Ministry of External Affairs, "1st Senior Officials' India-France-Australia Trilateral Dialogue," (press release, n.d., Ministry of External Affairs Media Centre, September 9, 2020), at <https://www.mea.gov.in/press-releases.htm?dtl/32950/1st+senior+officials+indiafranceaustralia+trilateral+dialogue>

34. Niklas Swanström, Jagannath Panda and Mahima N. Duggal, "Balancing China in the Indo-Pacific: France Joins Hands with India and Australia", Issue Brief, Institute for Security and Development Policy, November 2, 2020, at <https://isdpeu/content/uploads/2020/11/Balancing-China-in-the-Indo-Pacific-IB.pdf>

35. Céline Pajon, "A New Japan-France Strategic Partnership: A View from Paris", *Lettre du Centre Asie*, No. 74, Ifri, November 16, 2018, at https://www.ifri.org/sites/default/files/atoms/files/pajon_japan_france_strategic_partnership_2018.pdf

36. "Japan-France Summit Meeting", Ministry of Foreign Affairs of Japan, June 26, 2019, at https://www.mofa.go.jp/erp/we/fr/page4e_001052.html; Ministry of Foreign Affairs of Japan, *Roadmap on Japan-France Cooperation for Opening New Horizons between Japan and France under an Exceptional Partnership (2019-2023) [Translated]*, (Tokyo: Ministry of Foreign Affairs of Japan, June 2019), at <https://www.mofa.go.jp/files/000492473.pdf>

37. Ministère de l'Europe et des Affaires étrangères, *France's Partnerships in the Indo-Pacific*, n. 22.

38. "Foreign Secretary's Introductory Remarks at the India-France-Japan Workshop on the Indo-Pacific", Ministry of External Affairs, Government of India, January 19, 2021, at <https://mea>.

build an Indo-Pacific bloc to complement the Paris-Delhi-Canberra trilateral. This trilateral would not only strengthen France's presence and engagement in the region, but also contribute to the advancement of India-Japan third country cooperation agenda.

In a few of years, Paris has significantly augmented its diplomatic and political presence in the Indo-Pacific. It has built on its partnerships with Indonesia, Singapore and Vietnam to emerge as a development partner for ASEAN—a vital move to balance

China's own aid outreach to the region. It has expanded the mandate of its development agency, Agence française de développement (AFD), to conduct and participate in both bilateral and regional projects, and work in tandem with regional partners. Critically, France also successfully pushed the EU to adopt conclusions on a strategy for cooperation in the Indo-Pacific (expected to be fully shaped by September 2021) and promote the need for a coherent EU strategy on China.³⁹

In a few of years, Paris has significantly augmented its diplomatic and political presence in the Indo-Pacific. It has built on its partnerships with Indonesia, Singapore and Vietnam to emerge as a development partner for ASEAN.

France's India Connect Post-AUKUS

The already immense importance that New Delhi holds in Paris' regional diplomatic strategy is only likely to be further augmented after the AUKUS debacle. The AUKUS coalition, announced in September 2021, commits to bolster Australia's capabilities by leveraging the expertise of the US and UK through enhanced sharing of defence-related science and information technology and deeper integration of industrial bases

gov.in/Speeches-Statements.htm?dtl/33397/Foreign_Secretarys_Introductory_Remarks_at_the_IndiaFranceJapan_Workshop_on_the_IndoPacific; Indrani Bagchi, "India, France & japan plan Indo-Pacific bloc", *Times of India*, January 20, 2021, at <https://timesofindia.indiatimes.com/india/india-france-japan-plan-indo-pacific-bloc/articleshow/80356858.cms>

39. General Secretariat of the Council, *Council conclusions on an EU Strategy for cooperation in the Indo-Pacific* (Brussels: Council of the European Union, April 2021), at <https://data.consilium.europa.eu/doc/document/ST-7914-2021-INIT/en/pdf>

and supply chains.⁴⁰ The first joint endeavour under AUKUS involves supporting Australia's development of nuclear-powered submarines (for which the US will transfer its nuclear propulsion technology and UK provide technical assistance). This development caused Canberra to suddenly break its 2016 submarine deal worth over €50 billion with France to Paris's intense fury; France saw the move as a "stab in the back" and a serious breach of mutual trust by both Australia and the US.⁴¹ The abrupt, undiplomatic, and even brutal way the cancellation was announced only furthered France's lividity. It grossly undermined France's Indo-Pacific strategy. The Franco-Australian submarine deal was a key factor underpinning French presence and partnerships to show its commitment to the region; its cancellation therefore sent a message that France was being sidelined from Washington's consolidating security architecture. This in turn will make it more difficult for proponents of the Indo-Pacific in France to "defend an alliance of democracies against China to collaborate with a US administration whose methods are abrupt, including with regard to its own camp."⁴²

Importantly for India, the incident weakens the France-Australia security partnership that reinforces the Paris-Delhi-Canberra trilateral.⁴³ Not only did France recall its ambassador to Australia (and the US), but also cancelled its upcoming ministerial meeting of the trilateral. As France rethinks its approach to the region and devises strategies to continue to bolster its presence in the region post AUKUS, the France-

40. "Joint Leaders Statement on AUKUS", Statements and Releases, White House, September 15, 2021, at <https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/15/joint-leaders-statement-on-aucus/>.

