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# LAND TO SEAS

## The Deployment of China's Nuclear Forces

M. S. Prathibha

MANOHAR PARRIKAR INSTITUTE FOR
DEFENCE STUDIES AND ANALYSES
मनोहर पर्रिकर रक्षा अध्ययन एवं विश्लेषण संस्थान

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# *PREFACE*

China has deployed its nuclear forces to show any adversary that its nuclear deterrence is credible, and that any potential military attack under the threat of nuclear superiority is futile. China is modernising its nuclear forces to keep pace with the above-mentioned objectives even as it is apprehensive that its adversary is advancing on nuclear technology, strategy and tactics that can put the survivability of its nuclear forces at risk, and reduce the credibility of its nuclear deterrence.

Therefore, the deployment of its nuclear forces has to account for the type of missiles forces to determine the type of missions. The predominance of land-based missiles in China's Rocket Forces shows a preference for using its natural terrain advantages for an effective deterrence and compensate for the slow deployment of a growing sea-based deterrence. The types of mission that the Rocket Forces has to perform depends on the type of missile system that China prioritizes for its nuclear deterrence- a predominantly land-based missile system. Here, the predominant role is to survive a pre-emptive attack so that the deterrence can be stable.

Therefore, a credible deterrence policy rests on the type of deployment and their targeting plans. As a result, the strategic planning becomes about the kind of deployment and their targeting that gives China most credible and effective deterrence. China would achieve stability as long as it is able to dissuade a pre-emptive attack on its nuclear forces. So far China's preference for land-based nuclear deterrence helped it to achieve credible second strike capability, but the withdrawal of the US from the Anti-Ballistic Missile (ABM) treaty and associated space-based technologies mean that their strategies on deployment as well as the modernisation of its forces while insisting on a limited nuclear arsenal would become critical. Because any disruption to its limited nuclear arsenal in the form of further nuclear modernisation and reduced arms control norms of the adversary is de-stabilising and requires requisite change in their deployment and targeting strategy.

This has led China to increase the pace of the modernisation of its nuclear forces, change the patterns of its deterrence to reflect a robust posture, and finally, to adopt a strategy of deployment to counter the immediate challenge to its second-strike capability. It aligns with the way they have conceptualised their nuclear forces - that is for second-strike after it is subjected to a first strike. However, the question arises the way China is going to change the composition and trajectory of its nuclear forces as it sees itself responding to the changes in the US nuclear policy that is aimed at the perceived sophistication of growing Chinese nuclear and missile capability.

Such changes, in part due to modernisation of the nuclear forces as well as in response to the adversaries' strategies, has made it challenging for the Chinese leadership to abide by strict political conditions that moderate their nuclear policy, such as primacy of economic development, and the development of limited nuclear arsenal. Despite compulsions from some of their strategic thinkers, the assessment they had made after studying the strategic force development of the erstwhile Soviet Union is that despite their numerically superior nuclear arms against the US, the Soviet Union was not been able to mount a modern, active, and militarily responsive nuclear deployment like the US. They were unable to threaten the US effectively and, as a result, engaged in an arms race that eventually led to the collapse of the Soviet Union. Moreover, initially, the choice to use ballistic missiles for their deterrence meant that it can put American bombers at risk and in turn protect its ballistic missiles from pre-emptive attack by putting them in silos. In addition, the development of Submarine Launched Ballistic Missile (SLBMs) was supposed to give credibility to its second-strike capability.

However, the post-ABM nuclear environment meant that missile defence capabilities would increase the need for Multiple Independently Targeted Re-entry Vehicle (MIRV) capabilities and therefore push states to improve the ability to advertise their deterrence.

Therefore, the upgradation from the PLA Second Artillery Corp to PLA Rocket Forces shows a compromise between bringing visibility to its nuclear posture, and reduce the temptation to engage in a nuclear arms race by seeking parity. The Rocket Forces are supposed to diversify its deployment of the land nuclear forces (that focuses on survivability) to the active, regular, effective deployment of its nuclear forces that

not just survive a first strike but penetrate missile defence, engage in diversified deployment both within their domains (land/air/sea) but also outside it (joint domains). If applied with joint command and control, it would give the Chinese leadership a number of response options when under a nuclear threat, and more control to deter the US from escalating dominance during conflict. The patterns of nuclear deployment require China to actively test its capabilities, to assess whether its nuclear missiles can penetrate and reach the adversary after a first strike, to see whether its deployments are at low-risk to accidents, are safe from unauthorized use or theft, have a safe and secure command and control systems during multiple nuclear deployments in land and seas, and stress-test the resilience of communication systems while being under a nuclear attack.

The Chinese leadership may believe that nuclear weapons are for political use, not to be engaged in nuclear war-fighting. However, the need to portray an effective deterrence against the adversary's nuclear threat makes it crucial for them to adopt a robust posture. The changes in the deployment underway, thus, also indicate that China has began to put faith in its nuclear forces to be unveiled as well as usher in active deployment against a growing threat in its neighbourhood.

As such, the study of the sources of China's nuclear deployment is imperative as the debates in China are growing about the trajectory of its deployment. The Chinese are facing different sets of concerns regarding its nuclear deployment, especially after changes in the US nuclear posture. The topic is, therefore, timely as there is need to analyse the debates within China, and the effect on its strategy and doctrine. It is also significant to find out the direction of the Chinese nuclear trajectory as power competition between US and China is intensifying. How does it want to keep up with US nuclear policy without appearing to be weak? How can it convince others that its nuclear deterrence is useful against the changes — such as the deployment of MRBM — that the US is undertaking in its nuclear policy?

While there is a consistent approach to the deployment of the nuclear forces for the purpose of deterrence in a predominantly defensive manner, and the shrouding of its strategy to create uncertainty in the minds of the adversary, there is also an opposite push for letting the adversary know what the Chinese would like them to know. This makes

for friction between what they are willing (nuclear capability) to signal, and the efficiency of that deterrence.

This research work is a way to analyse and explore the way in which the Chinese have deployed their nuclear forces, their motivations, the challenges that they are facing, and the principles and strategies behind such a rationale. It is also necessary to study the next step in Chinese thinking and strategy concerning their nuclear forces for the purpose of deterrence in changing circumstances, especially considering the political goals that the leadership has set for 2049.

Moreover, China also has to decide on how to deploy its nuclear forces, the efficient kind of composition it would like to deploy given the changes in the nuclear environment, solve the questions surrounding the command and control of its sea-borne forces, and the way in which it wants to emulate, whether the US or Soviet Union, or a hybrid strategy, in terms of deployment. This is especially significant as the Chinese military reforms in 2015 have made tremendous changes to its overall force structure. The reforms have shown that the Chinese military is far more interested in emulating US military and its institutions rather than the Russian military doctrine. While there might be some influences that would remain in the Chinese military strategy, nevertheless, it is evident that the reforms are geared towards making the Chinese military as professional as the US military, especially in areas of command and control, training, use of information technology and artificial intelligence, and military responsiveness. Obviously, this has been modified to suit the Chinese conditions, and it would be relevant to see to what extent the deployment of its nuclear forces is following conventional methods, and to what extent this deployment being is modified to suit Chinese conditions.

The purpose of the study is to ascertain whether the changes in Chinese nuclear deployment represent a departure from its defensive outlook, and to comprehend to the extent it can maintain a defensive outlook, given the changing circumstances surrounding its nuclear environment. The strategies and tactics that the Chinese leadership are debating and implementing is going to influence the trajectory of deployment patterns, and would answer some the questions resolving offensive capability, such as MIRV to offset the US threat and, at the same time, its resolve to keep the cost of its policy to a minimum.

If the Chinese leadership is beginning to feel that the US is provoking China on the nuclear front, what would be the ways in which China would counter the US? Increase its capabilities in sea-based and air-based nuclear forces? The purpose of the study is to shed light on these discussions, and elucidate on the Chinese behaviour on the current and future strategies to help determine the prospects for a robust posture for Chinese nuclear weapons. This is especially relevant, given that the US has fundamentally introduced a new element in its posture, such as the deployment of more survivable, low-yield strategic weapons. While this may have been against the changes in Russian nuclear development, no doubt it has had a great effect on Chinese nuclear deterrence, and its concept of a nuclear threat.

There are great many developments in the Chinese nuclear forces: the deployment of more efficient ICBMs, which increase the survival of their nuclear forces; mobile platforms, and off-road capability, which can disperse under a nuclear threat; breakthroughs in sea-based ballistic missiles, and the overall improvement in their command and control; and other factors. Many experts are already concluding that the Chinese are looking towards a launch-on-warning posture, while an alternative explanation might be to provide more response time for the mobile missiles to survive by giving it appropriate warning time through early-warning capabilities. Therefore, it is necessary to hold these claims as well as the corresponding debates and compulsions that the Chinese are facing when deploying their nuclear forces to scrutiny.

This study attempts to answer this by analysing the deployment of China's nuclear forces. While there could be changes in the intentions of a particular country based on a certain existential situation under nuclear conditions, the capabilities and the systemic structures imposed on those capabilities would be difficult to change. The Chinese leadership is keen on establishing a system of response and coordination in their deployment of nuclear forces, and to utilise them during conflict. By researching the patterns of deployment, one is able to discern the principles behind them.

Obviously, the opaque nature of the Chinese nuclear development and the low availability of data regarding deployment patterns, restrict scholarship. When assessing issues such as the ability of the Chinese government to stay in command when under a nuclear threat or a

nuclear attack would be extremely difficult to fathom. It would be equally challenging to understand the way the leadership gathers, analyses, and synthesizes information about the nuclear threat, and then processes it through the decision-making system. The responsibility of the government to execute orders on the nuclear campaigns are not well-known.

Therefore, this study relies on a number of sources to collect data among Chinese sources. Moreover, there is always a problem of verifying the sources, as the information itself could be part of its disinformation campaign to the outside world. Therefore, notwithstanding the discretion of this author to use a number of methods of verification, certain methods could be suspect. The conclusions could thus be debated. However, these issues cannot be used as a rationale for not enquiring into the topic of nuclear deployment in China. No doubt, studying the deployment of China's nuclear forces still be marked by a certain opaqueness; but it does offer a view of the challenges that the Chinese are facing in order to follow their nuclear policy and strategy.

By studying the deployment of China's nuclear forces, this study investigates China's strategic forces, their combat readiness, the ability of their command systems to give warning of an attack, and the constraints on their deterrence that are going to play out in the immediate future. One of the significant ways in which the Chinese would pursue their goals in the new scenarios — such as the Indo-Pacific strategies, or contested spaces in its neighbourhood — will affect the deployment of its nuclear forces. The nuclear strategy and policy also affect deployment patterns; and, studying these deployment patterns allows one to pin down the exact nature of the strategy, and avoid speculation.

The nature of the Chinese nuclear development has continued to arouse debates and speculation in the strategically competitive atmosphere between the US and China. These hinge mainly on economy and technology. Given that China has entrusted the PLA to become a strong army, and the PLA Rocket Force to become a modern rocket army, it is imperative to study this area, given that the technological trends are going to increasingly affect the field of nuclear forces. The ability of the PLA Rocket Force to mount operations as a crisis intensifies would depend on the kind and extent of deployment patterns and capabilities.

Moreover, given the integration of conventional and nuclear missiles within the same organisation, the crisis stability is much important in the case of China. In fact, the deployment patterns that indicate a more expansive deployment from the land forces to the sea-based forces would either increase or decrease crisis stability.

In addition, the growing capabilities of the Chinese armed forces, both in anti-satellite capabilities and space technology, would have a profound impact on the strategies and deployment of the nuclear forces, not to mention the development of Artificial Intelligence. Already, there are efforts to constrain the Chinese nuclear forces through arms control initiatives. Obviously, the Chinese leadership would not agree to any norms that might limit its development without an assurance for mutual deterrence. Therefore, the continued development and deployment of the nuclear forces are going to be continuous and rapid. In this regard, this study attempts to contribute to the debates about Chinese nuclear forces.

*Chapter 1*

# China's Nuclear Forces: An Introduction

China has been continuously testing, developing and deploying its nuclear forces so that the Rocket Forces can perform its deterrence missions. The modernisation of its nuclear forces is to make sure that China is continuously enhancing its second-strike capability to counter the US nuclear superiority. The missile tests in the past decade confirm these efforts as it indicates the direction towards developing a credible and effective retaliatory strike capability. In addition, one of the ways was to increase the visibility of its deterrence by upgrading the military organisation that controls the nuclear weapons, the Second Artillery - initially a military branch. In the post-2015 reforms, the Second Artillery, which was an obscure name was changed into Rocket Forces, reflecting its true purpose. The Rocket Forces deploys different types of nuclear missiles for strategic deterrence, including conventional missiles.

The purpose of deterrence is to portray that its nuclear forces would be able to hold the adversary's cities, economic centres, and military assets at risk in case of a nuclear first strike. Moreover, China wants to assure that its second-strike capability is both survivable and dependable against an adversary, especially when the adversary might pursue a more complex defence against that second-strike. Though deterrence is not stable, the Chinese leadership believes that the instability comes from the US reluctance to disavow first strike option. Therefore, the choice before China is not only to make its nuclear deterrence credible by improving its capabilities and reducing its vulnerabilities in an offence-defence based nuclear environment but also posture its nuclear deterrence in a visible manner so as to dissuade the adversary from escalating and compelling them into a compromise into peace on the adversary's terms.

In other words, the Chinese posture has changed as it began to lay emphasis on the effective and coordinated deployment of nuclear forces from the land to the seas and opting out of substantial expansion of nuclear arsenal. Here, substantial would mean that its deterrence posture would move far beyond its policy to maintain a limited arsenal and engage in arms race with the US. There are many different ways of interpreting the robustness of the Chinese nuclear posture. The American perspective defines of robustness either being more than minimal deterrence (launch-on-warning) posture to achieving parity with the US. For instance, the nuclear modernisation of China in their view has already crossed 500 warheads and eventually would put its arsenal to the size comparable to the US in the near future.[1] There are others who believe that nuclear arsenal has increased according to the increasing number of silos but do not believe that China seeks to achieve parity.[2] Nevertheless, the US does consider the Chinese nuclear forces to play a more central role in China's military strategy.[3] The study of nuclear forces in this monograph argues that contrary to the binary argument on whether China is increasing its nuclear forces substantially or not, it is instead is attempting to redress the vulnerabilities in its deterrence that has been exposed due to the changing nature of US nuclear posture (post-ABM and post-Intermediate-Range Nuclear Forces (INF)). Even though first use of nuclear weapons are inherently

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1 Annual Report to the Congress, "Military and Security Developments Involving the People's Republic of China, 2023", Department of Defense, October 19, 2023.

2 Lyle Goldstein, "Raising the Minimum: Explaining China's Nuclear Buildup", Defense Priorities, April 5, 2022, at https://www.defensepriorities.org/explainers/raising-the-minimum (Accessed March 22 2023). Hans Kristensen, Eliana Johns and Matt Korda, "STRATCOM Says China Has More ICBM Launchers Than The United States - We Have Questions", *Federation of American Scientists*, October 2, 2023, at https://fas.org/publication/stratcom-says-china-has-more-icbm-launchers-than-the-united-states/ (Accessed October 3, 2023)

3 Robert P. Ashley, "Russia and Chinese Nuclear Modernisation Trends", Remarks at the Hudson Institute, May 29, 2019, at https://www.dia.mil/Articles/Speeches-and-Testimonies/Article/1859890/russian-and-chinese-nuclear-modernization-trends/ (Accessed December 22, 2022)

declaratory, China's statement in the NPT Review Conference in 2023 reiterates its stance on NFU policy and objection to nuclear arms race.[4]

Therefore, though China is driving its nuclear deterrence to be more visible to manage its vulnerability, it still does not correspond to the overall robustness that experts detect in its posture. That leads to the analyses that China is substantially increasing its nuclear arsenal. The evidence, however limited, show that the leadership's push for visibility is a short-term arrangement to posture its deterrence as robust and reduce the perception that its combat readiness required for a successful compellence against the US has not yet fully fructified. In the meantime, China's strategy is to sharpen its strategy of deployment and targeting, which strengthens the credibility of its nuclear deterrence to counter the changes it sees in the US nuclear and military posture. There are two main arguments presented in the succeeding chapters. One, China has attempted to increase the visibility of its deterrence by bringing Rocket Forces into a prominent role in the military strategy, and enhance the way adversaries see its contribution to the deterrence strategy. This strategy was visible when they changed the name from Second Artillery to Rocket Forces and revealed that it would be part of the joint command in their theatres. Secondly, China is adjusting its deployment and targeting strategy, by diversifying its strike options, within its land forces as well as improving its sea-based deterrence. The use of MIRV and expansion of sea-based deterrence would mean that China has to increase its arsenal to a certain extent. The combat readiness required for China to counter the US strategy in the Asia-Pacific with renewed alliance-strengthening strategies, increase in operational readiness of the US nuclear forces and with the possible expansion of medium-range ballistic missile deployment after withdrawing from the INF

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[4] Statement, "Upholding the Authority of the Treaty on the Non-proliferation of Nuclear Weapons, Serving international Security and Development", General Debate of the First Meeting of the Preparatory Committee for the 2026 NPT Review Conference, August 1, 2023, at https://www.fmprc.gov.cn/eng/wjdt_665385/zyjh_665391/202308/t20230801_11120913.html (Accessed August 23, 2023).

treaty is not ready yet. Therefore, China has adjusted its deployment strategy such as focusing more on land-based silos instead of a linear progression, which initially was earlier evident, when it attempted to move towards a sea-based deterrence for second-strike capability and mobile-based land nuclear forces for enhanced combat readiness.

One of the significant ways China would pursue its goals in the new scenarios such as renewed US focus in the contested spaces in its neighbourhood such as South China Sea or broadly in the Asia-Pacific region is to affect the deployment of its nuclear forces. The deployment patterns are derived from the nuclear policy and strategy. However, the nuclear strategy aids the deployment pattern more directly, and would help pin down the exact nature of the strategy used.

No doubt, studying the deployment of China's nuclear forces would result in a certain opaqueness; but it does offer a view of the challenges that the Chinese are facing in order to follow their nuclear policy and strategy.