41. Jules Darmanin and Zoya Sheftalovich, "'Stab in the back': France slams Australia, US over move to ditch €50B submarine deal", *Politico*, September 16, 2021, at <https://www.politico.eu/article/france-slams-australia-us-e50b-submarine-deal/>.

42. Valerie Niquet and Marianne Peron-Doise, "AUKUS and Submarines: The Fallout for France", *The Diplomat*, September 18, 2021, at <https://thediplomat.com/2021/09/aukus-and-submarines-the-fallout-for-france/>.

43. Pierre Morcos, "How France-Australia Cooperation can Help Stabilize the Indo-Pacific", *War on the Rocks*, April 5, 2021, at <https://warontherocks.com/2021/04/how-franco-australian-cooperation-can-help-stabilize-the-indo-pacific/>.

India partnership can gain added importance. In their most recent interaction in September 2021, Prime Minister Modi and President Macron reemphasised mutual trust and respect in the prized Paris-Delhi partnership and committed to deeper and broader cooperation.⁴⁴ As France increasingly recognises that transatlantic tensions will continue to feature in the coming times, Paris and Delhi can work to strengthen their binary as middle powers; France can help reinforce India's strategic autonomy (such as through increased defence trade, and supporting India's industrial and technological base), while India can be a key pillar of French Indo-Pacific approach.

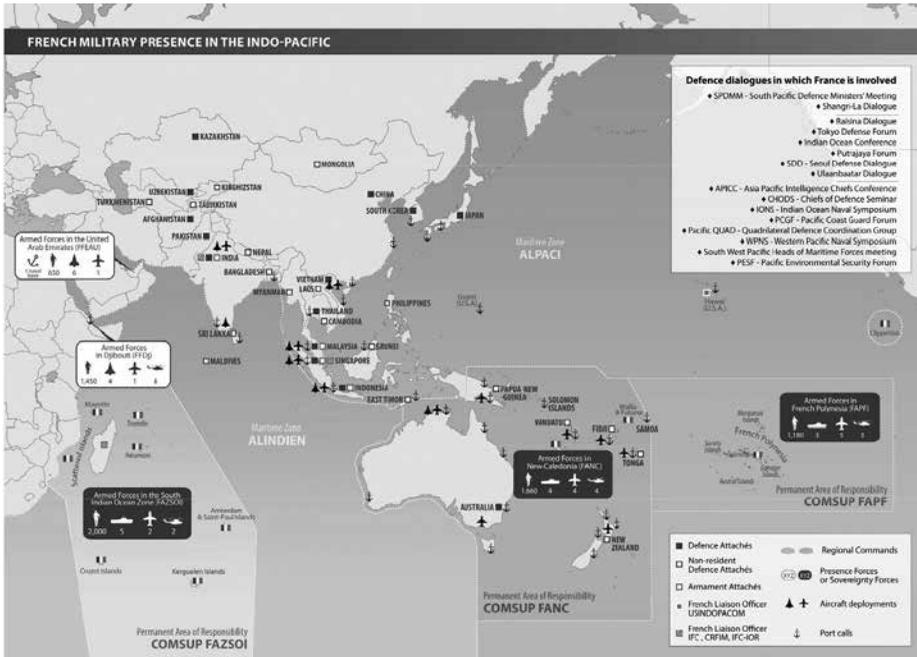
FRANCE: AN INDO-PACIFIC MILITARY POWER?

France's diplomatic endeavours in building alliances in the Indo-Pacific are complemented by its military presence in the region, which is divided into three permanent areas of responsibility: the South Indian Ocean Zone, New Caledonia, and French Polynesia (see Figure 2).⁴⁵ In the Indian Ocean, France has over 4000 personnel divided over bases at the United Arab Emirates, Djibouti, La Réunion and Mayotte Islands. In the Pacific, France has almost 3000 military personnel spanning New Caledonia and French Polynesia. The strength and capacity of the forces in these commands is detailed in Table 2. Over 60 per cent of France's total permanent overseas military commitments are stationed in the region to deal with potential security threats. In addition, Paris maintains defence attachés, armament attachés and liaison officers in 33 regional powers, which are central in shaping interactions with key Indo-Pacific powers; this network has essentially facilitated the creation of a security continuum from the East Africa to Western America.