The main focus of their nuclear forces is to dissuade the adversary of the need to engage in nuclear use, or the threat of nuclear use, by showcasing the set of capabilities and operational readiness of its nuclear forces. In particular, it is to let the adversary believe that actions that could be construed as a nuclear threat should be seen as futile in the face of Chinese deterrence. That is to say, in many countries, deterrence is achieved to preserve the status quo. As the Chinese believe that the current status quo is fundamentally opposed to the security and safety of the Chinese nation, the purpose of deterrence here is to compel the adversary from reacting to any potential Chinese action to change the status quo. Thus, while nuclear deterrence itself is defensive in terms of capabilities and operational readiness, the strategy is offensive. It is to reduce the resistance of the adversary to the actions of the Chinese leadership, and instead to make the adversary ponder on the consequences to the extent that his decision-making system is unable to effectively counter Chinese actions. Alternatively, some argue that the Chinese nuclear modernisation creates anxiety as it calls into question the US ability to limit damage and strengthen the Chinese capability to initiate conflict, and reduce the leverage that the US has over China

over its tolerance for bearing risks in case of a nuclear escalation.[5] On the other hand, persistent US strategy to pursue damage limitation would lead China to engage in limited nuclear escalation to counter the advantage of the growing US capabilities, which can put its nuclear deterrence at risk.[6]

Here, Chinese nuclear deterrence is not used as a threat in terms of acting pre-emptively; it is used as a threat in convincing the adversary that the consequences of engaging in a nuclear threat towards China will increase the risk of uncertainties of conflict, and that it is in the larger interests of the adversary to pursue peace. It is to stop the adversary from imposing any peace norm or dividend on the Chinese leaders in case of a conflict, or even before the conflict starts. China's strategy is about stopping the adversary from using any nuclear weapons, thus preventing an adversary from initiating action.

However, Chinese nuclear policy also wants to prevent the adversary from using nuclear threat, which is to prevent the enemy from resisting the actions of the Chinese leadership. This means that the adversary should also not resist the actions of the Chinese leadership — typically, issue a nuclear threat either by moving its forces closer to the Chinese shore in a threatening manner, or moving forces in the expectation of some Chinese action in a potential scenario, which would mean that the its nuclear deployment has to be highly effective in compellence. If the deterrence fails to achieve its strategy of dissuading the adversary from using nuclear threat, then the nuclear policy is to delay the decision-making of the adversary. Whether China would reach stalemate by engaging in nuclear escalation to stop the adversary from furthering the use of nuclear threat to impose restrictions on the Chinese military actions, remains to be seen.

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5 Caitlin Talmadage, "The US-China Nuclear Relationship: Why Competition is Likely to Intensify", Brooking Institution, September 2019, at https://www.brookings.edu/articles/china-and-nuclear-weapons/ (Accessed 12 December 2022).

6 Caitlin Talmadage (2017), "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in a Coventional War with the United States", *International Security*, 41 (4): 50-92.

As the result, the study investigates the Rocket Force — its organisation, training, command, military theory, and deployment. As China develops its air and sea-based nuclear forces, their deployment and their command will become a significant issue. Therefore, this study also analyses the deployment of air and sea based nuclear forces, and the impact on campaign science. Given that the Rocket Force is increasingly used with other services for joint exercises as also deployed in military exercises in areas of conflict such as the South China Sea, it becomes imperative to understand its role and relevance. For instance, how does the Rocket Force have to develop in order to use the triad of nuclear forces? To what extent would its command and control have to evolve? The study focuses on assessing Chinese strategic interests while deploying the nuclear forces, and its transformation from the land to the seas.

The nature of Rocket Force is to be studied within the context of PLA reform and restructuring, the modernisation of the command structure, theatre commands, joint operational commands, and military regions. As Xi Jinping continues to emphasize the modernising of both the nuclear and conventional aspects of the Rocket Force, a study of the way in which the deployed nuclear forces could be used to achieve China's strategic objectives becomes imperative.

Any scholarship on Chinese nuclear forces has to contend with the unreliability of the information, and the opaqueness of the Chinese statements. The scope of this study is limited as Chinese language sources can be insufficient to arrive at an conclusion. Overall, the study uses a variety of primary and secondary sources to investigate the research questions. The opacity of the nuclear policy of China adds to the confusion and incomplete information is part of the research process.

## DEBATES ON THE CHINESE NUCLEAR FORCES

China's nuclear weapons programme began in a modest fashion, where the scientific and technological community worked under tremendous pressures, especially after the Sino-Soviet split, which saw the withdrawal of Soviet technical advisors. The nuclear weapons programme was given the highest priority, and the threat of US nuclear first-strike made Mao Zedong to use the state's limited resources to pursue nuclear

weapons.[7] During the early years, the goal was to develop nuclear bomb to deter what the Chinese call as "nuclear blackmail", rather than a develop it as a tool to be used part of nuclear warfighting.

Deng Xiaoping's four modernisations and defence restructuring, the developments in the modernisation of the strategic forces created debates about the nature and scope of China's nuclear forces. The need to conceptualise Chinese nuclear strategy and doctrine became imperative. Even though Lewis and Xue had argued earlier that China followed minimum deterrence in contrast to the US and Russia, Alastair Iain Johnston for the first time analysed the changes that were visible in China's nuclear modernisation and suggested that changes in US nuclear policy was driving China towards limited deterrence posture, which involves both counter-force and counter-value targets and can control escalation.[8] Limited deterrence as a concept can still be used to described the changes that are visible in the Chinese nuclear posture. Lin Chong-Pin, have also contributed on the evolution of Chinese nuclear weapons strategy.[9]

Though China continues to display its capabilities — for example, displaying their strategic missiles in a military parade — it also substantially improved its conventional capabilities. This led to a review of the earlier assumptions about the Chinese nuclear posture. Evan Medeiros in his analysis presented China as looking at assured retaliation as its strategy,[10] while Jeffrey Lewis argues that it follows a "minimum means of reprisal" strategy in its nuclear policy.[11] China's entry into the nuclear

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7 John Lewis and Xue Litai, *China Builds the Bomb*, Stanford: Stanford University Press, 1988; and John Lewis and Xue Litai, *China's Strategic Seapower: The Politics of Force Modernization in the Nuclear Age*, Stanford University Press, 1995.

8 Alastair Iain Johnston, 'China's New "Old Thinking": The Concept of Limited Deterrence', *International Security*, 20 (3), 1995/96.

9 Lin Chongpin, *China's Nuclear Weapons Strategy: Tradition Within Evolution*, Lexington Books: Maryland, 1988.

10 Evan Medeiros, 'China's Search for Assured Retaliation: The Evolution of Chinese Nuclear Strategy and Force Structure', *International Security*, 35 (2): 48-87, 2010.

11 Jeffrey Lewis, *The Minimum Means of Reprisal: China's Search for Security in the Nuclear Age*, The MIT Press, 2007.

non-proliferation regimes, and the imposition several export control measures led to exploration of Chinese policy in nuclear disarmament, nuclear non-proliferation, and nuclear energy.[12] Thus, Chinese nuclear policy — in particular the changing nuclear posture and arms control policy, especially after its ascension to the Non-proliferation Treaty (NPT) — was of particular attention. Li Bin however had described the Chinese strategy as counter-coercion, and Yao Yunzhu as deterrence by retaliation.[13]

From the 1990s, the Chinese leadership had introduced the deployment of conventional missiles, development of ballistic missile technologies and doctrinal changes to suit the changing security environment. As China modernised its nucelar forces, some argued that it is moving twoards credible nuclear deterrence.[14] As China's military strategy changed to "local war in information conditions", scholarship on Chinese nuclear forces analysed the transition of the role of the nuclear establishment,[15] and China's nuclear future.[16] As Chinese nuclear forces

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[12] Alistair Iain Johnston, "Learning Versus Adaptation: Explaining Change in Chinese Arms Control Policy in the 1980s and 1990s", *The China Journal*, 1996; Alistair Iain Johnston, "Prospects for Chinese Nuclear Force Modernization: Limited Deterrence Versus Multilateral Arms Control", *The China Quarterly*, 1996; Bates Gill and Evan S. Medeiros (2000), "Foreign and Domestic Influences on China's Arms Control and Nonproliferation Policies", *The China Quarterly*, 161: 66-94.

[13] Li Bin, "Identifying China's Nuclear Strategy" (中国核战略辨析), *World Economics and Politics*, 2006 (9): 16–22.

[14] Michael Chase, "China's Transition to a More Credible Nuclear Deterrent: Implications and Challenges for the United States", *Asia Policy* 16, July 2013; Michael Chase and Evan Medeiros, "China's Evolving Calculus: Modernisation and Doctrinal Debate", and Christopher T. Yeaw, Andrew S. Erickson and Michael S. Chase, "The Future of Chinese Nuclear Policy and Strategy", in Toshi Yoshihara and James Holmes, (eds.), *Strategy in the Second Nuclear Age: Power, Ambition and the Ultimate Weapon*, George Washington Press, 2012.

[15] Evan A. Feigenbaum, *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age*, Stanford University Press, 2003.

[16] Paul J Bolt and Albert S. Willner, *China's Nuclear Future*, Lynne Rienner Publishers, 2005.

have intensified their deployment patterns, more attention is being given to Chinese nuclear forces, and the possible challenge to its own subscribed limitations on its posture, and to the nuclear forces of the US.

The increased build-up is looked upon by scholars to assess crisis stability, and the changes in the nuclear posture of China. First, nuclear threat perceptions are generally considered while seeking an explanation for the increased nuclear arsenal of China. Some may argue that the Chinese nuclear threat perceptions go beyond the deployment of missile defence to the addition of conventional global prompt strike. Recent US interactions with nuclear and near-nuclear states on China's periphery have possibilities of emerging as threat to the Chinese nuclear calculus.[17] Moreover, there are debates about the way China attempts to define strategic stability with the US and the intentions of the US in attempting to negotiate strategic stability with China.[18]

The threat of nuclear weapons during the Korean War acted as a rationale for the nuclear weapons programme. While the initial Soviet assistance were crucial to the Chinese in developing nuclear weapons, but the suspension of the aid in the late 1950s brought its own technological challenges and led the production cycles to become long and protracted. In addition lack of technological and scientific cooperation with other major nuclear powers and the political, social and economic disruption caused by the Cultural Revolution further delayed the technological advancement in the initial years. As a result, China's nuclear deterrence posture was minimum and they lacked a credible second-strike capability.

By the mid-1990s, China adopted a more confident deterrence posture due to advances in the delivery vehicles and nuclear miniaturization

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17 Susan Turner Haynes (2016), "China's Nuclear Threat Perceptions", *Strategic Studies Quarterly*, 10 (2): 25–62

18 George Perkoich, "Engaging China on Strategic Stability and Mutual Vulnerability, October 12, 2022, at https://carnegieendowment.org/2022/10/12/engaging-china-on-strategic-stability-and-mutual-vulnerability-pub-88142 (Accessed 22 March 2023).

technology. The strategic forces underwent modernisation drive to catch up to world military trends and the explosion of precision-guided weapons. The sophistication in conventional warfare for inflicting damage led to the emphasis on conventional missiles for the Second Artillery, and differences in the nuclear posture regarding the tactical and strategic level. Evan Medeiros and Michael Chase, showed a more pragmatic approach among the leadership towards assured retaliation rather than an expansion towards first use, or pre-emptive posture.

The growing sophistication of China's nuclear forces, and the impact of US abandoning the ABM Treaty was seen to be affecting US-China strategic stability. There is growing worry that the modernisation would affect the stability between the US and China as concerns about security dilemma due to the entanglement between nuclear and conventional forces in a potential US-China conflict.[19] Though concerns are there about the expanding missiles, many insist that China follows the strategy of "assured retaliation" rather than parity with the US.[20] Even the recent changes in the Chinese nuclear posture is still about assuring the strategy that retaliation is still possible under its current nuclear policy.[21]

## METHODOLOGY AND LIMITATIONS

The study of the deployment of China's nuclear forces have limitations due to the nature of the subject and lack of transparency about China's nuclear policy. This study looks at the deployment of the land, air, and sea-based nuclear forces to explore the changes that have been brought to the Rocket Force, and its role. What are the factors that drive the modernisation and the deployment of the nuclear forces? This study

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[19] Henrik Stalhane Hiim, M. Taylor Fravel, and Magnus Langset Troan (2023), "The Dynamics of an Entangled Security Dilemma: China's Changing Nuclear Posture", *International Security*, 47 (4): 147-187.

[20] M. Taylor Fravel and Evan S. Medeiros (2010), "China's Search for Assured Retaliation: The Evolution of Chinese Nuclear Strategy and Force Structure", *International Security*, 35 (2): 48-87

[21] Fiona S. Cunningham and M. Taylor Fravel (2015), "Assuring Assured Retaliation: China's Nuclear Posture and US-China Strategic Stability", *International Security*, 40 (2): 7-50.

utilises debates among Chinese scholars, military strategists, and numerous news articles that cover the developments in the Rocket Force, and in Chinese government documents and statements.

The study of Rocket Force deployment poses several methodological problems. The study of nuclear weapons faces challenges regarding the unavailability of empirical evidence from an actual occurrence of nuclear war. The deterrence models based on US-Soviet Union interactions are insufficient to explain Chinese nuclear behaviour. In addition, the paucity of relevant data, and the verifiability of the available data remains one of the foremost impediments in the study of nuclear China.

Scholars are often faced with the task of ascertaining the veracity of the claims in the open source materials. Therefore, analyses depend on articles in Chinese journals and newspapers that have been vehicles of government publication and information. However, these sources may be unreliable; but they provide the best possible access to understanding Chinese nuclear forces. Moreover, the same materials could also be questioned as to the degree to which the analyses reflect the actual problems in the Rocket Force. However, a perusal of the language sources reflects that the objectives and challenges or the capabilities advertised have to be the judgment of the scholar.

While considerable attention has been given to the role of nuclear deterrence and the emergence of theories of deterrence in Chinese behaviour.[22] This study attempts to understand the deterrence behaviour of China through the fundamental principles of deterrence. The application of deterrence theory to nuclear strategy results in paradoxes. Moreover, when analysing the Chinese case, the nuclear deterrence debates that analysed the US-Soviet Union nuclear relationship further limits its applicability to the Chinese nuclear relationship with the USA or other nuclear powers. In addition, the lack of any qualitative and quantitative data severely restricts even this applicability. Naturally,

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[22] Thomas Christensen (2012), "The Meaning of Nuclear Evolution: China's Strategic Modernisation and US-China Security Relations", *Journal of Strategic Studies*, 35 (4), 447–487.

scholars have worked within these limitations. For instance, the aim of most scholars is to understand in what ways Chinese behaviour would enable a nuclear counterattack in a conventional and local war. Alternatively, scholars would like to study whether China would exploit this symbiosis between the conventional and nuclear threshold to deter any US intervention in a potential conflict.[23]

## STRUCTURE OF THE STUDY

The content structure of the study is divided into five chapters. Apart from the introduction, the chapters are structured to emphasise on various divisions among the nuclear forces, such as the land-based, air-based, and sea-based. The fifth chapter deals with the campaign science of the Rocket Force, and its nuclear deterrence posture. The last chapter concludes the essential analyses of the study. The study uses Chinese sources to identify the various administrative and institutional organs to have clarity on the organisational type of the Rocket Force. The missile designation and deployment patterns are covered in the various annexes. The use of Chinese language sources has been done to enable and fill the gap in the literature available about the Rocket Force.

The various administrative and organisational information is given in separate annexes to enable clarity, while the main organisational divisions are addressed within the study. The information is subject to change often, with transfers and reorganisation. While some of the information does not have to view as dynamic, the deployment patterns might change, given the upgradation process. The language sources are used to provide the best possible interpretation to the issue analysed, and might contain data previously unavailable. However, regardless of the authenticity of the sources, such as credible news websites, journals, and military websites, one cannot ignore the aspect of disinformation.

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[23] Caitlin Talmadge (2018), "Beijing's Nuclear Option", *Foreign Affairs*, 97 (6): 44-51.

*Chapter 2*

# NUCLEAR ROLE OF THE PLA ROCKET FORCES

## INTRODUCTION

The Rocket Forces are responsible for handling the nuclear missiles and conduct nuclear campaign. The upgradation in its organisation is designed to adapt the Rocket Forces into the new challenges that are facing the Chinese military. It has specific objectives that was intended to address in securing China's strategic interests. The chapter argues that Rocket Forces were elevated to provide new type of deterrence (effective) to make it flexible and reliable enough that it can form the backbone of strategic deterrence. In addition, elevation is also to demonstrate the visibility of its deterrence posture to make it robust enough to counter perceived changes in the US nuclear policy.

## THE ROCKET FORCE AND ITS ORGANISATION

The People's Liberation Army Rocket Forces (PLARF, 中国人民解放军火箭军), in short, the Rocket Forces, commands both nuclear and conventional missiles. Upgraded as one of the military services of the Central Military Commission (CMC) on December 31, 2015, the Rocket Forces comes under the direct command of the Chairman of the CMC, Xi Jinping. Despite the relevance of conventional military capability in Chinese modernisation plans, the role of the Rocket Forces in Chinese nuclear deterrence remains undiminished.

In fact, in future, if the Rocket Forces hand over conventional tactical missiles to the PLA, it might concentrating solely on strategic deterrence. The continued importance accorded by the leadership for its development and deployment shows that it is fundamental to the leadership' goal — the "dream of a strong army". The elevation was viewed as necessary as the "strong army" is one of the objectives for

the fulfilment of the "Chinese Dream", the political concept of the Communist Party of China (CPC) under Xi Jinping. Moreover, the Chinese leadership believes that the reforms should result in a 'modern rocket army' (现代化火箭军). When the rocket forces was elevated in 2016, the leadership wanted it to realise its mission as the core of strategic deterrence and make its deterrence capabilities a decisive factor in deterring and winning wars.[1]

As a result of the military reforms, Xi Jinping was determined to increase the profile of the Rocket Forces. For instance, Wei Fenghe, previous Commander of the Second Artillery was inducted into China's CMC. Xi also promoted him as a General and later as Defence Minister in 2018. Achieving the position of the State Councillor under Xi's leadership, he resigned from both of his positions in March 2023.

The upgradation to the Rocket Forces was supposed to bring the organisation to its "actual identity" rather than the obscure 'Second Artillery'. The renaming was considered one of the transparency measures introduced in their military posture to improve the credibility of its forces. Even though the force was known as the Second Artillery, it was well-acknowledged within the Chinese strategic community that Zhou Enlai shrouded the name to hide its "real" name — that is, strategic missile forces. The Chinese leadership wanted to upgrade to show its willingness to be transparent and confident in its use of Rocket Forces for diplomacy (force projection), deterrence (backed with capacity to inflict damage), and test its usefulness to be part of joint operations.

The elevation of the Rocket Forces to military service also brought it to the top echelon of the decision-making system, such as former commander becoming the member of the CMC and assuming the defence minister post. The removal of Rocket Forces commander and political commissars, and Wei Fenghe instead reveals that such moves are easier said than done.

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[1] Wang Weidong and others, "火箭军勠力建设世界一流战略军种" (The Rocket Forces Strive to Build a World-Class Strategic Military Service), *PLA Daily,* 18 May 2017, at http://www.81.cn/depb/2017-05/18/content_7608183.htm (Accessed 22 March 2020).

In fact, the appointment of the current commander of the Rocket Forces, Gen Wang Houbin and the political commissar, Xu Xisheng, both from the PLA Navy and PLA Air Force respectively indicates that the purpose of the elevation of the Rocket Forces are facing tough challenges. For instance, to become the world-class strategic military service, one of the special requirements for the Rocket Forces from Xi Jinping are "absolute loyalty, absolute purity and absolute reliability" (绝对忠诚、绝对纯洁、绝对可靠).[2] The central leadership put forth these "three absolutes" (三个绝对) in 2012 with regard to army construction, which placed ideological construction at the forefront to ensure leadership of the Party over the army.[3]

## THE ROCKET FORCE: BACKGROUND

The previously known Second Artillery (解放军第二炮兵部队) was formed on July 1, 1966. It was placed under the direct command of the CMC. It is now widely understood that the decision to embark on the development rockets and missiles was made in 1956, when the "father of rocketry," Qian Xuesen,[4] presented the need for China to

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[2] Wei Bing and Li Bingfeng, "New Type of Missile Power Casts a Long Sword for a Great Power" (新型导弹方阵铸就大国长剑), *PLA Daily*, 8 August 2022, at http://www.mod.gov.cn/gfbw/wzll/hjj/4917537.html (Accessed 22 June 2023).

[3] This was the initial version published in 2012. See, "习近平：确保部队绝对忠诚、绝对纯洁、绝对可靠" (Xi Jinping: Ensure Absolute Loyalty, Absolute Purity and Absolute Reliability of the Troops", *Jiefangjun Huabao*, 21 December 2021, at https://www.chinanews.com.cn/mil/2012/12-21/4429080.shtml (Accessed 2 July 2022). In 2023, the CMC published the updated version of Xi Jinping's thought on the military titled, "Study Outline of Xi Jinping Thought on Strengthening the Military", where "Two Establishments" is discussed in detail. See, Jun Zheng, "Advance Victoriously Under the Guidance of Xi Jinping's Thought on Strengthening the Army" (在习近平强军思想引领下胜利前进), *Quishi*, 1 March 2023, at http://www.qstheory.cn/dukan/qs/2023-03/01/c_1129405841.htm (Accessed 7 June 2023).

[4] Qian Xuesen was the most important personality of Chinese rocket forces, who earlier was part of Caltech, where he founded the Jet Propulsion Laboratory, along with others. He was later put in house arrest for five years on the suspicion of being a communist. Later, he was deported to China.

acquire ballistic missiles[5] in a meeting of the CPC Central Committee. During that time, due to limited resources, many had urged the spending of those resources on fighter aircraft. Qian Xuesen had submitted a report titled, "Document of Suggestions Regarding Establishing Our Country's National Defence Aviation Industry" (建立我国国防航空工业的意见书),[6] where he had argued that the importance of developing ballistic missiles were greater than that of fighter aircraft. In his view, unlike the fighter aircraft, missiles were not manned, were cheaper to produce, and can be easily used to find targets, which would suit China's developing status.[7] The rationale was that since it would take considerable time to develop the other services, missiles would provide valuable deterrence against foreign powers in the meantime. At the same time, its focus was purely scientific research which, in the longer term would help improve Chinese high-technology. When his plan was approved, he was made the Director of the Fifth Academy of the Ministry of National Defence to conduct research and development into ballistic missiles and nuclear weapons.

After the Central Committee meeting of 1956, a decision was made to develop nuclear weapons, satellites, and missiles. China also established the first ground-to-ground missile forces, called the Dongfeng First Branch (东风第一枝), predecessor to the Second Artillery, in 1959. The Xian Artillery School (西安炮兵学校), the successor to the First Artillery School, was changed in 1959 to train technical personnel for the missile forces.[8] It had gone through several changes, and now is

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5 Huang Qingqao, "Where the Name of 'Rocket Army' Did Come From? Qian Xuesen Proposed the Name in 1956 New Year's Day" (火箭军"之名从哪儿来：1956年元旦由钱学森提出), *The Paper*, 2 January 2016, at http://www.thepaper.cn/newsDetail_forward_1415968 (Accessed June 20, 2022).

6 Qian Xuesen (Short Bio), at http://cpc.people.com.cn/daohang/n/2013/0226/c357214-20605263.html (Accessed May 3, 2023).

7 Huang Qingqao, no. 5, ibid.

8 "The Establishment and Development of the Chinese PLA Second Artillery Corps" (中国人民解放军第二炮兵的成立及发展), *Xinhua*, July 24, 2007, at http://news.xinhuanet.com/mil/2007-07/24/content_6423240.htm (Accessed January 3, 2023).

called the PLA Rocket Force University of Engineering (中国人民解放军火箭军工程大学). In addition, China issued the "Outline of the Development Plan of Science and Technology in 1956–1967", which had prioritised science and technology research into rockets, among others.[9] For an effective implementation of these plans, the CPC Central Committee formed the Ministry of Defence Aviation Industry, and appointed Nie Rongzhen as its Head. As missiles were preferred over aircraft, and the urgency of the foray into the development of nuclear weapons meant that focus on developing ballistic missiles became imperative.

The term "Two Bombs and One Satellite" (两弹一星), came to represent the collective effort towards developing nuclear weapons, missiles, and artificial satellites.[10] The nuclear programme was code named Project 596, and the satellite programme as "651". In 1960, China launched its first missile, and later, three medium-range ballistic missiles. In Lop Nur, a DF-2 missile was used for the first time to carry out a nuclear test in 1966. On July 1, 1966, the CMC formed the Second Artillery Corp, and went on to test several missiles and nuclear weapons. After succeeding in testing Intercontinental Ballistic Missiles (ICBMs) in 1971, in 1988, submarine launched ballistic missile (SLBMs) tests were successfully conducted.[11] In 1984, the then Second Artillery had started engaging in combat preparedness duty tasks. After the Gulf War, the substantial sophistication in conventional strikes using precision guided

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9 Full Text Document, *Outline of the Development Plan of Science and Technology in 1956-1967*, (1956-1967年科学技术发展远景规划纲要), at http://www.most.gov.cn/ztzl/gjzcqgy/zcqgylshg/200508/t20050831_24440.htm (Accessed December 3, 2022).

10 Contrary to some Chinese sources, this report clarifies that Two Bombs One Satellite does not mean, Atom, Hydrogen Bomb and Satellite, but Atom Bomb, Ballistic Missile and Satellite. See, Wang Zhigang, "Mao Zedong's Decision to Develop, 'Two Bombs One Satellite'" (毛泽东决策研制 " 两弹一星 "), *Study Times*, October 13, 2011, at http://theory.people.com.cn/GB/15884603.html (Accessed January 4, 2023).

11 Wang Zhigang, Zhang Liwei, and Li Xiaodong, "Mao Zedong and 'Two Bombs One Satellite'" (毛泽东与两弹一星), *Hainan Ribao*, May 27, 2013, at http://dangshi.people.com.cn/n/2013/0527/c85037-21624030.html (Accessed December 23, 2022).

munitions affected major policy changes in the Chinese military. One among them was that the Second Artillery had to modernise its conventional strike capabilities. Furthering nuclear weapons technology led to neutron bomb capability and miniaturisation within the Second Artillery. The success of developing and modernising Chinese nuclear forces has been China's top leadership priority, so much so that even during Cultural Revolution, the leadership protected the programme.[12]

China distinguishes its Rocket Force from that of other countries, such as France and Great Britain, in the absence of their land-based nuclear missiles. It is also different from that of the US which, having land-based strategic missiles, has them under the control of the US Air Force. Further, it identifies differently from Russia, which has a Strategic Rocket Forces. Because of China's inventory of both nuclear and conventional warheads, both strategic and tactical missiles are under one unified service, and thereby, in the Chinese view, named Rocket Force, rather than have the same name as in Russia.[13]

## ROCKET FORCE'S PREDECESSOR: THE SECOND ARTILLERY

During Deng Xiaoping's time, after the death of Lin Biao, the Second Artillery had been affected by the Cultural Revolution and suffered factional politics. Amid the growing sophistication of the US nuclear forces, Deng had attempted to restore normalcy and instructed that the Second Artillery must be politically reliable.[14] Deng Xiaoping's "Army Building in the New Period" (邓小平新时期军队建设思想),

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[12] Lewis and Xue, in *China Builds the Bomb*, catalogues these disturbances and its impact on Chinese nuclear weapons programme.

[13] Zheng Wenhao, "Chinese Second Artillery Corp Has Been Renamed as Rocket Forces: Secrets Behind the Two Words Without 'Strategy'" (中国二炮部队改名火箭军 不加战略二字有何玄机), *Sina Military*, January 1, 2016 at http://mil.news.sina.com.cn/china/2016-01-01/doc-ifxneept3524560.shtml (Acceessed November 14, 2022).

[14] Wang Yongxiao and Tao Shelan, "中南海始终关注中国战略导弹部队建设" (Zhongnanhai has Always Paid Attention to the Construction of China's Strategic Missile Forces), 15 June 2006, at http://news.enorth.com.cn/system/2006/06/15/001331984.shtml (Accessed November 8, 2022).

brought peace and development as the two historic trends of the time, leading China to prioritise economic growth. Importantly, Deng's thought brought to focus the modernisation of Army's equipment by three factors that characterised the modern conditions of war: a) international environment is governed by peace and development; b) making use of the peacetime when major wars will not be fought c) the national economic construction should be priortised.[15]

By the time of Jiang Zemin, the Gulf War and the development in the conventional strike technology (Revolution in Military Affairs, RMA) meant that the earlier Second Artillery concentrated on infusing science and technology to aid the modernisation. Broadly, Jiang Zemin's policy of 'national defence and army building' was to bring the Chinese military to catch up with the 'latest trend in military development (military science and technology)', especially in weapons and equipment.[16] Jiang Zemin's thought stressed 'mechanisation and informationalisation' as the dual construction for a high-tech war, and provides the reason why the General Armament Department was established.

Jiang Zemin's military thought influenced the Second Artillery in a similar fashion like the other services, such as weapons and equipment. His instructions for the Second Artillery was to focus on high-tech defence operations and modern technology, and become a lean and effective strategic nuclear power (精干有效的战略核力量).[17] Hu Jintao,

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[15] Han Hongquan, "邓小平怎样抓军队建设" (How Deng Xiaopoing Grasped Army Building), 5 June 2020, at http://cpc.people.com.cn/n1/2020/0605/c367207-31736727.html (Accessed 2 June 2022). Also See Deng Xiaoping's Thought on Army Building in the New Situation (邓小平新时期军队建设思想), *Qiushi*, 29 July 2012, at http://www.qstheory.cn/special/2012/zddqzx/zdcg/201207/t20120729_172803.htm (Accessed July 3, 2023).

[16] Advancing Jiang Zemin's Thought on Army Building of the People's Liberation Army (解放军在江泽民建军思想下前进), October 20, 2003, at http://military.china.com/zh_cn/important/64/20030820/11526547.html (Accessed February 2, 2023).

[17] Forging Republic's Peace Shield: Documentary on Jiang Zemin's Concern About Second Artillery Construction (锻造共和国和平盾牌 - 江泽民关心二炮建设纪实), March 20, 2002, *Xinhua*, at http://people.com.cn/BIG5/shizheng/16/20020319/690655.html (Accessed March 4, 2023).

continuing with Jiang Zemin's informationalisation, promoted "scientific development" as the guiding theory for the Chinese armed forces, and added "new historic missions" and "diverse military tasks" as the objectives of the leadership.[18] From Jiang Zemin's foray into bringing science and technology to Hu Jintao's scientific development, the Second Artillery added conventional and cruise missiles, improved mechanisation and logistics support, and increased the survivability of its missiles by adding mobility (mobile missiles rather than silos).

The missiles were not only hidden in deep silos but through the building of deep tunnels, and other methods of mobility have the capability to move to a desired location, thus increasing its survivability against a nuclear first strike. Hu Jintao had decided to improve by illustrating a grand idea or theme. The concept of a historic mission, a Marxist/Leninist concept, was brought to merge into the guiding strategy for the PLA. Regardless of the change in leadership, the idea that the Second Artillery as an organisation is a significant player to fulfil the "historic mission" (历史使命) of China is about using the most successful and technologically superior organisation to be part of defence policy as much as to do with finding a role for them in a rapidly evolving modern warfare scenario.

During the decades after the Second Artillery was formed, the leadership concentrated on mechanisation and firepower. By the 2000s, the earlier Second Artillery began to implement information-based combat capabilities in the development of its ballistic missiles, especially integrating nuclear and conventional missiles.[19] The modernisation of the missiles and equipment led the Chinese leadership to realise that the Second Artillery needed scientifically and technically capable personnel to efficiently use the equipment.

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[18] For the origin and evolution of Hu Jintao's New Historic Mission, see James Mulvenon, 'Chairman Hu and PLA's "New Historic Missions"', *China Leadership Monitor*, n. 27, 9 January 2009 at http://media.hoover.org/sites/default/files/documents/CLM27JM.pdf (Accessed April 4, 2023).

[19] Zhang Xuanjie, and others, "Second Artillery Corps: To Be Equipped with Both Nuclear and Conventional, For Precision Strikes", (第二炮兵：核常备兼，可精确打击), *Xinhua Daily Telegraph*, September 24, 2009, Issue 4.

Reflecting this, in 2006, for the first time, there was an effort from the leadership of the then Second Artillery to articulate the objectives of the organisation. Jing Zhiyuan and Peng Xiaofeng, the previous Commander and Political Commissar of the Second Artillery, respectfully wrote an essay on *Qiushi* titled, "Faithfully Fulfilling the Historic Mission of the Strategic Missile Forces".[20] This was the first time the role of Second Artillery was enunciated through the term of a 'historic mission', and written about by the leadership of the Second Artillery.

In the essay, both authors stated that the Second Artillery should obey the strategic intentions of the CPC Central Committee and the CMC in developing a well-off society. Hence, firstly, the historic mission is to help the Party consolidate its ruling status; secondly, the Second Artillery should safeguard national interests, the security, sovereignty, and territorial integrity; and thirdly, the Second Artillery should carry out nuclear counterstrike and conventional missile precision strikes; and fourth, the strategic missile force should incorporate information technology to become an informationalised missile force.[21] According to them, to fulfil the above-mentioned mission, they stated that the Second Artillery had to do the following:

- carry out political tasks of the Party
- maintain the correct direction of the strategic missile forces development and enhance combat effectiveness
- maintain ideological (Party's Marxist thought theory) and moral puritaccelerate preparations for military struggle to protect national interests
- rely on scientific and technological innovation to transform combat capability

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[20] Jing Zhiyuan and Peng Xiaofeng, "Faithfully Fulfilling the Historic Mission of the Strategic Missile Forces – Commemorating the 40th Anniversary of the Formation of the Second Artillery Corps" (忠实履行战略导弹部队的历史使命 - 纪念第二炮兵组建40周年), *Qiushi*, 2006 (12), at http://www.qstheory.cn/zxdk/2006/200612/200907/t20090708_8765.htm (Accessed February 2, 2023).

[21] Ibid.,

- create high-quality military talent (educated military personnel)
- promote military management, equipment and personnel policy and auditing.[22]

The essay was relevant for several reasons. It portrays the evolution of the predecessor of the Rocket Force as it became more modernised with improved weapons and equipment, and focused on shifting to increasing the ability of the forces to "accelerate" military preparedness, compared to Jiang Zemin, who stated that the forces had to prepare for "military struggle". This is because, by the end of Jiang Zemin's time, the Second Artillery had already modernised its modern missile launch positions, the integration of nuclear and conventional missiles, intercontinental ballistic missiles (ICBMs) for counter-strikes, increased conventional strike missile capability, rapid manoeuvrability and precision strike capability, completion of the command automation system, missile automation test system (testing standards), strategic missile training simulation system, entry of college-educated experts into the corps (the Excalibur Talent Project), mobile warfare capabilities, and inclusion of new technologies, such as anti-interference and anti-reconnaissance.[23] Therefore, understandably, during Hu Jintao's time, the Second Artillery was able to underscore its role for the 'historic mission'.

Notably then, in 2009, both Jing and Peng had further propounded the role of Second Artillery to play a significant role for national defence in another essay, titled "Building Strategic Missile Troops with Chinese Characteristics".[24] They argued that the Second Artillery had achieved the following results:

- maintained Party command and correct political direction (Party loyalty)
- transitioned from fixed and single nuclear force to mobile and combined (nuclear/conventional) force

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22 Ibid.,

23 Ibid., No. 17.

24 Jing Zhiyuan and Peng Xiaofeng, "Building Strategic Missile Troops with Chinese Characteristics" (建设中国特色战略导弹部队), *Qiushi*, 2009 (3), at http://www.qstheory.cn/zxdk/2009/200903/200906/t20090609_1656.htm (Accessed May 3, 2023).