44. "PM speaks on telephone with President of France", Ministry of External Affairs, Government of India, September 21, 2021, at <https://www.mea.gov.in/press-releases.htm?dtl/34291/PM+speaks+on+telephone+with+President+of+France>.

45. Ministère des Armées, *France and Security in the Indo-Pacific* (Paris: Délégation à l'information et à la communication de la défense, May 2019), 7, at <https://www.defense.gouv.fr/layout/set/print/content/download/532754/9176250/version/3/file/France+and+Security+in+the+Indo-Pacific+-+2019.pdf>.

Figure 2: French Military Presence in the Indo-Pacific (2018)



Source: French Ministry for the Armed Forces

Table 2: French Military Presence in its Indo-Pacific Commands

Military Base	Capacity
North Indian Ocean (United Arab Emirates and Djibouti)	<ul style="list-style-type: none"> • Combat aircraft (6 Rafale in the UAE and 4 Mirage-2000 in Djibouti) • 8 helicopters • 1 tactical transport aircraft
South of the Indian Ocean (La Réunion and Mayotte islands)	<ul style="list-style-type: none"> • 2 surveillance frigates equipped with 1 helicopter each • 1 supply and support vessel • 2 patrol vessels (including 1 polar patrol vessel) • 2 tactical aircraft
Pacific Ocean (New Caledonia and French Polynesia)	<ul style="list-style-type: none"> • 2 surveillance frigates equipped with 1 helicopter each • 2 multi-dimensional ships • 3 patrol vessels • 2 multi-mission ships • 5 maritime surveillance aircraft • 4 tactical transport aircraft • 5 helicopters

Source: Compiled by the author based on data from the French Ministry for the Armed Forces

In studying French military capabilities, it is also important to recognise that France's commitment to security in the region is multi-dimensional. France's 2017 Defence and National Security Strategic Review painted an alarming picture of how major upheaval in the region now posed a direct threat to France and Europe, and military power on the international stage was crucial to achieving French ambitions.⁴⁶ This was reinforced in the 2021 update to this Strategic Review, which took into account the disruptions caused by the COVID-19 pandemic and US-China competition.⁴⁷ The 2021 update to France's Indo-Pacific strategy further contextualised these in the region.⁴⁸ Power assertiveness, return of strategic great power competition, deteriorating rule of law and multilateralism, maritime conflicts, incremental use of hybrid strategies through new technologies, terrorism, proliferation, as well as unconventional security challenges like climate change are all identified as threats requiring urgent attention. This change in the strategic, politico-legal and technological regional environment has emphasised the urgency of modernisation—as laid out in France's Military Planning Law of 2018—to build a “coherent, agile and innovative armed forces model.”⁴⁹

Such extensive recognition of threats that have a direct consequence on France's national security has caused Paris to step up its military activities in the region. In part, this focus is driven by a need to match a persistent trend amongst Indo-Pacific powers to invest heavily in large and modern militaries; the region is home to seven of the world's 10 highest defence budgets, making it prone to a tougher operational environment and undermining of regional and global balance of power. Apart from humanitarian and disaster relief (HADR) and anti-trafficking

46. Strategic Review Committee, *Defence and National Security Strategic Review* (Paris: Délégation à l'information et à la communication de la défense, October 2017), at <https://www.defense.gouv.fr/content/download/520198/8733095/file/DEFENCE%20AND%20NATIONAL%20SECURITY%20STRATEGIC%20REVIEW%202017.pdf>.

47. Ministère des Armées, *Strategic Update 2021* (Paris: Délégation à l'information et à la communication de la défense, February 5, 2021), at <https://cd-geneve.delegfrance.org/Defence-and-National-Security-Strategic-Review-1890>.

48. Ministère de l'Europe et des Affaires étrangères, *La stratégie de la France dans l'Indopacifique*, n. 6

49. Ministère des Armées, *Strategic Update 2021*, 8.

missions, these bases are also central to France's surveillance activities in the region, protecting its EEZ and participating joint military exercises (see Table 3).

Table 3: French Bilateral and Regional Military Exercises in the Indo-Pacific

Countries/Region	Joint Military Exercises
India	<p>Varuna (Naval), Garuda (Air Power), Shakti (Army)</p> <ul style="list-style-type: none"> • Annual bilateral exercises <p>Desert Knight (Air Power)</p> <ul style="list-style-type: none"> • First edition held in January 2021, jointly organised as part of France's SKYROS deployment • Both participated with their Rafale jets (among others)
Australia	<p>Pitch Black (Air Power), Kakadu (Naval)</p> <ul style="list-style-type: none"> • Biennial simulated warfare exercise with multilateral participation from Indo-Pacific powers <p>Australian Army Skill at Arms Meet (Army)</p> <ul style="list-style-type: none"> • A competition for individuals and armed units between Australia and foreign armies invited to participate, to allow an assessment of capabilities <p>Koolendong (Army)</p> <ul style="list-style-type: none"> • US-Australia led exercise with French participation since 2016
South Korea	<p>Key Resolve</p> <ul style="list-style-type: none"> • Annual multilateral exercise led by US-South Korea, involving several hundred thousand soldiers and civilians • Complex exercise comprising smaller air, land and sea exercises <p>Ulchi Freedom Guardian</p> <ul style="list-style-type: none"> • World's largest computer-based simulation exercise held annually

Thailand	<p>Cobra Gold (Army)</p> <ul style="list-style-type: none"> • Annual multinational exercise organised by US and Thailand, with French participation (alongside Mongolia, Nepal, New Zealand, Fiji and Philippines) <p>Pirab Jabiru</p> <ul style="list-style-type: none"> • Biennial exercise co-organised by Thailand and Australia, with over 100 participants from 20 countries • Peace-keeping exercise involving militaries, police forces, government and non-governmental organisations
Singapore	Coores, Marixs
Indonesia	<p>Komodo (Navy)</p> <ul style="list-style-type: none"> • Biannual multilateral exercise focused on HADR
Mongolia	<p>Khaan Quest (Armed forces)</p> <ul style="list-style-type: none"> • Annual multinational exercise co-organised by Mongolia and the US focused on UN peacekeeping
Bay of Bengal	<p>La Pérouse (Naval)</p> <ul style="list-style-type: none"> • Led by France, includes India, Japan, Australia and the US alongside France, first edition held in April 2021
United Arab Emirates (UAE)	<p>Desert Flag-VI (Air Power)</p> <ul style="list-style-type: none"> • Involves UAE, US, Saudi Arabia, Bahrain and France • Observer forces: Jordan, Greece, Qatar, Egypt, South Korea
Indian Ocean	<p>Papangue (Armed forces)</p> <ul style="list-style-type: none"> • Multinational exercise organised by France in Reunion to enhance interoperability in evacuating nationals • Involves deploying land, sea and air assets
Pacific Ocean	<p>Marara, Equateur, Croix du Sud</p> <ul style="list-style-type: none"> • Organised by France via its French Polynesian and New Caledonian Armed Forces and focused on HADR

Source: Compiled by the Author

France's Military Deployments to the Indo-Pacific

Notably, according to a recent French government update, France's permanent military capabilities in the Indo-Pacific remain unchanged

since the implementation of France's Indo-Pacific strategy in 2018 (see Figure 3 for updated military presence).⁵⁰ However, this permanent security system is regularly reinforced by deployments of naval vessels and aircraft from mainland France as “proof of capability to deploy far and for long periods.”⁵¹ In 2019, France deployed a Carrier Strike Group (CSG) led by nuclear-powered aircraft carrier Charles de Gaulle for Mission Clemenceau, which not only joined Operation Inherent Resolve against Daesh, but also performed naval-air manoeuvres with Egypt, India, Australia, US, Japan, Indonesia, Malaysia and Singapore.⁵²

Figure 3: French Military Presence in the Indo-Pacific (2021)



Source: French Ministry for Europe and Foreign Affairs

50. Ministère de l'Europe et des Affaires étrangères, *La stratégie de la France dans l'Indopacifique*, n. 6, pp. 25-26.

51. Ken Moriyasu, “French nuclear sub prowls South China Sea”, *Nikkei Asia*, February 10, 2021, at <https://asia.nikkei.com/Politics/International-relations/Indo-Pacific/French-nuclear-sub-prowls-South-China-Sea>.

52. Xavier Vavasseur, “French Navy CSG Ends Indo-Pacific Mission”, *Naval News*, July 8, 2019, at <https://www.navalnews.com/naval-news/2019/07/french-navy-csg-ends-indo-pacific-mission/>.