- strategic deterrence capability and defensive combat capabilities under conditions of informationalisation
- played a role in military operations other than war such as flood fighting, earthquake relief, etc.,
- increased scientific and technical cadres
- implementation of information security to secure missile weapons, equipment and combat positions.[25]

Therefore, it was not surprising the then Commander and the Political Commissar urged the cadres to,

> accurately grasp the strategic position of the Second Artillery in safeguarding national security and developmental interests, understand changes in the international strategic pattern, build informationalisation of strategic missile forces and security needs of national development strategy as long-term goals, deepen the strategic research of the Second Artillery, develop strategic focus, strategic initiatives, strategic steps of the Second Artillery… strengthen the battlefield system, intensify the training of scientifically qualified personnel, build the requirements of nuclear/conventional missile combat capability necessary for winning informationalised warfare, military training under information conditions.[26]

These changes are important to recognise to understand the recent changes in the Rocket Forces. At least till Hu Jintao's period, there was a consistent but linear progression to the modernisation of the nuclear forces. That the Second Artillery was going to modernise towards sea-based deterrence and mobile forces. However, the trajectory of Rocket Forces indicate that the Chinese leadership has adjusted the patterns of deployment and targeting. In order to portray an effective deterrence, it would rather focus on diversified deployment, robustness of deterrence, and establish a system of response and coordination in their deployment of nuclear forces.

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[25] Ibid.,

[26] Ibid.

## ROCKET FORCE'S NUCLEAR ROLE: OBJECTIVES AND CORE REQUIREMENTS

It is therefore comes as no surprise that Xi Jinping has always given high political support to the Rocket Forces. Now, in Xi Jinping's time, 'historic mission' has been brought into the Rocket Force's vocabulary. The Rocket Force has been, once again, tasked to realise the historic mission and develop a 'modern rocket army' (现代化火箭军). Xi Jinping's statements on historic mission reveal that it is associated with the rejuvenation of the Chinese nation, and the 'two centenary goals.'

In addition to this, the party construction of socialism (socialism with Chinese characteristics) and Marxist theoretical thought also form the objectives of the leadership.[27] For the Rocket Force to realise the historic mission, it had to modernise in areas such as military training, management, institutional innovation, personnel training, supervision against corruption, and especially use the strategic forces to play a strategic role.[28]

In 2016, immediately after the upgradation, tasks were the following:

- grasp and understand the concept of historic mission
- formulate a development strategy for the rocket army
- build a plan for making the rocket army force structure more scientific
- improve combat effectiveness
- improve "actual" military training

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[27] Xi Jinping, "The Historic Mission of the Communist Party of China" (新时代中国共产党的历史使命), *Qiushi*, 30 September 2022, at https://www.gov.cn/xinwen/2022-09/30/content_5715173.htm (Accessed May 3, 2023).

[28] "Keep in Mind the Historic Mission, Enhance Strategic Capability: Strive Hard to Build Strong Modern Rocket Army" (牢记历史使命 提升战略能力 — 努力建设一支强大的现代化火箭军), *People's Daily*, September 27, 2016, at http://politics.people.com.cn/n1/2016/0927/c1024-28742019.html (Accessed March 8, 2023).

- integrate the rocket army within the joint operational command system of the Chinese armed forces
- enforce political discipline and uphold Party's leadership
- improve personnel policy and recruitment.[29]

According to the top officials, Rocket Force was supposed to play a significant role in 'deterring war, creating a favourable strategic environment, and maintaining global strategic balance and stability'.[30] First, it is evident that the role of Rocket Forces have become more expansive than the Second Artillery. If it has to deter war and create a favourable strategic environment, then it would have to engage in active and effective deployment.

Secondly, Xi Jinping after the 2015 military reforms urged the PLA Rocket Forces to build a modern rocket army. With regard to the nuclear responsibility of the Rocket Forces, the goal of a modern rocket army is to first make sure that the organisation reflects the new name rather than tie it to the conservative nature of the earlier Second Artillery. The then commander of the missile forces Wei Fenghe stated that Rocket Fores should "enhance credible and reliable nuclear deterrence and nuclear counter-attack capabilities", and strengthen the "combat effectiveness".[31] They also would have to maintain a moderate state of alert at ordinary time. For instance, according to the requirements set by Xi Jinping, the Rocket Forces had to be ready at any time.[32]

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[29] Ibid.

[30] Defence Ministry's Regular Press Conference on October 27, Ministry of National Defence of the PRC, October 28, 2016, at http://eng.mod.gov.cn/HomePicture/2016-10/28/content_4754434.htm (Accessed January 3, 2023).

[31] Wei Fenghe, "Remember the Precepts, Listen to the Party Command and Strive to Build a Powerful Modern Rocket Army" (牢记训词 听党指挥 努力建设强大的现代化火箭军), *Qiushi*, 3 February 2016, at http://theory.people.com.cn/n1/2016/0203/c83846-28108577.html (Accessed February 10, 2023).

[32] Huo Zhengxuan, "Build a World-Class Strategic Military Service" (打造世界一流战略军种), *People's Daily*, 21 May 2017, at http://military.people.com.cn/n1/2017/0521/c1011-29288994.html (Accessed May 3, 2023).

These point to the effective and diversified deployment of its strategic missiles under different circumstances and an emphasis on timely execution.

Third, when the Rocket Forces were elevated, the leadership wanted it to achieve the objective of "having both nuclear and conventional (dual roles), deterring wars in all-battle spaces (domain-wide deterrence of war)" (核常兼备、全域慑战).[33] These changes were in line with the leadership's goal to prepare the armed forces, including the Rocket Forces for the "new era".

During the 2015 military reforms, the military officials interpreting the leadership's goals believed that the Rocket Forces would focus on strengthen the credibility and reliability of the nuclear deterrence and nuclear counter-attack capabilities according to the strategic requirements of "nuclear conventional integration, deterring wars in all-battle spaces".[34] These were later reflected in the defence white paper titled, China's National Defence in the New Era in 2019.[35] This objective corresponds with the understanding that the Rocket Forces are being equipped to deter first strike, but also nuclear threat and blackmail. In order to achieve these requirements, then the strategic forces would have to enhance its deployment and targeting strategy in a diversified fashion. Under such a strategy, the Rocket Forces would be able to

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[33] *CCTV News*, "Rocket Force's New Type of Missiles Brigades Exposed, Dongfeng Missiles Emerges Organically", (火箭军部队新型导弹旅曝光 东风导弹成建制出现), 3 May 2022, at https://news.cctv.com/2021/05/03/ARTIgmkNAsQaK4PsSbgZAuKX210503.shtml (Accessed 9 January 2023).

[34] Liang Pengfei, "How to Build a Modern Rocket Army Having Both Nuclear-Conventional Integration, All-Area War Deterrence", (核常兼备全域慑战，现代火箭军怎么建?), *PLA Daily*, March 10, 2016, at http://www.xinhuanet.com/mil/2016-03/10/c_128788226.htm (Accessed June 3, 2020).

[35] State Council Information Office of the People's Republic of China, "China's National Defense in the New Era", July 2019, at https://english.www.gov.cn/archive/whitepaper/201907/24/content_WS5d3941ddc6d08408f502283d.html (Accessed 3 February 2023).

carry out effective nuclear deterrence as the strategic forces would ready to conduct nuclear campaign at any given time.

Fourth, the Rocket Forces have to develop a combat system of nuclear missiles that is on 'high-status on duty' (高状态值班)as compared to conventional missiles that are required for combat at any time. Overall, the Rocket Forces might not specifically spell out the nuclear role of the organisation as they might encourage the actual combat use of strategic forces, and the formation of the combat system, which would involve both nuclear and conventional forces.[36] The diversification is about modernising the Rocket Forces to have equipment integration, command informationalisation, operating different models of missiles and different launch methods, and fixed and mobile launch positions. Once the strategic forces on high-status duty, which distinguishes from the conventional missiles that are required to be ready for combat at any given time, an effective deployment strategy would mean that the disperse points and targeting strategy would differ. The strategic missiles would focus on survivability and mobility for surviving first strike whereas the conventional missiles would be forming an offensive strategy.

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[36] Note 1, Ibid.

*Chapter 3*

# DEPLOYMENT AND MODERNISATION AND LAND NUCLEAR FORCES

There are five structural factors that affect deployment: the organisation/structure of the force; weapons and equipment; training levels; combat capability; and integrated and joint operations and command capability. Together, it can get the leadership to plan an effective strategy of deployment and establish a system of response and coordination in their deployment of nuclear forces. If Xi Jinping's goal is to build a strong army that has the capability to 'to fight and win the war' (能打仗、打胜仗),[1] then the Rocket Force deployment has to utilise its land-nuclear forces more efficiently for an effective nuclear counter-strike capability.

## A) ORGANISATION / STRUCTURE

The structure of Rocket Force is divided into the administrative division, the missile classification division, and the organisational division, all which are then placed within the organisation of six missile bases. The then Second Artillery had missile classification such as the i) ground-to-ground strategic missile forces (surface-to-surface missiles — 地对地战略导弹部队); and ii) conventional operational tactical missile forces (常规战役战术导弹部队). The ground-to-ground forces have the combat capabilities of nuclear deterrence, strategic nuclear counter-attack ability, and precision strikes. The missiles are, generally, short-range, medium-range, and intercontinental missiles, along

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[1] According to Chinese sources, this strategy means following the following factors: First, China has not only fight the war, but win the war; secondly, the combat effectiveness of the armed forces should be the primary task of army construction; third, military strategy should be innovated; and fourth, expand and deepen the preparations for military struggle (informationalisation, modernisation, military talent); fifth, military training; and sixth, military management.

with other units such as engineering units, equipment, technical support, and logistical support units. The conventional missile force consists of a conventional tactical missile weapons system. For instance, all the ballistic missiles are under the former, while conventionally armed tactical missiles are under the latter. Thus, when the white papers state that the Rocket Forces have to achieve combat capability, it means to achieve nuclear counterstrike and conventional precision-strike for both these divisions.

Apart from missile classification, the Rocket Force is organised administratively. Earlier, each administrative level resembled the organisational structure of the Headquarters Department of the Second Artillery. The support regiments were administrated with the missile bases, and other support units were administered under the battalion level. Administratively, the earlier Second Artillery was divided into four top-level departments, and others.[2]

They were:

- Second Artillery Headquarters Department (司令部)
- Political Department (政治部)
- Logistics Department (物流部)
- Equipment Department (装备部).

The main organisational structure of the Rocket Force is as follows:

1. Rocket Forces General Staff (火箭军火箭军参谋部)
2. 2PLA Rocket Forces Political Work Department (中国人民解放军火箭军政治工作部)
3. PLA Rocket Forces Logistics Support Department (中国人民解放军火箭军后勤保障部)

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[2] The Rocket Forces might have an organisation that may resemble the broader reorganisation.

4. PLA Rocket Forces Equipment Department (中国人民解放军火箭军装备部)
5. Rocket Forces Discipline Inspection Commission (火箭军纪律检查委员会)

Rocket Party Committee (火箭军党委)

Units that are directly under the Rocket Forces command (Subordinate Units 直属单位) are:

1. PLA Rocket Forces Joint Tactical Training Base (中国人民解放军火箭军合同战术训练基地)
2. PLA Rocket Forces Integrated Training Base (中国人民解放军火箭军综合训练基地)
3. PLA Rocket Forces 308 Engineering Command Department (火箭军308工程指挥部)
4. PLA Rocket Forces Equipment Research Institute (中国人民解放军火箭军装备研究院)
5. PLA Rocket Forces University of Engineering (中国人民解放军火箭军工程大学)[3]
6. PLA Rocket Forces Command College (中国人民解放军火箭军指挥学院)
7. PLA Rocket Forces General Hospital (中国人民解放军火箭军总医院)

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[3] According to the Chinese sources, more than 80 percent of the military commanders at the division-level units of Rocket Forces, more than 90 percent of chief of staffs, and 85 percent of missile brigade commanders are all from the this university. See, Introduction to the Rocket Forces Engineering University (火箭军工程大学简介), 6 December 2022, at http://www.81.cn/jx_208569/10162462.html (Accessed June 3, 2023).

The structure of the Rocket Force is divided administratively by bases (基地). Within bases, there are numerous brigades (旅), and within brigades are battalions (营). Each base has a base commander and a political commissar. The number of missiles per brigade might vary according to the type of brigade, conventional or nuclear.[4]

Rocket Forces combat units are divided into six main missile bases, and numerous other bases.[5] They are:

1. Base 61 (61 基地 - previously 52 - Huangshan, Anhui Province)
2. Base 62 (62 基地 - previously 53 - Kunming, Yunnan Province)
3. Base 63 (63 基地 - previously 55 - Huaihua, Hunan Province)
4. Base 64 (64 基地 - previously 56 - Xinning, Qinghai Province and Lanzhou, Gansu Province)
5. Base 65 (65 基地 - previously 51 - Panyang, Liaoning Province)
6. Base 66 (66 基地 - previously 54- Luoyang, Henan Province)
7. Base 67 (67 基地 - previously 22 - Nuclear stockpile - Baoji, Shaanxi Province)
8. Base 68 (68 基地 - previously 57 Engineering Base- Luoyang, Henan Province)[6]
9. Base 69 (69 基地 - previously 28 技术后勤训练基地及作战训练基地) (Technical Logistics Base and Combat Training Base, Jingyu, Jilin)

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[4] David Logan, *Making Sense of China's Missile Forces*, in Philip Saunders and others (Edts), "Chair Xi Remakes the PLA: Assessing Chinese Military Reforms", National Defense University Press, Washington, 393-435.

[5] For the detailed information, See Table 2 – Missile Base Deployment Chart.

[6] Base 68 is an engineering base, with the deputy-army level located at Luoyang, Henan.

10. Base 25 (25二炮核导弹存储地) (Nuclear Missile Storage and Assembly Base, Guangyuan, Sichuan).[7]

11. Rocket Forces Comprehensive Training Base (火箭军综合训练基地) - Zhangjiakou

12. Rocket Forces Research Institute (Beijing) – (军火箭军研究院)

13. Rocket Forces NCO School (火箭军士官学校) – Qingzhou, Shandong province

14. Golden Wheel Command Department (金轮工程指挥部) – (engineering project involved in missile construction for Saudi Arabia)

Rocket Forces also have other units, which have separate jurisdictions. They are

1. Rocket Forces Engineering Corps(火箭军工程部队)

2. Rocket Forces Logistics Support Troops (火箭军后勤保障部队)

Within the force deployment structure, the previous Second Artillery had several subordinate units (战略导弹部队所属部队) that move together to perform military tasks. They were at times called the "seven brothers" (七兄弟). They are:

- survey soldiers (勘测兵)
- tunnel soldiers (坑道兵)
- equipment inspection soldiers (装检兵)
- convoy soldiers (押运兵)
- measurement soldiers (测量兵)

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[7] Base 68, 69, and 25 have little information available publicly regarding their functions and organisation.

- mount soldiers (安装兵)
- array soldiers (阵管兵).[8]

There are sub-systems (相应保障部 (分) 队组成) within the brigade and battalion units. They were:

- combat support (作战保障)
- equipment and technical support (装备技术保障)
- intelligence (情报)
- reconnaissance (侦察)
- computing (计算)
- meteorology (气象)
- telecommunications (通信)
- chemical (防化)
- camouflage (伪装)

However, these subordinate units or sub-systems are not mentioned in any recent administrative units of the Rocket Force. Therefore, it is possible that these divisions are either non-functional, or re-organised within the missile bases or brigades. However, previously available information suggests that missile bases, brigades, and battalions all have several subordinate units. A launch battalion has launch companies, testing elements, control elements, and refuelling elements.[9] The survey soldiers are at the battalion level, whereas the tunnel soldiers are part of the engineering, at the regiment level. The equipment soldiers are part of the science and technology cadres. In this case, different units mean that a greater level cooperation is needed among different units

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[8] Chinese Strategic Missile Forces 'Seven Brothers' (中国战略导弹部队 "七兄弟"), *Zhongguo Rencai*, 2008 (16), pp.1-5

[9] Note 4, Ibid.

for missile launch training, coordination for joint operations, and training innovations to reduce launch preparation time. Some changes have been implemented to reorient the engineering units to be kept under separate jurisdictions (army-level grade) rather than under the missile base.[10] There are indications two types of support battalions were formed after Rocket Forces came into being, where support units such as communication, automobile, service, equipment maintenance, comprehensive protection has been organised and integrated into "comprehensive support battalion" (综合保障营). On the other hand, surveying, mapping, geography, meteorology, hydrology and chemical defence has been integrated into "combat support battalion" (作战保障营).[11]

However, there might be many engineering units. The technology, repair, equipment inspection, and warehouse units from the missile base level have all been promoted to regiment level from organisation level. As China concentrated its efforts on improving the elements of electronic warfare in the then Second Artillery, they had added an Electronic Countermeasure Squad (电子对抗分队) at the brigade level of the earlier Second Artillery.[12] The Rocket Forces now train for more complex scenarios and reconnaissance and electronic countermeasures are part of it.[13] Earlier in 2010, it was reported that the weather office was upgraded into Meteorological Office (二炮气象中心).[14]

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[10] There are very few reports on the engineering units of the Rocket Force.

[11] Wang Weidong and others, "The Two Cutting-Edge Teams of the Rocket Army Missile Brigade Performed Well", (火箭军导弹旅两支"保障新锐"表现不俗), PLA Daily, 20 December 2018, http://www.81.cn/depb/2018-12/20/content_9383886.htm (Accessed May 8, 2023).

[12] *Xinhua*, "Second Artillery (Unknown) Brigade Electronic Countermeasure Squad Launch Decoy Missiles", (第二炮兵某旅电子对抗分队发射烟幕干挠弹), October 10, 2010, at http://news.xinhuanet.com/photo/2010-10/26/c_12701345.htm. (Accessed December 2, 2022).

[13] CCTV News, "Rocket Forces' Winter Training, the Missile Force Comes With 'Sword of Heaven'" (火箭军的"冬训"！导弹劲旅携"天剑"而来), 9 January 2021, at http://m.news.cctv.com/2021/01/09/ARTIb3VofgAq7o4GNjqaJquX210109.shtml (Accessed March 3, 2022).

[14] There is no specific report about it after the reforms in 2015.

These support units are still functional under the Rocket Forces and are integral part of the fire assault exercises.[15]

The new organisation and structure show that the Rocket Force is changing to accommodate its missions to be more mobile and survivable. Mostly, these changes point to the desire to streamline the structure of the Rocket Force. While some of the main departments have been changed and reorganised, the status of these smaller units is unknown. The Rocket Force deploys missiles through different basing systems, such as mainly underground silos, and road-mobiles. After reorganisation, the Rocket Forces are training for mobility and dispersed deployment. Most importantly, the different units must be integrated so that there is seamless coordination between them.