Following this, the Marianne mission saw, for the first time in the Western Pacific, the deployment of the nuclear attack submarine L'Emeraude, to conduct a patrol of the highly contentious South China Sea waters.⁵³ It aimed to not only affirm freedom of navigation and rule of international maritime law—the United Nations Convention on the Law of the Sea (UNCLOS)—but also demonstrate France's ability to deploy strategic resources 15,000 km away and over long durations (8 months), despite the difficulties imposed by the health crisis.⁵⁴

Importantly, France has focused extensively on augmenting its Air Force and Space presence in the region, such as through its contribution to the missions of the forces of sovereignty, through its participation in exercise *Pitch Black* 2018 (Australia), *Pegasus* 2018 missions (South-East Asia) and *Skyros* 2021 (Indian Ocean). France and India also held joint air exercise *Desert Knight-21* (in addition to their on-going *Garuda* series) in January 2021, deploying fighter jets (including Rafale), transport and tanker aircraft; the mega exercise came as the Indian Air Force remains in a state of high operational readiness in light of border tensions with China.⁵⁵ In the maritime domain, in April 2021, both states conducted the 19th edition of their annual naval exercise, *Varuna*, with "high tempo-naval operations at sea, including advanced air defense and anti-submarines exercises, intense fixed and rotary wing flying operations including cross deck helicopter landings, tactical manoeuvres, surface and anti-air weapon firings, underway replenishment and other maritime security operations."⁵⁶ They came as a part of the long-

53. Sebastian Seibt, "France wades into the South China Sea with a nuclear attack submarine", *France 24*, February 12, 2021, at <https://www.france24.com/en/france/20210212-france-wades-into-the-south-china-sea-with-a-nuclear-attack-submarine>.

54. Ministère de l'Europe et des Affaires étrangères, *La stratégie de la France dans l'Indopacifique*, n. 6, p. 24.

55. PTI, "Indian, French air forces to conduct 5-day joint military drill near Jodhpur from January 20", *Times of India*, January 18, 2021, at <https://timesofindia.indiatimes.com/india/indian-french-air-forces-to-conduct-5-day-joint-military-drill-near-jodhpur-from-january-20/articleshow/80332123.cms>.

56. Ministry of Defence, "Exercise Varuna - 2021" (press release, Release ID: 1713839, Press Information Bureau, April 24, 2021), at <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1713839>; Also see Rajeshwari Pillai Rajagopalan, "India-France Naval Exercise: Growing Strategic Synergy", *Diplomat*, May 13, 2021, at <https://thediplomat.com/2021/05/india-france-naval-exercise-growing-strategic-synergy/>.

term deployment (February to June 2021) of the French CSG for *Mission Clemenceau 21* in the Mediterranean, Persian Gulf and Indian Ocean.⁵⁷ The India-France military logistics agreement of 2018 provides further synergy between the two countries, widening their respective strategic outreach and enhancing interoperability.

India is far from the only focus for French military activity in the region. Paris has also led the *La Pérouse* exercises in the Bay of Bengal in April with the Quad member states since 2019, with India joining its 2021 edition.⁵⁸ In the Pacific, it organises the Southern Cross in New Caledonia and also participates in fishery policing and rescue operations post-natural disasters, via its armed forces based in New Caledonia and Ploynesia, under the FRANZ agreement.⁵⁹ Notably, France, Japan, Australia and the US initiated their first-ever large-scale joint exercises in southwest Japan and the East China Sea.⁶⁰ The drill took place against the backdrop of China's rising maritime assertiveness vis-à-vis the disputed Senkaku islands and Beijing's Taiwan reunification agenda, to bolster cooperation between like-minded powers.

Such deployments offer France an avenue for greater cooperation with critical partners such as India, Japan, Australia and the US. This expanded defence in the Indo-Pacific theatre (with allies India, Japan and Australia), first instituted in 2019, is a strong symbol of France's commitment to strengthen its presence and partnerships and acts as a bridge linking the region to Europe. Further, they demonstrate a gradually building convergence between France and the Quad, opening the possibility of a 'Quad+France' framework. This is further complemented by French involvement in regional defence dialogues—like the ADMM+, South Pacific Defence Ministers' Meeting

57. Ministère des Armées, *Press Kit—Clemenceau 21 Mission* (Paris: Ministère des Armées, February 18, 2021), at https://www.defense.gouv.fr/english/content/download/606899/10193070/Press%20Kit_Clemenceau21_ENG.pdf.

58. Milind Kulshreshtha, "French Naval Exercise La Perouse: India Joins to Make it Full QUAD", *Financial Express*, April 3, 2021, at <https://www.financialexpress.com/defence/french-naval-exercise-la-perouse-india-joins-to-make-it-full-quad/2226137/>.

59. Ministère de l'Europe et des Affaires étrangères, *La stratégie de la France dans l'Indopacifique*, n. 6, pp. 55-56.

60. "Japan embarks on joint military manoeuvres with US, France, Australia", *Nikkei Asia*, May 11, 2021, at <https://asia.nikkei.com/Politics/International-relations/Japan-embarks-on-joint-military-maneuvers-with-US-France-Australia>.

(SPDMM), Shangri-La Dialogue, Raisina Dialogue, Tokyo Defense Forum, Indian Ocean Conference, Putrajaya Forum, Seoul Defense Dialogue (SDD), Ulaanbaatar Dialogue, Asia Pacific Intelligence Chiefs Conference (APICC), Chiefs of Defence Seminar (CHODS), Pacific Coast Guard Forum (PCGF), Quadrilateral Defence Coordination Group (Pacific QUAD), Western Pacific Naval Symposium (WPNS), South West Pacific Heads of Maritime Forces Meeting, Pacific Environmental Security Forum (PESF), and the Indian Ocean Naval Symposium (IONS).

Simultaneously, it should be noted that France's military commitment to the Indo-Pacific is driven, at least in part, by commercial factors as well. India features as a major market for French military equipment. France's sale of 36 4.5 generation nuclear-capable Rafale fighters, six Scorpene-class submarines, light utility helicopters and missile systems to India;⁶¹ 12 conventional attack submarines and Australia;⁶² and upgrades to French equipment (six Lafayette frigates and 60 Mirage 2000 fighter jets) sold to Taipei in 1991⁶³ only demonstrate its commitment to the long-term security of the region.

THE ROAD AHEAD: CHALLENGES AND OPPORTUNITIES

France's human, territorial, political and military presence in the region has facilitated the formation of trust-based, close and long-term partnerships with like-minded states. In many ways, France's acute focus on regional partnerships has helped frame France as a resident Indo-Pacific power, thereby legitimising its position and role in the region. However, to fully realise its potential in the region, Paris must actively pursue new avenues for deepening engagement and constantly evolve its strategy to tackle persisting challenges to French engagement.

61. Rahul Bedi, "Rafale Delivery Underlines France's 'Below Radar' Role as Key Source of Weapons for India", *The Wire*, July 30, 2020, at <https://thewire.in/security/rafale-delivery-underlines-frances-below-radar-role-as-key-source-of-weapons-for-india>.

62. Nigel Pittaway, "Australian defence leaders defend submarine buy with France's Naval Group", *Defense News*, January 17, 2020, at <https://www.defensenews.com/2020/01/17/australian-defense-leaders-defend-submarine-buy-with-frances-naval-group/>.

63. Yang Chung-hsin, "French arms sales could tip the scales", *Taipei Times*, June 1, 2020, at <https://www.taipetimes.com/News/editorials/archives/2020/06/01/2003737389>.

A Balancing Act

Paris's key task going ahead is striking a strategic balance between the US and China, whose primary fields of competition overlap in the Indo-Pacific. Already characterised as an intense rivalry in the economic and technological domains, Paris recognises the real threat of the competition extending to the military domain amidst an uncontrolled escalation.⁶⁴ Moving forward, Paris must navigate these tensions to prevent a crisis while balancing its ties with US and China. Although the 'Indo-Pacific' remained absent from recent US-France interactions,⁶⁵ both have several overlapping security interests in the region giving them increased convergence. Accordingly, the Indo-Pacific will be, as the French Minister for Europe and Foreign Affairs stated, "at the heart of a renewed and rebalanced transatlantic partnership" that is slowly taking shape under Biden.⁶⁶ Nevertheless, despite this increasing convergence with the US, a bipolar Cold War-like scenario of "highest possible" conflict, where France is forced to align with either the US or China, is not in Paris' interest.⁶⁷

Simultaneously, Paris must find ways to constrain behaviour of regional players who threaten to undermine stability or disintegrate the international order. China is at once a partner, competitor and strategic rival for Paris (and the EU);⁶⁸ how Paris balances these overlapping dimensions will dictate the success of Paris' regional objectives. Therefore, engagement with Beijing

64. Ministère de l'Europe et des Affaires étrangères, *La stratégie de la France dans l'Indopacifique*, n. 6.

65. White House, "President Biden's Meeting with President Macron", US Embassy & Consulates in France, June 12, 2021, at <https://fr.usembassy.gov/president-bidens-meeting-with-president-macron/>; Office of the Spokesperson, "The United States and France: Allies, Partners, and Friends", US Embassy & Consulates in France, June 24, 2021, at <https://fr.usembassy.gov/the-united-states-and-france-allies-partners-and-friends/>.

66. Ministère de l'Europe et des Affaires étrangères, "United States—Visit by Jean-Yves Le Drian—speech at the Carnegie Endowment for International Peace".

67. Rym Momtaz, "Macron: EU shouldn't gang up on China with US", *Politico*, February 4, 2021, at <https://www.politico.eu/article/macron-eu-shouldnt-gang-up-on-china-with-u-s/>; "France won't align with US or China on Indo-Pacific", *Times of India*, June 11, 2021, at <https://timesofindia.indiatimes.com/world/europe/france-wont-align-with-us-or-china-on-indo-pacific/articleshow/83420182.cms>.