## B) WEAPONS AND EQUIPMENT

The primary weaponry and equipment of the Rocket Force land nuclear forces are its ballistic missiles. China's nuclear forces are essentially land-based though its sea-based deterrence is improving with the Chinese military conducting continuous patrols of their nuclear submarines armed with possible JL-3 SLBMs. China is consistently strengthening the Rocket Forces' second-strike capability on land, while concentrating on efforts to operationalise its nuclear forces at sea. While China does have strategic bombers, none of them carry tactical nuclear warheads.[16] Therefore, predominantly, China deploys its land-based ballistic missiles for nuclear deterrence and beginning to possibly deploy JL-3 in its Jin-class submarines.

The Chinese land-based ballistic missiles which are equipped with nuclear warheads are DF-21A, DF-31, DF-31A, DF-31B, DF-41, DF-4A, DF-5A, DF-5B, and DF-26. From the beginning of the 1990s,

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[15] Li Yongfei and others, "Hardcore Brigade Commander: Remembering Zhou Yongkun, Brigade Commander of the Rocket Forces Missile Brigade (Unknown)" (硬核旅长——记火箭军某导弹旅旅长周勇坤), *China Youth Daily*, August 9, 2021, at https://people.cctv.com/2021/08/19/ARTIgp0Sgz9VkuIwxUV4jv0C210819.shtml

[16] There are very few reports on China's tactical nuclear weapons.

China inducted DF-21 missiles, which is a two-stage solid propellant medium-range ballistic missile (MRBM) that developed from JL-2. DF-21 was its most successful design, which enabled the designing of other anti-ballistic and anti-satellite technology. DF-21A is the nuclear version of the series, and is a medium-range ballistic missile. The DF-21 was China's first solid-fuelled missile, and has been deployed since 1991, and DF-21A by 1996. It has a range for about 1800 kilo meters compared to the DF-21, which has a range about 1700 kilo meters. The DF-21 and the DF-21A missiles are intermediate range ballistic missiles that have the capability of carrying nuclear warheads.[17]

After 2000, China started to induct DF-31 and DF-31A. DF-31A has improved upon combat accuracy and penetration, manoeuvre capability and survivability and DF-31A are around two brigades, which has the capability for dispersed deployment. The DF-31A faces challenges due to limited mobility in tough terrain and reduced flexibility. It was limited to well-paved roads and has to be n be driven to the launch site, where it can be supported by logistical support units, but it would be subjected detection, whereas now the DF-31AG is highly mobile and is intended to protect against pre-emptive strikes.[18]

China has made progress in testing and deploying newer missiles such as the DF-31AG with upgraded technology. In 2023, Bulletin of

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[17] China also produced DF-21C, the conventional version of DF-21 and DF-21D, the anti-ship missile for naval warfare. China has been devoting its research and development to anti-ship missiles named as DF-21D, a variation of the DF-21 missile. China has been keen on acquiring capabilities that can prove as a deterrent to the presence of naval forces in East and South China Sea. Attention was given in 2004, when a decommissioned American naval tank ship called the L-1169, was sold to Greece and later sunk in an exercise using Penguin anti-ship missile and torpedoes. It was an attempt to assess whether torpedoes or missiles work better against naval ships.

[18] Xia Yang, "The Vertical Screen is Exposed, DF-31AG Launched Without Support on the Plateau Indicating Strong Maneuverability" (起竖画面曝光！东风-31AG导弹亮相高原 无托发射、机动能力强悍), *Dongfang Wang,* 26 March 2021, at https://j.eastday.com/p/161673901277014068 (Accessed April 23, 2022).

Atomic Scientists estimated that China had around 24 DF-31As and unknown number of DF-31AGs.[19]

The addition of ICBMs further bolsters China's nuclear capability. The DF-31A (A represents the nuclear role) was first deployed in 2007, and has around 24 missiles in its inventory and around six launchers. The DF-31A has longer range than the DF-3. China had earlier older liquid-fueled missiles such as the DF-5, which was stored underground and highly vulnerable to first strike. The older missiles took longer launch preparation time. The DF-4 and DF-3, deployed for regional targets, also remained highly vulnerable and nearing retirement. The newer solid-fueled ballistic missiles are supposed replace the older missiles and their mobility and dispersed deployment would have ensured that the Chinese can initiate counter-force or counter-value strike options after a nuclear first strike. The DF-5, and DF-3 missiles are to be replaced with newer missiles. However, the Chinese deployment reflect a diversified pattern. There seems to be simultaneous deployment of DF-31AG and DF-41 in a rapid fashion, in addition to the deployment of dual-role DF-26 and resurgence of upgraded liquid-fueled ballistic missiles such as DF-5B/C, with MIRV capabilities suggesting that China still does not want to fully rely on solid-fueled missiles solely for its strategic deterrence.[20]

The newer missiles such as the DF-41, DF-31AG and the DF-26 prioritises mobility, maneuverability, and equipped with penetration capabilities against the growing missile defence threat. For instance, the launch vehicles are such that it widens the deployment options for China in case of a nuclear threat. The DF-26 provides an interesting case, where it achieved the goal of "having both conventional and nuclear roles" as per the requirements of the Rocket Forces blueprint. The DF-26 is the only new-generation strategic missile that can launch

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[19] Hans M. Kristensen, Matt Korda, Eliana Johns, "Chinese Nuclear Weapons, 2023", *Bulletin of Atomic Scientists*, March 13, 2023, at https://thebulletin.org/premium/2023-03/nuclear-notebook-chinese-nuclear-weapons-2023/ (Accessed June 3, 2023).

[20] M. S. Prathibha (2019), "China's DF-41 Ballistic Missile Deployment and the Impact on its Nuclear Deterrence", *Journal of Defence Studies*, 13 (4): 51-69.

both nuclear and conventional ballistic missiles. The deployment can happen without launch support and due to its strong mobility, it can be deployed across the region and carry out precision strikes.[21]

The DF-41 missile is viewed as a response to the rebalancing of the USA in the Asia Pacific, and the development of missile defence systems. The modernisation of the launch platforms underscores Chinese strategy of ensuring survivability over the size of the nuclear arsenal.

The older missiles were slower to deploy and the nuclear posture remained mostly defensive. But most dramatic changes happened in the last decade when there was expansion of testing and deployment of the newer missiles. The Chinese leadership believe that the nuclear deterrence of China is generally improving as it deploys upgrades its capabilities at all domains.[22]

The deployment of China's ballistic missiles is contingent upon improving the various capabilities that are associated with the missiles themselves. For instance, within the technology of the missiles, China is transforming in areas of global positioning systems (加装全球定位系统), strategic missile miniaturisation (战略导弹小型化), stealth technology 隐形化, solid propellants 装填固体燃料, shortening launch preparation and launch time (缩短发射准备与发射时间), improving missile survivability (提高导弹生存能力)[23], ensuring multiple warhead entry (发展多弹头技术), using booster rockets (发展诱饵助推火箭), decoy warheads (弹头诱饵), and anti-jamming

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[21] *Xinhua*, "DF-26 Nuclear Conventional Missile Formation: A New Strategic Weapon with Both Nuclear and Conventional Weapons" (东风-26核常兼备导弹方队：核常兼备的新型战略利器), 1 October 2019, at http://www.xinhuanet.com/politics/2019-10/01/c_1125063262.htm (Accessed 8 May 2022). Also See, Joshua Pollack, "China's DF-26: A Hot Swappable Missile?", *Arms Control Wonk*, May 17, 2020, at https://www.armscontrolwonk.com/archive/1209405/chinas-df-26-a-hot-swappable-missile/ (Accessed June 3, 2022).

[22] *China Youth Daily,* "Dongfeng Express, Global Attainment" (东风快递 全球速达), 17 December 2020, at http://zqb.cyol.com/html/2020-12/17/nw.D110000zgqnb_20201217_1-08.htm (Accesed 22 May 2023).

[23] CCTV News Note 13, Ibid.

technology (加强干扰与抗干扰能力). Other than missiles, the support systems are being modernised to aid the deployment of the missiles. The missile brigades have improved on satellite support, telecommunications, and computing. The Rocket Force have also added reconnaissance and camouflage to its inventory to make the missiles more survivable. For instance, computer networks are installed to improve simulation training in the brigades. During one of the training programmes, it was reported that command vehicles used computer simulations to test rapid reaction and communication debugging capabilities. The technological level of the sub-ordinate support units was also improved. The trend is such that advanced computers are used among the Rocket Forces branches, especially in advanced systems.[24]

The target is for effective coordination and response to reflect robustness. For instance, one of the ways is to increase the response and coordination of the nuclear emergency response mechanism of the Rocket Forces after a WMD attack. [25]

The deployment of these missiles depends on the Rocket Force's ability to use its ground equipment (missile storage, launch preparation, launch facilities) effectively, as it is an important part of its missile weapons system. For instance, the Transport Erector Launcher (TEL) group has five back-up vehicles, and they are tasked with missile storage and protection, transportation, docking, raising for vertical launch, testing, targeting, launch control, and other operations. The modernisation of the ballistic missiles into solid-fuelled has enhanced their abilities as they now use high-powered electric generator vehicles, launch control vehicles, and automated test vehicles. These developments show that

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[24] *PLA Daily*, "Rocket Force Expert Analyse the Development Trends of Air Defence Missile Systems" (火箭军专家解析防空导弹系统发展趋势), 30 January 2016, at http://www.xinhuanet.com/mil/2016-01/30/c_128686244.htm (Accessed June 3, 2022).

[25] *CCTV News*, "How to Defeat a Bio-Chemical Attack? New Equipment of the Rocket Forces Unveiled" (生化袭击"怎么破"？火箭军的新式装备亮相了), 6 April 2021, at http://m.news.cctv.com/2021/04/06/ARTIzD8K11vfIHyKtUTexIdr210406.shtml (Accessed June 23, 2022).

the deployment of missiles and associated capabilities with regard to launch time and dispersing methods have improved remarkably and will help in its strategy for an effective deploymet and rapid response.

## C) TRAINING LEVELS

When overall Chinese armed forces were reviewed to assess the training standards of the troops, it was found that the testing standards for training were low, and the training did not reflect actual war conditions. In the case of China, often orders in the military training were not carried out. That meant that the training conditions, training tests, and evaluation methods were not an accurate representation of war conditions that China is facing in its strategic environment. This challenge was considered so prevalent that the condition was called "invisible formalism" (隐形的形式主义). Invisible formalism is where training does not reflect actual training, but reflects what the PLA calls "false skills". It means that peace time training does not reflect battlefield conditions, or one does not perform the actual exercise in training; it is only "playacting".

This was a condition recognised across the Chinese armed forces, including in the Rocket Force before the military reforms. For example, a 2014 report explains this phenomenon. During one of the actual combat exercises involving the 14th Group Army (unknown — 某)[26] brigade, an order was given suddenly by the director of the department that the 'enemy helicopters are in the air and are attempting to descend near the rear of the command post to attack or harass', and troops were given instructions to dispose. However, not even one solider was removed from that area; but the staff officer reported that the 'situation of the enemy position has been released'.[27]

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[26] The term "unknown or a certain" signified by the character (某) refers to a department or institute within an organization, which cannot be named in public reports due to national security concerns. Therefore, news releases use this term to denote an unnamed department or particular unit.

[27] Ouyang Zhiming and Ling Tao, "Very Difficult to Closely Practice the Training Exercises from Beginning to End" (真难严实贯穿演训全程), *PLA Daily*, November 20, 2014, at http://www.81.cn/jfjbmap/content/2014-11/20/content_93445.htm (Accessed June 23, 2022).

This type of "empty false skill' was criticised.[28] The report further identified invisible formalism as a 'tumour' that is not easy to find but, nonetheless, could have disastrous consequences.[29] According to the director of one of the political departments in the previously Second Artillery, invisible formalism existed because some commanders do not want to 'lose face' by losing points in front of their superiors, and are willing to reduce training standards rather than score low in the tests.[30] The Rocket Forces now recognise that though many measures have been taken, the challenges are still present at the grassroots. The invisible formalism has become a burden at the grassroots in the Rocket Forces and that it still has not been rectified means that challenges are continuing.[31]

Earlier, on March 20, 2014, Xi Jinping had approved a publication from the CMC titled "Ideas Regarding the Improvement of Military Training Actual Combat Standard" (关于提高军事训练实战化水平的意见), to be implemented across the Chinese military. The publication instructed the Chinese military to develop a deep understanding of the actual training standards, establish combat standards, overcome shortcomings and weak links in the training

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[28] Invisible Formalism is once again distinguished from Visible Formalism. Visible Formalism is described as something that could be removed, and constitutes some of the activities, such as inserting a red flag, reading manuscripts, etc.

[29] No. 27 Ibid.

[30] Guo Xifeng, "Training Cannot Always Be 'Attack the Mountaintop'" (演训也不能总是"攻山头)', *Science and Technology Daily*, June 23, 2015, at http://digitalpaper.stdaily.com/http_www.kjrb.com/kjrb/html/2015-06/23/content_307227.htm?div=-1 (Accessed 22 January 2022).

[31] Hu Pu, "To Alleviate a Burden, One Cannot Reduce Without Changing" (减负，不能光"减"不"变"), *PLA Daily*, 26 December 2022, at http://www.81.cn/jfjbmap/content/2022-12/26/content_330663.htm (Accessed May 7, 2023).

content, bring innovation in training and management, and deepen the military training management programme and joint training system.[32]

In the Rocket Forces, these guidelines have been implemented and all missile units have been to perform to meet the standards of actual combat conditions.[33]

Further, to improve the training system, in 2015, the General Staff Department had introduced a publication titled, "2015 All Military Training Instructions" (二〇一五年全军军事训练指示) to be carried out within the Chinese military. These instructions were aimed at strategic and tactical training, joint training, inter-services training, domestic and foreign joint exercises and training; developing combat training methods (such as cross-base training), battlefield flexibility training; and operational command training (such as joint operational command training), command strategy training to handle uncertain situations; equipment training, and the training monitoring mechanism, and design and teaching system in the colleges.[34]

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[32] President Xi Jinping Ratifies CMC Publication, "Ideas Concerning the Improvement of Military Training to Actual Combat Standard" (经习近平主席批准 中央军委印发《关于提高军事训练实战化水平的意见》), *Xinhua*, March 20, 2014, at http://news.xinhuanet.com/mil/2014-03/20/c_119869379.htm (Accessed May 7, 2023).

[33] *CCTV News*, "Rocket Forces: Actual Combat Training Improves Combat Capabilities Under Complex Conditions" (火箭军：实战化训练提升复杂条件下作战能力), 5 January 2022, at https://news.cctv.com/2021/01/05/ARTIUPvtHHBJcDLWN9xTia0w210105.shtml (Accessed 23 June 2023).

[34] Zhong Xun and Liang Pengfei, "General Staff Department Deploys New Annual All Military Training Tasks" (总参部署新年度全军军事训练任务), *Zhongguojun Wang*, January 18, 2015, at http://jz.chinamil.com.cn/n2014/tp/content_6313233.htm. Also see, Yue Feifei, "General Staff Deployed New Annual Training Tasks, Emphasis Placed on Strengthening Joint Operational Command Training", (总参部署今年全军训练任务着重指出强化作战指挥训练), *Beijing Youth Daily*, January 22, 2015, at http://www.81.cn/2015lzjqkh/2015-01/22/content_6318618.htm (Accessed 23 January 2023).

Further, for the Rocket Forces, information conditions meant that simulation exercises become crucial in military training. The simulation training platforms are helping in carrying out combined missile launch training and other complex missions.[35]

Like the other military services, the Rocket Forces also embraced these instructions for improving training, especially since they were brought into the fold of joint and integrated training and operations with other services. The training were to provide the missile brigades a way to disperse, deploy and engage in deterrence operations.

Therefore, the Rocket Forces focused on achieving breakthroughs in strategic containment capabilities through good use of training platforms and live ammunition launches. [36] The Rocket Force also emphasised on the military strategy to resemble 'actual combat' (实战), especially focusing on network command and control, simulated training, actual combat training, science and technology-based training, construction of simulated, networked and AI based military training methods.[37] Overall, coordinated missile launches became important.

The Rocket Force had comparatively different concerns when compared to the PLA Army. They had highly sophisticated weapons, such as missiles and equipment (software related equipment related to missile launches and automation), which required highly qualified personnel rather than what is required for the army. Thus, the training modules

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[35] Li Yongfei and Duan Kaishang, "Simulation Training of a Missile Brigade of the Rocket Force Achieves Informationalisation Upgrade" (火箭军某导弹旅模拟训练实现信息化升级), *PLA Daily*, 18 March 2021, at http://www.mod.gov.cn/gfbw/wzll/hjj/4881182.html (Accessed March 23, 2022).

[36] Wang Weidong, "Live Up to the Mission, Improve Your Ability To Win In A Down-To-Earth Manner" (不辱使命，扎扎实实把打赢能力搞上去), PLA Daily, 10 March 2019 at http://www.81.cn/jfjbmap/content/2019-03/10/content_228972.htm (Accessed April 3, 2023).

[37] Zhang Qiang, "Networked, Simulation and Real Life, This Rocket Force Training Science and Technology Content is Rising" (网络化、模拟化、实景化，这个火箭军部队训练科技含量"涨涨涨"), *Science and Technology Daily*, 26 May 2022, at http://stdaily.com/index/kejixinwen/202205/77ac2ab342984ea59ccfba9649878ed4.shtml (Accessed January 3, 2023).

focused on training personnel even to use the equipment and missiles safely, and with ease. For instance, after the implementation of the new training military training instructions, one of the brigades reported an increase of average score of 10 percent in their tests, especially in their technical capability to operate the new weapons and equipment.[38]

A 2015 report had spoken about these issues about the introduction of a simple military training software system, which enabled the officers to quickly understand the essential operation of the new weapons. However, due to training with different types of equipment and troops (missile brigades have several sub-ordinate units), the training management was not realistic. Soon, debate had emerged as to how to rectify the situation, with some officers not willing to change the software as they had felt that considerable scientific and human resources had been used to produce the system, and did not want to arbitrarily change the software system; some even supported technical upgrades to the software. The report concluded with the Party member of the brigade advising the troops not to be limited by authority, and not to mechanically borrow the ideas, but be flexible enough to change the training programme or software if it does not meet the actual conditions, and that an effective military training relied on various factors that had to be synchronised efficiently.[39] Because the Rocket Forces training is complex because military exercises are conducted with multiple new weapons on the field, technical reconnaissance, electronic countermeasures, and special warfare units.

For the Rocket Force, it became imperative after the military reforms to integrate the different units to perform the military training tasks. The Rocket Forces focuses particularly on reducing the launch time and preparation, especially with respect to the deployment at launch sites at the brigade level and launch battalion level. Moreover, the

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[38] Song Haijun and Cheng Kaifei, "Second Artillery Brigade's Upgraded Actual Combat Standard Training System Is not About Borrowing Ideas Mechanically", (第二炮兵某旅对照实战标准升级训练系统"拿来主义"不是生搬硬套), *Renmin Wang*, February 2, 2015, at http://military.people.com.cn/n/2015/0202/c172467-26488191.html (Accessed March 23, 2022).

[39] Ibid.

exercises of the Rocket Forces focuses on complex battlefield environment under high-threats, where different missile units perform their duties, and jointly exercise in adverse conditions.[40] In the strategic requirement of the Rocket Force, where winning wars has become part of the strategy, timely launch and quick response to orders is crucial for the strategic missiles to become a trump card.[41] In addition, the response and coordination was also about establishing timely communication between launch vehicle and command and control. In other words, the Rocket Forces should be able to respond in any manner, at any time, at any adverse conditions. These continue to show that perfecting the strategies of deployment and targeting has become the focus of the Rocket Forces to assert its robustness.[42]

These live exercises and training for military preparedness during the Hu Jintao era became a highly significant achievement for the Rocket Force. Especially, training drills were conducted under conditions of a nuclear attack. The earlier Second Artillery had such training exercises, where it conducted missile test launches, held operations under camouflage, and extreme battlefield conditions.[43] Compared to before, where launch support units accompanied the launch missions, now, the launch battalions are increasingly becoming independent performing some of the duties (driving, repair, refueling) themselves. In other words, the launch operations has to become an well-oiled machine.[44] Even if

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40 Note 13, Ibid.

41 Liu Jianwei and others, "War Reporters Visit A Missile (Unknown) Brigade of the Rocket Forces: Follow The Missile Tank to Attack in the Dark" (战地记者探访火箭军某导弹旅：跟着导弹战车暗夜出击), *PLA Daily*, 21 March 2022, at http://www.mod.gov.cn/gfbw/wzll/hjj/4907107.html (Accessed June 23, 2022).

42 Ibid.

43 Xinhua, Second Artillery Missile Tested at Actual Combat Conditions: Launch Footage Exposed, (二炮战略导弹实战检验性发射画面曝光), 20 April 2014, at http://news.xinhuanet.com/mil/2014-04/20/c_126410389.htm. The CCTV footage is available at http://video.sina.com.cn/p/news/mil/v/2014-04-18/195263757369.html. (Accessed April 2, 2022).

44 Note 41, Ibid.

a missile changed its flight path, the latest position of the missile is deducted in twenty seconds by a missile control operator manually.

The Rocket Force has also developed simulation training systems (战略导弹仿真模拟训练系统). These developments are in its goal to streamline its military doctrine, namely local war under information conditions. Ultimately, the structure changed, most importantly, the need for the standardized military training of the forces, for all the subsystems to work together to ensure combat readiness. For instance, a missile automatic test system (导弹自动化测试系统), missile control system (导弹控制系统), and electronic command system (电子化指挥系统) were implemented. These systems ensured that the launch battalions ran operations smoothly, and could have training under simulations. In addition, strengthening training in civil defence against nuclear attack were also improved. The Civil Air Defence of the PRC is in charge of it, and have detailed several protection and training methods to guard against a nuclear attack.[45] The forces are deployed on virtual networks to increase online training towards "command battlefield simulation, monitoring and evaluation, training and management, and integrated support", with each units conducting training in their own network systems.[46]

The 2010 Defence White Paper declared a decade earlier that the Second Artillery had "developed a military training system unique with the strategic missile force, improved the conditions of on-base, simulated and networked training, conducted trans-regional manoeuvres and training with opposing forces in complex electromagnetic environments".[47] Even though the Rocket Force were upgraded and

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[45] Protective Action Training During a Nuclear Attack (核袭击时的防护动作训练), *Handbook of Air Defence and Disaster Prevention Knowledge*, at http://www.ccad.gov.cn/view/zhishibolan/renminfangkong/sfwqzs/20110505/583.html. The full report is available at http://www.ggj.gov.cn/rfdt/rfdtzxfw/rfdtzxxz/201207/P020120710462480052702.pdf. (Accessed March 23, 2023).

[46] Wang Yongxiao and Pan Li, ibid.

[47] Ministry of Defense of the PRC, *Defence White Paper 2010*, State Information Council, March 31, 2011, at http://news.xinhuanet.com/english2010/china/2011-03/31/c_13806851.htm

the reforms increased its training capabilities, it still continues to suffer in other areas. The challenges continue in the field namely:

- the need for operational theory innovation
- role of nuclear missiles in dual roles (DF-26)
- integration of missile operations in a triad
- joint combat training of land and naval nuclear forces
- military leadership
- information command combat skills and AI

The Rocket Forces have been looking at the training levels according to the requirements of its military strategy. For instance, as the Rocket Forces have been tasked with reliable nuclear deterrence and nuclear counterattack capabilities, they have been improving their readiness, reaction time in terms of launching capabilities, and expanding their training with both old equipment to make sure that it retain combat effectiveness and new equipment, which can quickly amass its combat power.[48] This in turn pushing the Rocket Forces to streamline application of tactics and support (communications, personnel training, simulation equipment research, and formation and positioning of the combat units, etc) according to the battlefield requirements.[49]

In addition, the efficiency of the brigade commanders are being tested while they are getting more assistance to complete their tasks as the Rocket Forces consider the brigade commander to be the critical link

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[48] Li Yongfei and others, "A Missile Brigade of the Rocket Forces: Two Double-Edged Swords Combined Forging the Trump Card of the Elite Squad" (火箭军某导弹旅：“双剑合璧”锻造王牌劲旅), *PLA Daily*, 24 August 2022, at http://www.mod.gov.cn/power/2022-08/24/content_4919222.htm (Accessed June 18, 2023).

[49] Ibid.

in the operational chain.[50] As a result, the brigade commander is able to have his own team consisting of his staff and these examinations tests the proficiency of the team.

## D) COMBAT CAPABILITY

The Rocket Force measures its strength in the battlefield and the modernisation of their forces by assessing "combat capability", or "combat effectiveness", or "fighting strength". These are assessed by conducting military exercises, and assessing how the troops are performing to the stated objectives of the exercise. Given that in the past few years, the leadership has focused on training, theory, teaching, and exercises on what the military calls "actual combat", the Rocket Force has also attempted to assess its capability by performing exercises that would resemble "actual combat" and, significantly underscore their improving battlefield training. For instance, one report suggested that the Rocket Force has indeed improved combat effectiveness, contrary to many experts who doubt the capability. In the exercise that involved the launch of their DF-21 missile brigade, the report explained that instead of the eight missiles, the brigade displayed ten DF-21 missiles.[51] According to the report, combat effectiveness is high because the uncertainty of the number of missiles would fool the anti-missile system, and the DF-21 missile is high-speed at mid-range and manoeuvres at the end of its flight, thus raising its capability to the level of Pershing II of the US.[52] While whether the DF-21 is actually comparable to the Pershing II or not, the Rocket Force believes that its combat effectiveness in the battlefield in terms of nuclear deterrence is increasing, thus signalling their confidence in the deployment of the ballistic missiles.

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[50] Li Longyi, "Sharpening the Edge of the Spear: Mastering Hardcore Skills"(磨砺重剑之锋 练就硬核本领), *People's Daily*, 30 April 2021, at http://cpc.people.com.cn/n1/2021/0430/c64387-32092619.html (Accessed June 18, 2022).

[51] "Where Does the Combat Effectiveness of Rocket Forces Come From? DF-21 Is the 'Smart' Solution!", (火箭军战斗力从何而来？东风21"帅气"解答), *Tanjun Lunzhan*, November 5, 2016, at http://www.twoeggz.com/news/2272709.html (Accessed March 23, 2022).

[52] Ibid.

In the Chinese perspective, combat effectiveness increases if the military embraces innovation. Not surprisingly, the leadership has emphasised innovation at all levels. For the Chinese military, innovation has been more successful in the Rocket Force; thus, it is considered better than other military services. The Rocket Forces therefore has made continuous improvement in its combat capability through continuous investigation and research, surveys, adjustment of training plans accordingly, and increasing talent effectiveness thereby insisting on problem-solving method to improve combat readiness, command links, and organisational construction.[53] The emphasis on the missile launch process has had helped the Rocket Force to increase its combat effectiveness. Thus, combat effectiveness is increasing and would affect the way China views its deployment.

## E) COMMAND / CONTROL

The Rocket Force wanted to improve command and control; therefore, it has upgraded its information and equipment systems. According to Chinese sources, in the event of an attack, there are several levels of command that work. There is a supreme or high command. It is assumed that the President is the supreme command, and it is general knowledge that the Standing Committee is the most important organisation. In addition, the safety of the nuclear weapons are taken into account in order to strengthen its command and control. For instance, the nuclear safety control system (核安全控制制度), has a personnel qualification, a control system, transport, training, security management, a nuclear emergency response mechanism, and other measures to reduce non-authorised launches and launch accidents. The command and control centres, posts, and units are being modernised. The communications link between units are being secured, and guarded by countermeasures. Also, military training is now emphasising destroying enemy command centres. After the restructuring, the command and control of the Rocket Force would be directly from

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[53] *PLA Daily*, " The Party Committee of a certain Rocket Force conducted an in-depth investigation and study to solve problems in Army Development", (火箭军某部党委深入调查研究解决部队发展难题), 15 September 2023, at http://military.people.com.cn/n1/2023/0915/c1011-40078536.html (Accessed September 23, 2023).

the CPC Central Committee and CMC.[54] The Rocket Force would carry out the nuclear counter-strike, and other deterrence strikes, after receiving its orders.

The defence white paper does shed a few details about the command structure of the Rocket Force. According to the 2013 white paper,

> If China comes under a nuclear threat, the nuclear missile force will act upon the orders of the CMC, go into a higher level of readiness, and get ready for a nuclear counterattack to deter the enemy from using nuclear weapons against China. If China comes under a nuclear attack, the nuclear missile force of the PLASAF will use nuclear missiles to launch a resolute counterattack either independently or together with the nuclear forces of other services.[55]

The Rocket Forces are to conduct nuclear counterattack with the nuclear forces and other services. Whether this might change — since the Rocket Force might have more responsibilities — is a question that remains unanswered.

## DEPLOYMENT OF THE LAND NUCLEAR FORCES: CONCLUSION

The Rocket Force is transforming deployment patterns, training methods, personnel education, and operational concepts. These changes are underway amidst the limitations of the technology and innovation. Chinese deployment patterns show a considerable development towards streamlining and simplifying the operational system. The strategic deployment shows that the missile bases are undergoing changes to accommodate a new role for the Rocket Force, and the training exercises are conducted at the brigade and battalion levels. At the brigade

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[54] Dong Zhaohui and others, "President Xi Expects Strong, Modern Rocket Force", *Xinhua*, September 26, 2016, at http://eng.chinamil.com.cn/view/2016-09/26/content_7277932.htm (Accessed November 2, 2022).

[55] People's Republic of China, *The Diversified Employment of China's Armed Forces*, State Information Council, April 2013, at http://news.xinhuanet.com/english/china/2013-04/16/c_132312681.htm (Accessed July 2, 2022).

and battalion levels, technological innovations are most visible, and the PRC has spent considerable amount in gaining publicity for its efforts in modernising the Rocket Force to gain credibility for it as a retaliatory strike state. However, these changes are incremental and slow, given the PLA goals for the new situation.

While weapons and equipment have made considerable progress, the structure of the organisation and combat capability are evolving. While training systems are being changed, it is quite visible to see that the Rocket Force, like the other armed services of China, are struggling to change the "human" factor, that is, the troops. The ability of the troops to understand battlefield conditions is sorely lacking (that is why the emphasis on actual combat), and the ability to respond to the uncertainties in warfare is limited. Given these factors, the leadership's decision to form a separate department for international military cooperation point to the fact that more importance should be given to military diplomacy. The aim of this exercise would to be encourage the Rocket Force to learn and understand more about combat and warfare from interaction and joint exercises.[56] In the immediate future, given that China is still developing an effective sea-based nuclear deterrence, its deployed land-based nuclear forces would continue to play a role in its deterrence policy.

The Rocket Force would have to undergo further reorganisation if China's strategic submarines go on nuclear patrols. Moreover, the Rocket Force has to reform its command and control at the missile base level if tactical nuclear weapons are being deployed for the strategic bombers. Thus, China's Rocket Force still has to emerge as an effective deterrence player, considering the objectives of the leadership, as such, is to "win wars". It might provide protection against nuclear first strike; but its role in furthering the objectives of the leadership has to be improved.

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[56] This experience of learning from others, is one of Chinese political practices. During China's entry to arms control regimes, their understanding of nuclear proliferation and nuclear order were learnt from interactions with American arms control experts.

*Chapter 4*

# AIR NUCLEAR FORCES: THE LESSER FORCE

## INTRODUCTION

There is little known about China's air-based nuclear forces. As of now, China has not deployed its tactical nuclear warheads. China deploys strategic bombers; some of them are nuclear capable. As China becomes more confident in its capability, in the future, China might deploy its strategic bombers tipped with nuclear warheads. Its history with bombers has been understated due to its difficult history with aerospace technology. Even though, its nuclear role is unclear at this point, the capability of its strategic bombers to carry nuclear warheads might change not only China's deployment patterns but the very command structure of the Rocket Force, and its relationship with the PLA Air Force.

## DEPLOYMENT OF NUCLEAR-CAPABLE STRATEGIC BOMBERS

China has deployed strategic bombers, called the Xian H-6, with the PLA Air Force. Among the various modifications, the H-6K is the latest version, capable of carrying nuclear warheads. However, news reports show that the H-6K bomber's role might not be nuclear and be only used for conventional strikes at American bases.[1] As of now,

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[1] The *Global Times* report denied that H-6K bomber's primary role is nuclear, and blames the speculations on Western news reports to play up China as a nuclear threat. See, Wei Yunfeng and Ma Jun, "Chinese Nuclear Bomber Can Attack American Bases, Main Battlefield Is Non-Nuclear War" (中国核轰炸机可攻美基地 主要战场并非核战争), *Huanqiu Shibao*, at http://mil.huanqiu.com/paper/2013-12/4706731.html.

the PLA Air Force has around 10 H-6K strategic bombers.[2] Recently, there are speculations that the Chinese PLA Air Force would soon deploy H-20 stealth bomber as part of its strategic deterrence.[3] It would replace the H-6 bomber series. The H-6K could be used in the interim period until the new bombers are entered into service.

The earlier H-6 is a twin-engine bomber, built by the Xian Aircraft Industrial Corporation. At Lop-Nur, the H-6 bomber was used to drop nine nuclear devices. As mentioned earlier, as the Chinese leadership gave more attention to the development of ballistic missile technology, the importance given to developing the nuclear capability of the strategic bombers decreased. The newest version of H-6K, is fitted with Russian D-30 KP-2 turbofan engines. The H-6K bombers entered service in 2009,[4] and carry cruise missiles and anti-ship missiles (YL-12). The H-6K bombers have several modifications that have helped them in becoming a more formidable bomber than before. The PLA Air Force uses it for air patrols in the East China Sea and the Western Pacific to conduct high-sea training and to improve its combat capabilities by engaging in low-altitude flying.[5]

By modernising the older H-6 bombers, the H-6K has several improvements in areas such as: fuel consumption, which was reduced by 20 per cent; engine thrust, which was increased by 30 per cent; the load capacity, which was increased from 9 tonnes to 12 tonnes; a satellite

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2 Some sources say there are about 40 H-6K bombers, and two models of the 20 H-6M bomber.

3 Minnie Chan, "High Hopes of China's H-20 Stealth Bomber Launch as PLA Top Brass Vow Weapon System Upgrades", *South China Morning Post*, 11 November 2022 (Accessed May 3, 2023).

4 It was first reported in 2013, thus the date of entering service is unclear.

5 CCTV News, "Visit the Trump Card of Our Air Force: Unmasking H-6K and Formosa Taiwan's Tale", (探访我空军王牌部队 揭秘轰6K与宝岛台湾同框照背后故事), 28 April 2021, at https://news.cctv.com/2021/04/28/ARTIICygFTrdN42eZymJAdDW210428.shtml (Accessed January 3, 2023).

navigation system; fire control radars; and reconstructed avionics system, etc. The electronic countermeasures that are part of the H-6K are:

> missile warning system, radar warning, integrated electronic warfare system, chaff ejector device, and together they are able to detect enemy radar exposure, incoming missile strikes, and issue warning to the crew and at the same time implement corresponding automated implementation of active and passive defence interference procedures.[6]

The cockpit, understandably, is redesigned to accommodate these changes so that the pilot can comprehend the flight parameters of the aircraft and navigation information as well as the status of each airborne system.[7] All these modifications are carried out to magnify deployment options. The strategic bomber H-6K also offers the Air Force the capacity to conduct offensive operations, and be a part of the reliable second strike capability. The H-6K due to continuous modernisation can perform patrol missions in South China Sea and other far-sea missions such as training in the Western Pacific.[8] China could deploy the bombers against hostile countries in tactical campaigns. For China, the advantage of using bombers seems to be that they can be in the air for a long time, guard against any surprise attacks, can quickly reach the theatre of operations, unlike other military strategic weapons, and forms of the non-contact warfare. Moreover, H-6K conducts training exercises jointly to normalise its presence around Taiwan, remove the boundaries such as first island chain.[9]

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6 Huang Ao and others, "H-6K: China's Air Force Strategic Deterrence Capability Has Seen Initial Establishment" (轰-6K：中国空军战略威慑能力已初步建立), *The Paper*, October 17, 2015 at http://m.thepaper.cn/newsDetail_forward_1365017 (Accessed May 3, 2023).