68. Ministère de l'Europe et des Affaires étrangères, "United States - Visit by Jean-Yves Le Drian", n. 66.

must be balanced by a strong stance on promoting universal values (such as against Chinese digital authoritarianism), while also regulating US-China trade, technology and security competition.

France will need to navigate these waters delicately and act as a balancing and stabilising regional power; here, strategic partnerships with other middle power states—India, Japan and Australia—as well as ASEAN will be crucial. In concert with these actors, France must lead the way in shaping the transatlantic pivot towards the region such that the approach is defined not by confrontation but promotion of an inclusive region underpinned by a rules-based order. This will ensure the continuation of multilateralism’s strengthening and the promotion of Europe’s strategic autonomy. Now that France has successfully framed its regional presence as a local actor, it must conceive ways to become a regional leader in order to shape tomorrow’s equilibrium today.

Overcoming Colonial History

France has contended that through electing delegates to the French National Assembly and Senate, it has established itself as a local democratic actor rather than an external colonial power. However, while the Réunion and Mayonette islands (départements) are inalienable French territories, New Caledonia, French Polynesia, Wallis and Futuna Islands are categorised as French overseas collectives with broad autonomy.⁶⁹

Although France’s territories and military presence give it resident power status, its quest for legitimacy in the region is predicated on its colonial legacy. France’s history of conducting nuclear tests in these territories (1966-1996) remains a source of intense resentment in French Polynesia, whose residents tend to view them through a colonial or racist lens.⁷⁰ In 2018, New Caledonia held a referendum on independence from France, which saw

69. See David Scott, “France’s “Indo-Pacific strategy: regional power projection”, *Journal of Military and Strategic Studies*, vol. 19, no. 4, 2019, pp. 76-103, at <https://dscottcom.files.wordpress.com/2019/08/france-indo-pacific-1.pdf>.

70. “France denies covering-up nuclear tests near French Polynesia in Pacific”, *France 24*, March 7, 2021, at <https://www.france24.com/en/asia-pacific/20210703-france-denies-covering-up-nuclear-tests-near-french-polynesia-in-pacific>.

France's regional engagement efforts—particularly its bid to join IORA—have seen strong opposition from regional actors, including South Africa, Madagascar, Comoros, and (until recently) Australia, over its nuclear colonial past.

a narrow victory in favour of staying. In this context, France's regional engagement efforts—particularly its bid to join IORA—have seen strong opposition from regional actors, including South Africa, Madagascar, Comoros, and (until recently) Australia, over its nuclear colonial past.⁷¹ Therefore, while French strategic presence in the region is crucial, the political situation in South Pacific is complex with continued growth of pro-independence parties and movements. More notably, the local governments of these territories are seeking increased economic and investment ties with China,⁷² and could potentially complicate the narrative that they could act as bulwarks to Chinese expansionism.⁷³ Therefore, France's capabilities in the region are contingent on the "evolution of its territories on the statutory level and their will and capacity to be relays for regional action in Paris";⁷⁴ France must address these issues head-on and urgently to maintain its regional position.

A Quad Connect

Under such considerations, France's existing independent military capabilities, while adequate for undertaking sovereignty missions and joint exercises, face certain limitations; this only accentuates the importance of its partnerships and joint activities, and development of air and naval

71. Indrani Bagchi, "France's colonial link hits bid to join Indian ocean group", *Economic Times*, January 29, 2019, at <https://economictimes.indiatimes.com/news/defence/frances-colonial-link-hits-bid-to-join-indian-ocean-group/articleshow/67735530.cms>.

72. For instance, see David Wroe, "China casts its net deep into the Pacific with \$2b fish farm", *Sydney Morning Herald*, May 18, 2018, at <https://www.smh.com.au/politics/federal/china-casts-its-net-deep-into-the-pacific-with-2b-fish-farm-20180518-p4zg69.html>.

73. Nic Maclellan, "Momentum for independence from France in the Pacific shouldn't be underestimated", at *The Strategist*, July 15, 2019, <https://www.aspistrategist.org.au/momentum-for-independence-from-france-in-the-pacific-shouldnt-be-underestimated/>.

74. Nicolas Regaud, *France's Indo-Pacific strategy and its overseas territories in the Indian and Pacific oceans* (Australia: Australian Strategic Policy Institute Limited, 2021), p. 4, at <https://www.aspi.org.au/report/frances-indo-pacific-strategy-and-its-overseas-territories-indian-and-pacific-oceans>.

capacities. A closer connect with the Quad grouping as a whole can be crucial to augment French pre-positioned capabilities in the region. The France-led *La Pérouse* exercise already saw it working with the Quad states on tactical manoeuvres for surface warfare, anti-air warfare and air defence.

However, there remains immense room for issue-based cooperation; for instance, Paris could be an important partner in the Quad's vaccine initiative to support Australia's mandate of 'last-mile' delivery of vaccines to remote littoral states. Furthermore, in its capacity as a link between Europe and the Indo-Pacific, France could mobilise European support for COVID-19 response and recovery in the region. Europe (alongside India) is a major producer of vaccines and a key part of the global COVAX program, and could support vaccine production efforts in the region to expand manufacturing capacities of regional states. In addition, France could also be a value-added partner in the Quad's climate change and emerging technologies initiatives. Paris' Indo-Pacific strategy has evolved uniquely in that it distinctively frames climate change as a foremost national security challenge, making it a natural partner for the Quad. In emerging tech too, as US-China great power competition intensifies, France's addition could help project a more inclusive space; critically, India, Japan and Australia can collaborate with France to frame rules for the domain to prevent competition from transcending into conflict.

Similarly, considering France's role as a trade power in the region, it can collaborate with regional economic, trade and investment-driven initiatives such as the Supply Chain Resilience Initiative (SCRI) and the Blue Dot Network (BDN) that are led by Quad states. Risk diversification in order to create open and resilient supply chains has emerged as a priority theme in France during the pandemic, with a staggering 73 per cent of organisations looking to change their

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supply chain strategies to adapt to the shifting environment.⁷⁵ It can therefore draw considerable benefit from being a partial or full dialogue partner in the India-Japan-Australia-led SCRI, which aims to build alternate global supply chains governed by democratic values and resilient to future disruptive events. Moreover, working with the US-Japan-Australia-led BDN could help France further bolster its regional developmental aid efforts while balancing growing Chinese influence. The BDN essentially aims to act as a certification authority to encourage quality infrastructure via high transparency and sustainability standards. With the resources that Paris brings, it could push to transform the still-nascent agency into a broader, multi-stakeholder 'marketplace' venture that can promote democratic values while enhancing the quality and quantity of infrastructure and connectivity investments.⁷⁶ Importantly, this could help balance the China's BRI, which is a source of concern for France as well as the Quad states.

The German Question

Even as the Indo-Pacific region gains prominence in European outlook, it is evident that the two powers leading this initiative—France and Germany—do not have entirely compatible visions for the region. Both states continue to have obvious differences in their approaches to and priorities within the region, and share notably dissimilar dynamics with China. For one, Germany remains significantly dependent on the Chinese economy, and is therefore much more eager to continue engaging with Beijing. Therefore, while France perceives itself as a strategic local actor, Germany's stance draws primarily on its economic interests in the region; this includes its stake as a major trading nation dependent on open sea lanes and a stable environment conducive to economic growth. On the other hand, France

75. Roshan Gya, Cyndi Lago, Michael Becker, et al., *Fast Forward: Rethinking supply chain resilience for a post-COVID-19 world* (Singapore: Capgemini Research Institute), 5, at https://www.capgemini.com/wp-content/uploads/2020/11/Fast-forward_Report.pdf

76. Jerre V. Hansbrough, "From the Blue Dot Network to the Blue Dot Marketplace: A Way to Cooperate in Strategic Competition", in Alexander L. Vuving (ed.) *Hindsight, Insight, Foresight: Thinking about Security in the Indo-Pacific* (Honolulu: Daniel K. Inouye Asia-Pacific Center for Security Studies, 2020), at <https://apcss.org/wp-content/uploads/2020/09/11-Hansborough-25thA.pdf>.

has displayed a more comprehensive view encompassing the defence and security domains (which includes climate change). Moving forward, France will face a challenge in shaping the EU's Indo-Pacific engagement such that it is favourable and contributes to realising France's vision.

CONCLUSION

Therefore, since the implementation of its Indo-Pacific strategy, France has made several strides in regional engagement. It has all but succeeded in portraying itself as a regional actor with a critical role to play as a link to Europe. Not only has Paris greatly emphasised its bilateral partnerships and engaged increasingly in mini-lateral groupings, but it has also reinforced focus on multilateral institutions in the region. Moreover, it has enhanced its military activities, particularly in terms of joint exercises, with the aim to demonstrating and strengthening its commitment to the region. Nevertheless, several challenges face France as it enters into the next phase of its Indo-Pacific engagement, which will, in all likelihood, be influenced considerably by the emerging European framework. Navigating a rapidly intensifying US-China rivalry, overcoming persisting historical resentments within the region, shaping Europe's Indo-Pacific approach and initiating deeper avenues for cooperation are key challenges that France will need to contend with in the short- to medium-term future. France's response to these challenges and opportunities will determine whether it achieves its ambition of establishing itself as a stabilising power protecting freedom and the rules-based order.