7 Huang Ao (2015), Ibid.

8 Huang Ming and others, "Towards New Victories, Fly Hard, Air Force Regiment, 2nd Brigade Formed an Iron Fist in the Sky" (空军航空兵某团飞行二大队锻造空中铁拳纪事), *Xinhua*, 20 June 2023, at http://dangjian.people.com.cn/n1/2023/0620/c117092-40017894.html (Accessed July 2, 2023).

9 Liu Xuanzun, "H-6K Bombers Conducts Nighttime Taiwan Encirclement Flights", *Global Times*, 19 June 2023, at https://www.globaltimes.cn/page/202306/1292849.shtml (Accessed August 5, 2023).

The H-6K bomber carries around six air-launched cruise missiles (KD-20/AKD-20) that can carry either nuclear or conventional warheads. The CJ-20 missiles, with a range about 1500-2500 kilo meters, can help the bomber carry out attacks against American bases in Guam, Hawaii. The CJ-20 cruise missile, and the corresponding K type, was seen as an ideal way to extend the service life of the H-6 bomber series. The CJ-20 missiles have greater penetration capabilities as well as high precision strike capability. The bomber with the missile is supposed to carry out initial assaults with the Rocket Force ballistic missile against the enemy command system, and air defence systems. Hence, the use of cruise missiles to target air defence and command systems

Though the bomber's capacity to hit Guam of the USA is considered by the Chinese Air Force as a significant achievement, the leadership understands that the H-6K cannot be considered as a true strategic bomber even though it is nuclear capable. Even though many of the modifications have been carried out by the Air Force on the bomber, it still does not achieve the technological capability of the US or Russia. While the H-6K has upgrades that comprises of newly designed fuselage, new turbofan engine, advanced avionics, the H-20N could be used for aerial nuclear deterrence. In fact, the H-20N could emerge something similar to the DF-26 in a dual role capability. The dual role capability is needed as the modern warfare requires that strategic forces like the H-20N cannot only rely on nuclear warheads, it can perform both missions, such as conventional and nuclear.[10]

## CONCLUSION

For an effective nuclear deterrence role, Chinese strategic bombers have to make considerable modifications in the weight of the aircraft;

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[10] Experts Talk about H-20N Design, It has Stealth Performance and Has Conventional and Nuclear Role, (专家谈轰-20设计思路：具备高度隐身性能，“核常兼备”), *The Paper*, at https://m.thepaper.cn/kuaibao_detail.jsp?contid=1573361&from=kuaibao (Accessed January 2, 2023). Xie Ruiqiang, "What Kind of New Generation of Strategic Bombers does China Need?" (轰-6K装新涡扇发动机，可对夏威夷进行空中突袭), *The Paper*, September 5, 2016, at http://www.thepaper.cn/newsDetail_forward_1524231

install a more advanced avionics system; install a more modern engine; and recalibrate the bomb capacity in the air craft. Therefore, it is understandable that Chinese reports deny that the nuclear warheads are not deployed; nor are these bombers now used for nuclear missions. The advance in technology shows that the strategic bombers have only conventional roles due to technological constraints, and will be assisting in land and naval missions. However, to what extent that the Chinese military would actually rely on strategic bombers for theatre operations is unknown. Unless considerable advances are not carried out, the nuclear role of these bombers would be uncertain. The same debate would emerge as to the sustainability of the nuclear missions if China can effectively use its land-based missiles. The issue of the command and control of the nuclear warheads would also emerge. The Rocket Force, as of now, controls the nuclear warhead storage and maintenance. Thus, the control of the nuclear warheads by the Rocket Force or the Air Force would have to be debated if the nuclear roles of the strategic bombers becomes more pronounced. So far, the PLA Air Force has no training in handling nuclear-mission based training, unlike the US Air Force, thus complicating the deterrence roles of Chinese military forces. If the strategic bombers have more pronounced roles, then the leadership has to assign troops for handling nuclear missions, and institute separate training, like the Rocket Force ground troops. Thus, in the immediate future, the air-based nuclear forces would not be deployed for deterrence roles or patrols. Until new strategic bomber H-6N and its capabilities become clearer, the nuclear triad of China is incomplete. If the H-6N carries a ballistic or hypersonic glide, then there will more questions about the nuclear role of China's latest bomber.

*Chapter 5*

# Deploying to Seas: Nuclear Ballistic Missile Submarines

## Introduction

China has given its nuclear ballistic submarine significant attention within the PLA Navy. The deterrence at sea is considered key to achieving survivable second-strike capability. The need to have survivable nuclear missiles if their land missiles are under first strike made the leadership consistently move towards policies that could enable them to deploy nuclear missiles at sea. Given that China's air-based nuclear option is under-developed, sea-based deterrence emerges as the most suited to its strategic needs. China has now reportedly deployed six Jin-class submarines (094A) equipped with JL-2A SLBMs, while some reports suggest that China may have fitted its SSBNs with JL-3 missiles. Before China lacked an effective sea-based deterrence with the deployment of JL-2 due to its limited range. A survey of Chinese language sources shows that continuing challenges dog submarine deployment, thereby resulting in research into more advanced nuclear strategic submarines. The slow deployment of an effective sea-based deterrence may have forced its adjustments towards the deployment of the land-based ballistic missiles by upgrading its silo-based ballistic missiles.

## Background to Nuclear Submarine Development

On June 27, 1958, Nie Rongzhen submitted a report to the CPC Central Committee on the development of nuclear submarines, titled "Report Concerning the Development and Manufacture of Atomic Missile Submarine" (关于开展研制导弹原子潜艇的报告). On July 28, 1958 the CMC passed the resolution titled, "Resolution Concerning the Naval Construction" (关于海军建设的决议), stressing the importance of developing nuclear submarines. On 29 June 1958, the approval for building a nuclear submarine was given. The CPC Central

Committee then approved Lieutenant General Luo Shunchu (Group Leader), Zhang Liankui (deputy), Liu Jie and Wang Zheng to form a four-member group to lead the development of a nuclear submarine,[1] and Yu Xiaohong, of the Naval Scientific Research Centre (海军科学研究部部), to be specifically responsible for the research and development. The Second Machinery set up the Reactor Research Office, which started nuclear power research, and the Navy and First Machinery together were responsible for the overall design, development, and implementation of the tasks.[2] The feasibility of the programme was produced, and overall parameters were established. In 1960, the Institute of Atomic Energy, under the guidance of Peng Huanwu and other experts, brought out a proposal titled, "Nuclear Powered Submarine Programme Design (Draft)", and the preliminary work was laid. However, the Great Leap Forward, and later, the withdrawal of Soviet support greatly affected the programme. The submarine programme relied on the expertise of Soviet advisors and their close cooperation with the Chinese scientists. Also, the development of the first atom bomb and ballistic missile meant that the submarine programme was temporarily halted. In 1963, however, the Central Committee tasked a group of researchers to engage in theoretical research (preparatory work) and experiments. This was because Liu Huaqing, the Director of the Naval Research Institute, and Dai Runsheng, the Political Commissar, convinced Nie to give importance to the submarine programme.[3]

In 1963, the Naval Research Institute (Seventh Research Institute 国防部舰艇研究院(第七研究院) of the National Defence Department included a Nuclear Powered Submarine Engineering Institute

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1 China's Nuclear Submarine: 50 Years Development History Secrets, (中国核潜艇50年研制历程揭秘) *Naval and Merchant Ships*, 2008, at http://mil.news.sina.com.cn/p/2008-08-12/0743516051.html (Accessed June 3, 2023).

2 Song Yichang and Yuan Hang, "Sail to the Deep Ocean: Documentation of New China's Shipbuilding Industry's Takesoff", (驶向深蓝——新中国舰船工业腾飞纪实) Shandong People's Publishing House: Shandong, 2009.

3 Zhang Chun and Li Zhiju, "Nie Rongzhen and China's First Nuclear Submarine" (聂荣臻与中国第一艘核潜艇), *Jinri Keyuan*, 2011 (12): 66-67.

(潜艇核动力工程研究所), which carried out the programme and design of the submarine.[4] In 1963, the Central Committee also approved the Reactor Research Unit of the Atomic Research Institute, the Naval Vessel Research Institute, and the Nuclear Submarine Technology Unit to merge, and form the Institute of Atomic Powered Submarine Engineering Research Institute.[5] The Second Machinery Department started the Reactor Engineering Research Institute (反应堆工程研究所) which constructed the conventional submarine.

However, around the mid-1960s, the developments regarding a nuclear submarine began in earnest, when the initial design for it began to form in the nuclear power plant. Soon after, nuclear reactors were set up in terms of equipment and materials, leading to the first submersible High Power Long Wave Radio. On August 15, 1965, the 13th session of the CPC Central Committee officially approved the development of a nuclear submarine. Within this decision, it was decided that China would develop a torpedo-attack nuclear submarine; and secondly, commence research on a ballistic missile nuclear submarine; and, at the same time, begin the construction of a reactor for a nuclear submarine and a naval submarine base. In 1966, the overall design and research was started by the Nuclear Submarine Research and Design Institute (核潜艇总体研究设计所).

The Cultural Revolution disrupted the nuclear submarine programme.[6] In 1967, the CMC issued a special letter saying that all units involved in the nuclear submarine project to continue with the task. In 1968, the first nuclear submarine construction began, wherein China developed a torpedo attack submarine. In October 1969, the 'State Council Central Military Commission Nuclear Submarine Engineering Leading Group' (国务院中央军委核潜艇工程领导小组) was established. In 1970, the

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[4] Yang Lianxin, "'The Four Stages' of Development of China's Nuclear Submarine Venture" (中国核潜艇创业发展的"四个阶段"), *Zhongguo He Gongye*, 2013 (11): 57

[5] Note 1, Ibid.

[6] Lewis and Xue's *China's Strategic Seapower*, details the disruptions caused by the Cultural Revolution on China's submarine programme.

Chinese nuclear submarine was launched in water, and in July 1971, the first submarine achieved nuclear power generation. On August 1, 1974, the first torpedo nuclear powered attack submarine had a successful navigation test, and was incorporated in to the naval forces. In 1967, the Navy also looked into the requirements of a ballistic missile submarine, and the National Defence Science and Technology Commission approved the ballistic missile nuclear submarine tactical technology assignment document, and two solid fuelled rockets. In 1967, the PLA Navy held the '1016 meeting', where breakthroughs in applications for underwater launch of a missile for the SSBN, personnel safety, ballistic missile weapon systems were discussed. As a result of this meeting, the Defence Science and Technology Commission issued a document for the development of SSBN developmental work and tactical technologies.

By 1970, preliminary and technical design for the 092 SSBN was completed. Peng Shilu and Huang Xuhua were the chief architects, and the 713 Research Institute was responsible for the underwater missile launch system. Within the design of the submarine, the team used the nuclear reactor, steam turbine, and other ancillary equipment of the Type 091 nuclear attack submarine. Since a SSBN has a ballistic missile — unlike the SSN which has torpedoes — the compartment for ballistic missiles had to be added, which would in turn increase the size of the submarine. Along with the adjustment in the propulsion and propeller to suit the ballistic missile submarine from nuclear attack one, there were changes in the outbound pressure system, air conditioning insulation system, water injection system, missile detection and targeting, and launch control system.[7]

The improvements in the nuclear-powered submarine hastened the development of SSBNs. In April 1981, China's SSBN was launched in water and, in 1983, the SSBN was delivered to the PLA Navy. After mid-1980s, China carried out several tests of nuclear submarines. In 1988, China tested SLBMs as well as first generation SSBNs. After this,

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7 "Discussion on China's 092 Strategic Nuclear Submarine, First Test Failed", (浅谈中国092型战略核潜艇 第一次试验遭失败), *Modern Ships*, March 30, 2015, at http://mil.news.sina.com.cn/2015-03-30/1537826254.html

the navy concentrated on improving the safety and reliability of the nuclear submarine. The launch of the Xia-class submarine was supposed to have finished in 1973; but the difficulties in design regarding the SLBMs and launch systems delayed submarine development. Now, China has deployed six Jin Class (094A) strategic submarines and would eventually deploy a more advanced 096 nuclear submarine.

## DEPLOYING THE BALLISTIC MISSILE SUBMARINE (SSBNS)

China believes that deploying ballistic missile submarines into the Pacific for nuclear deterrence patrols is an application of its nuclear deterrence.[8] The move towards deploying strategic submarines is significant for the Chinese leadership as it perceives the US as posing a considerable threat in detecting and targeting land-based nuclear forces. Its sea-based nuclear deterrence could offer second-strike capability against the increasing US capabilities.

However, its first strategic submarine is the first-generation ballistic missile submarine called the Xia-class submarine (092 型弹道导弹核潜艇), which carries a 12 JL-1 (巨浪-1) submarine launched ballistic missile (SLBM). The design of this submarine was completed in 1970; it was launched in 1981 and was delivered to the PLA Navy in 1983. In 1988, the test of SLBM was conducted successfully. The Type 092 was deployed within the North Sea Fleet, and it made its first appearance in the 60th Anniversary of the PLA Navy Sea Parade in 2009. The Xia-class submarine had the hull to the length of 120 meters, the maximum dive depth of 300 meters, and maximum underwater speed of 22 knots. The hull number of the 092 SSBN is No. 406, and is located in Qingdao, Shandong. However, Xia never went on sea patrols even after going through several upgrades in its sonar systems. This submarine was mainly used for training, and as

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[8] Wen Chengliang and others, "Nuclear Patrol To Boost China's Own Security", *Global Times*, May 29, 2016, at http://en.people.cn/n3/2016/0529/c90000-9064803.html (Accessed 3 January 2023); Gao Chen Hu (2018), "Looking at the International Nuclear Order From the Perspective of the International Nuclear Situation" (从国际核态势视角看国际核秩序), *Quarterly Journal of International Politics*, 3 (1): 55-88.

a model for the upgraded versions. This was the first attempt in China to create a credible second-strike capability, and sea-based nuclear force.

In 1988, China decided to concentrate on a modified 092 SSBN, learning from the challenges from the first SSBN. This second-generation SSBN was called the Jin-class (094 型核潜艇) strategic submarine. This submarine could carry up to 12 JL-2 SLBMs (巨浪-2). This submarine was designed by the Wuhan No. 2 Ship Design and Research Institute (719 Unit) of the China Shipbuilding Industry Corporation, and built by the Bohai Shipbuilding Heavy Industry Company in Huludao city, in Liaoning province. The construction of the submarine began in 1999, and was completed in 2004. The 094 submarine has been fitted with JL-2 SLBMs, which has a range more than 7000 kilo meters.

The Jin-class submarines are to be the equivalent of Soviet Victor III and Delta class submarines, and underwent testing to reduce design flaws and increase safety standards on nuclear radiation. The 092 submarine is reputed to generate noise (160 decibels). Unlike the Xia-class, the Type 094 has a new nuclear reactor, high thermal efficiency, and higher underwater speed. The 094 uses the high temperature gas-cooled nuclear reactor, increasing the thermal efficiency of the submarine. China has six Type 094 submarines currently deployed in the PLA Navy. The Chinese leadership paid particular attention to reducing the noise level of the Jin-class submarine, and make a more reliable propulsion system, therefore making it less vulnerable to anti-submarine warfare.[9] The 094 is equipped with a 'deep ocean blue laser information transmission system' that enables the submarine to stay underwater for communication.

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[9] Chinese submarines are rumoured to be noisy. Submarines in general are detected through sonar by their distinctive signature and acoustic targets. Acoustic equipment could pick up sensitive sounds underwater through passive observation by being inactive, thus remaining invisible. Generally, the noise produced by the submarine is insulated by the hulk, therefore dampening the sound of crew and activities. Wu Riqiang (2018), "How China and the US Can Avoid a Nuclear Arms Race", (中美如何避免核军备竞赛), International Security and Strategy Workshop, 22 January 2018, at http://cesruc.ruc.edu.cn/info/1004/1355.htm (Accessed May 2, 2023).

Learning from the 092 submarine, 094 did attempt to reduce the noise of the submarine during its sail. For instance, the new nuclear reactors reduced considerable noise, and also included further improvements in noise reduction methods in hydraulic vibration dampening transmission device, sound insulation design of the cabin, plastic coating of surfaces, high-precision propeller and new design for drainage.[10] In terms of the underwater acoustic system, they are equipped with towed array sonar, giving the submarine better detection capabilities as compared to earlier technologies that were very weak in detecting submarines in the rear. With the improvement in the underwater acoustics system, China's 094 submarine has a 365 degrees perception of the seas. The release of the arrays is longer than 1 kilo meter, thus allowing the submarine to capture signals at a very low signal frequency.

China has made several breakthroughs in electronic information; some of the systems of 094 has been improved. These are operations command, underwater sound, fire control, and navigation. The 094 submarine also has other advantages, such as an integrated display and control, information acquisition and processing capabilities, inertial navigation, satellite and integrated navigation system, positioning accuracy, automation systems, manoeuvrability and concealment capabilities, and safe and reliable missile launch systems.[11] Chinese experts believe that, since the speed of the 094 Type submarine is relatively low and easier to detect and attack, China needs to develop a new generation SSBNs. However, despite such upgrades, the 094 remains vulnerable to detection.

In the early years, the PLA Navy had to contend with a 092 submarine, which not only had low automation level, but had high submarine

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[10] "The Reason for Chinese Nuclear Submarine Noise, Hidden Military Secrets", *Zhanlue Wang*, September 12, 2016, at http://weibo.com/ttarticle/p/show?id=2309614018807525012774

[11] "Mysterious Underwater Nuclear Shield: A Brief Discussion on the Development of 092 to 094 Submarines" (神秘的"水下核盾"，浅议092到094潜艇的发展), 16 October 2023, at https://3g.china.com/act/military/13004177/20231016/45614652_2.html (Accessed October 20, 2023).

noise making the technological capability to be very low. The 094 was designed to be what 092 was not. The Chinese leadership found that building a strategic nuclear submarine was much more technologically sophisticated, and by the time of conducting research for the 094 submarine, it was decided that it would be more reliable, have higher power, and increased automation than the older submarine. The foundation has been laid for future development of upgraded versions as some of the technologies — such as design and construction, submarine command and control, communication and navigation — had already been developed. They also decided to change the missile capsule as the ICBMs are much longer than torpedoes as the hull diameter of an attack submarine is much smaller.

The 094 submarine and its upgraded versions put into work the mainstay of the strategic submarine, to make the missile capsule to fit the SLBMs. The structural mechanics of making the missile cabin fitted for the missiles became the crux of its challenges related to the strategic nuclear submarines. Because the hull is small, the missile capsule produced a 'turtle back' that protrudes from the submarine. This protrusion affects the linear and evenly distributed water pressure and induces turbulence, and increasing the noise of the submarine.[12] The 'turtle' is, in fact, considered the biggest design flaw of the 094 submarine.[13] It has also affected Chinese submarines' frictional resistance, thereby affecting the speed. Especially, with regard to the 094 Type submarine, the nuclear power system is of the first-generation, thus needing an external power pump for continuous cooling, therefore increasing the noise of the submarine further.[14] In order to carry out nuclear patrols and also reduce the noise of the submarine, the submarine

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[12] *Science and Technology Daily*, "China's Type 094 Strategic Nuclear Submarine Makes a Domineering Appearance in the South China Sea" (中国094型战略核潜艇南海霸气亮相), 18 April 2018, at https://www.jfdaily.com/wx/detail.do?id=86500 (Accessed May 2, 2023).

[13] Note 11, Ibid.

[14] "094 Strategic Missile Nuclear Submarine: Known As the Second Counterattack Force" (094战略导弹核潜艇：被称为"二次反击力量), 20 May 2018 at https://m.163.com/dy/article/DI8FLPHI0515UJBJ.html?spss=adap_pc (Accessed May 5, 2023).

has to lower its speed, thus affecting two factors: first, increasing the time required by the submarine to cover the patrols; and secondly, reducing the time available to the submarine patrols in the waters as it has to stay longer.[15] Since the noise of 094 could only be lowered during low-speed, the submarine is not useful in high-speed situations, thus reducing the deterrence effect. The Chinese sources agree that there is a clear technological gap between the 094 submarine and the Ohio-class submarine. This shows that the Chinese leadership still not yet convinced that their sea-based nuclear deterrence can be effective against the US capabilities. Therefore, it is no surprise that the rapid expansion of nuclear arsenal has come from the land nuclear forces.

## THE SUBMARINE LAUNCHED BALLISTIC MISSILE

The PLA Rocket Force uses three SLBMs, such as the JL-1, JL-2 and JL-3. JL-2 is a SLBM which is a sea variant of the DF-31 land-based ballistic missile, and can carry 3 to 4 multiple independent re-entry vehicle (MIRV) or a single warhead, and has a range about 8000 kilo meters. The first launch of this missile was conducted in 2001 from Golf-class submarines, and later, in October 2001 and February 2002. The construction of the SLBM began in 1956 and in 1958; the Central Committee set up a Ballistic Missile Nuclear Submarine Project Leading Group. The Fifth Research Institute's Deputy Head, Wang Zheng, was responsible for the research and development of SLBM. In 1965, the Seventh Machinery Industry, which replaced the Fifth Research Institute, started working on a solid propellant short-range ballistic missile as a SLBM prototype. Since this missile could not be fitted into the submarine, work again resumed with now a different two-stage, solid propellant, and medium-based missile for the submarine.

At the very earliest, the Chinese experts were having difficulties in resolving the technical aspects of the SLBM so that it could be fired from a submarine. For instance, the launch platform for a submarine is always under motion; therefore, its computer systems, navigation, positioning, and missile guidance system have to change according to the demands of the submarine. Also, Chinese experts found significant

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[15] Note 11, Ibid.

problems in resolving the technological difficulties relating to an underwater launch, and launch strength calculation. Overall, Chinese technicians found that their challenges lay along four key questions: firstly, how to calculate the shift from surface missiles to submarine-launched underwater missile mobile launch technology, similar to the Soviet Union journey (without the Soviet technical assistance); secondly, how to prepare the launch mode; thirdly, how to experiment with the launching of missiles to adapt to submarine technology; and fourth, to select the appropriate power plant and guidance system.[16] The experts then resolved these issues by using a water cylinder, gas-powered launch mode, a vertical launch, and a two-stage power plant.

The most challenging for the scientific and technical community was to master solid propellant technology. In 1981, China began to test the SLBM, but only succeeded in 1982. On October 12, 1982, the SLBM was successfully conducted from a vessel, and later started conducting tests in 1984 from the submarine. However, China failed at these tests, and finally succeeded in 1988 when it fired the JL-1 SLBM.[17] JL-1 SLBM had a few disadvantages: first, the JL-1 could carry only 200-500 KT nuclear warhead, and has limited strike range; secondly, it could only cover US military bases in Asia, and has the accuracy of 600 meters.

The JL-2 SLBM is a three-stage, solid rocket propellant, strategic ballistic missile. The missile has a manoeuvring warhead, and is produced by the China Aerospace Science and Technology Corporation. As a second-generation missile, JL-2 has a range of 8000 kilometers, which gives it limited range against the US.[18] Due to the lack of a sufficient

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16 Note 7, Ibid.

17 Huang Weilu, "China's First Submarine Launched Intercontinental Ballistic Missile Formerly Known as "JuLong-1", Why was the Name Changed?", (中国首型潜射洲际导弹原名"巨龙"为什么要改名?), *Xinhua*, September 11, 2015, at http://news.ifeng.com/a/20150911/44631464_0.shtml (Accessed May 9, 2023).

18 Ma Jialu, "The JL-2 Made Its Debut At Military Parade, Can be Launched From Nuclear Submarine For Nuclear Counterattacks" (巨浪-2导弹首次亮相阅兵式，从潜艇发射远程导弹可实现核反击), *Nanfang Dushibao,* 1 October 2019, at https://news.southcn.com/node_179d29f1ce/0fbb022f32.shtml (Accessed May 9, 2023).

power system in the 094 submarine, only 12 JL-2 SLBM could be fitted. As the submarine tonnage has to be reduced to limit the stress on the power system, the missile is relatively small. The JL-2 is equipped with two kinds of warheads: a single tonne warhead or a MIRV based war head. The deployment of a 094 submarine, fitted with the JL-2 SLBM, still does not pose a considerable challenge to the US, as the submarine has to travel to the eastern side of the Philippines Sea to target the US East Coast.

## DEPLOYMENT OF SEA-BASED NUCLEAR FORCES

Even though the Chinese soures say that JL-2A is fitted with the 094/094A SSBNs, speculations are that JL-3 has replaced it. The deployment of Type 094A SSBN by China serves a very significant role for Chinese deterrence. In the Chinese view, the deployment would give long-range nuclear capabilities for deterrence purposes and once, having initial deployment capability was meant to carry out nuclear deterrence patrols in the second-island chain.[19] As of now, China has six 094A submarines,[20] and deterrence patrols are becoming more frequent.

The Chinese leadership became interested in a sea-based deterrence force because of its policy of following limited force, and no first use policy. Because of the advances in science and technology, and the resultant technologies, this makes, in the Chinese perspective, its land-based and air-based nuclear forces under threat. Therefore, the leadership considers the sea-based nuclear forces essential to its second-strike capability, and the survival of its nuclear forces after a nuclear first-strike. The deployment of the JL-2 missile, which has a range of

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[19] Jiang Feng, Lan Yage and others, "Foreign Media Speculation About Chinese Nuclear Submarine Debut" (中国核潜艇亮相引外媒猜测), *Global Times*, October 29, 2013, at http://world.huanqiu.com/depth_report/2013-10/4501675_2.html (Accessed July 17, 2023).

[20] Hans M. Kristensen, Matt Korda, Eliana Johns, "Chinese Nuclear Weapons, 2023", *Bulletin of Atomic Scientists*, March 13, 2023, at https://thebulletin.org/premium/2023-03/nuclear-notebook-chinese-nuclear-weapons-2023/ (Accessed June 3, 2023). The details of the number of nuclear missiles and their designation details are available in this report.

12,000 kilo meters, would ensure that it has the capability to reach the US coast. The strike accuracy of this missile is around 50 meters, having improved much upon the previous JL-1 missile. Other measures were also added to the Jin-class submarine so that it could be deployed within the Chinese waters, and offer minimum deterrence effect. Moreover, the sources speculate that the PLA Navy must have replaced the 094 submarines with the upgraded 094A, which gives it considerable improvement for its sea-based deterrence.[21]

Within the six submarines that China has deployed, at any given time, two submarines should be deployed at the theatre operations; two should be at the base, rotating the duties among them; and two at the supply and maintenance base. China wants to plan the deployment of the nuclear strategic submarines so that it could form 50% of its next generation nuclear force deployment. The rationale for increased sea-based deterrence is to make military intervention in potential conflict with China more difficult, especially with respect to the Taiwan Straits.

Since the deployment of the 094 Type submarine does not offer China the necessary deterrence effect, it had already announced the development of another advanced submarine — the Type 096 SSBN. This 096 Type can carry up to 24 SLBM, and will carry more nuclear warheads. This new type of strategic submarine can be launched from China's offshore, and could directly hit the US. This new submarine is in China's long-term plan, and needs system-wide, technical and scientific research to achieve it. The six 094A submarines were reportedly deployed by 2020 and more likely that the PLA Navy would concentrate on more upgradation till they could deploy the 096 submarines. The upgraded versions that was spotted in 2021 has several improvements,

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[21] Peter Suciu, "China Now Has Six Type 094A Jin-Class Nuclear Powered Missile Submarines", *National Interest*, May 6, 2020, at https://nationalinterest.org/blog/buzz/china-now-has-six-type-094a-jin-class-nuclear-powered-missile-submarines-151186 (Accessed July 3, 2023).

which confirms that in the meantime, upgraded versions of 094 submarines are likely.[22]

Though first spotted in 2018, the 094A has several modifications to the 094 submarine. This submarine is modified to have a more prominent hump and retractable towed array sonar (TAS), and might be equipped with JL-2A SLBMs.[23] The deployment of the SSBNs indicate that there is continuous improvements in its sea-based deterrence. If the JL-3 SLBMs are deployed in the upgraded version of the 094 submarine,for an effective deterrence to be portrayed, China has to consistently upgrade its submarines, which would lengthen its deployment timeline.

## RELEVANCE OF THE SOUTH CHINA SEA

### a) Strategic Submarines at SCS

Compared to the East China Sea, the South China Sea is considered ideal for the deployment of strategic submarines as the depth of the water is ideal for the tonnage of the submarine. Moreover, it could emerge as a counter weight to the US carrier battle group activities in the area.[24] The new type of submarine that were visible in the SCS were called as 094A submarines, with upgraded version of the 094. These are considered modest improvements over the 094 since they have two major improvements: first, is noise reduction; and secondly, the missile hull is more to accommodate the SLBMs. The decibel level

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[22] Minnie Chan, "China Raises Nuclear Submarines Stealth Games With Redesign and Tactics to Hide ID Numbers", South China Morning Post, 9 October 2021, at https://www.scmp.com/news/china/military/article/3151686/china-raises-nuclear-submarine-stealth-game-redesign-and (Accessed November 5, 2022).

[23] Zhang Qiang, "094A Appeared in South China Sea, Turtle Back Design is Not Simple" (094A亮相南海，“龟背”发型不简单), *Science and Technology Daily*, 18 April 2018, at http://www.stdaily.com/index/kejixinwen/2018-04/18/content_660579.shtml (Accessed November 5, 2022).

[24] "094 Internal Cabinet Exposure" (过于落后，可以展示? 094内部舱室曝光), 14 May 2023, at https://3g.china.com/act/military/13004178/20230514/44966614_1.html (Accessed July 8, 2023).

of the new submarine (094A) is around 110 decibels.[25] However, according to China, even the deployment of its strategic submarines in the SCS is at risk because of US naval activities. The US naval capability, in terms of anti-submarine warfare and its battle carrier groups' capability is considered high enough to pose a threat to the strategic submarine. The Chinese strategic nuclear submarines are not considered advanced enough to challenge US naval activity in the SCS. Therefore, in the immediate future, China might not use its strategic submarines to challenge US naval presence in the SCS. They, however, would try to conduct nuclear patrols in the SCS in line with its efforts to enhance coordination and active and regular deployment.

Until the deployment of the advanced 096 Tang class submarines, China will continue to lack an effective nuclear strike capability. While these submarines have initial strike capability, the effectiveness of the submarines to conduct operations that coincide with the objectives of the leadership in terms of "winning wars" are not high enough.

## b) The Rocket Force in the at SCS

Nuclear submarines could be increasingly deployed at the South China Sea area by China. There has already been cooperation between the Rocket Forces and the South China Sea Fleet to facilitate joint operations and training. The Rocket Force's contribution to joint operations began as an essential factor according to the Chinese military's vision of a future war.[26] The first few joint exercises held in 2014 and 2015 were conducted in the South China Sea. As a result, they had started to transfer officials from the Second Artillery to the PLA Navy for

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[25] Chen Guangwen and Yuan Zhou, "Chinese 094A Strategic Nuclear Submarine Suddenly Appeared, Is the Goal South China Sea?", (中国094A型战略核潜艇突然现身 是否是目标直奔南海) *Yangtze Evening News*, at http://www.yangtse.com/huanqiubolan/2016-07-21/948748.html (Accessed October 8, 2022).

[26] "PLA Navy, Air Force and Second Artillery Exercises in South China Sea, Examines In Depth Our Military Joint Combat Capability", (海空军和二炮南海演习深度检验部队联合作战能力) *Renmin Ribao*, September 25, 2014, http://military.people.com.cn/n/2014/0925/c1011-25732683.html (Accessed April 7, 2023).

facilitating this process. For instance, a few months after his promotion at the end of May 2015, Ren Yongji, was transferred as the Deputy Chief of Staff of the PLA Navy's South Sea Fleet.[27] After this stint, Ren was transferred back to the 56th missile base as its Deputy Commander in 2016. These early jointness indicated that SCS was emerging as an area for Rocket Forces to conduct patrols and participate in military exercises to increase coordination with other services. For instance, the purpose of the 2014 exercise was to test joint command performance and conventional missile strike.

It has culminated in the 2020 exercise, where the Rocket Forces launched the DF-26 missile in an cross-regional confrontational exercise in response to the US aircraft carriers in South China Sea.[28] Such exercises are always meant for exhibitional deterrence, designed to use the deterrent capability of the Rocket Forces' anti-ship missiles, and to facilitate training for joint operational capabilities among different branches of the Chinese military. In general, Rocket Forces might also use its operational tactical missiles for such exercises. These missiles would be used in the early stages of a war against enemy command centres, key radar positions, air defence missile positions, and airports. For instance, in the Western Pacific, Shandong aircraft carrier conducted joint exerises with Rocket Forces to break through the second-island chain, where DF-26 missiles, intended to signal the US that the Rocket Forces have anti-ship and anti-submarine capabilities.[29] In Chinese calculations, the Rocket Force's cruise missiles could also be modified into anti-ship missiles for use against large warships, given that the

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[27] Wang Jun, "Second Artillery 56th Base Former Leader Ren Yongji has Transferred Across Service as South Sea Fleet's Deputy Chief of Staff (二炮第56基地原领导任永吉跨军兵种调任南海舰队副参谋长)," May 31, 2015, *The Paper*, (Accessed May 31, 2023).

[28] Liu Xuanzun, "PLA Rocket Forces Launches DF-26 Aircraft Carrier Killer Missile in Fast-Reaction Drills", *Global Times*, 6 October 2020, at https://www.globaltimes.cn/content/1196944.shtml (Accessed July 28, 2023).

[29] Liu Xuanzun, "China's Shandong Aircraft Carrier Group Collaborates With Rocket Force, Land-based Aviation Forces in 1st Far Sea Exercise" *Global Times*, 7 May 2023, at https://www.globaltimes.cn/page/202305/1290247.shtml (Accessed December 3, 2023).

Tomahawk was initially a surface missile, and later converted into an anti-ship missile.[30]

A Chinese report in 2015 already warned the possibility of the Rocket Forces intending to use its missile units to "reminding those who might want to control China in the South China Sea that they will face formidable missile strength."[31] In addition, Major General Yin Zhuo (of the Navy Informatisation Expert Advisory Committee) pointed out that the force has two main targets: "large warships and offshore targets … if countries in bases or airports around [the] South China Sea attack China or attempt to occupy the islands, then China has the right to use [the] Second Artillery to attack these airport or bases."[32] The recent exercises confirm the projections made in 2015.

## CONCLUSION

The deployment of strategic submarines is evolving in a way that the leadership is laying the ground for an eventual deployment of strategic nuclear submarines fitted with SLBMs. Apart from nuclear submarines, the Rocket Forces are now conducting joint exercises with the PLA Navy. Moreover, strategic submarines are now deployed in the South China Sea Fleet, and thus, further enhancing the role of sea-based nuclear deterrence. From these developments, it is evident that the China's nuclear forces at sea are weak at best, and still some time away from becoming an efficient deterrence force. Its technological limitations have played a role in the development of its deterrence, and would continue to play a role in the pace of development of deterrence at sea.

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[30] US warships in the Pacific are all fitted with Tomahawk cruise missiles.

[31] Navy Stages Live-Ammo Drill in S. China Sea," *China Daily*, August 3, 2015, at https://www.chinadaily.com.cn/china/2015-08/03/content_21483771.htm (Accessed December 3, 2022).

[32] "Major General: South China Sea Naval Exercises Concentrated at Tactical Level, Second Artillery Can Counter-Attack Foreign Bases (少将：海军南海演习属战役级 二炮可反击外国基地)," *Renmin Wang*, July 30, 2015, (Accessed January 4, 2022).

*Chapter 6*

# Campaign Science and Nuclear Deterrence

The leadership in China demands that the Rocket Force deploys nuclear forces for two objectives: namely, nuclear deterrence (核威慑), and strategic nuclear counterattack capability (战略核反击力量). Thus, Chinese nuclear deterrence is to be able to execute an effective second-strike after being subjected to a first strike. The No-First Use Policy is still part of Chinese nuclear policy as mentioned in all the white papers.

## Campaign Science and Deterrence

Scholars are divided about the nature of Chinese deterrence behaviour. Various terminologies are (minimum/credible/limited/assured) being used to conceptualise the way the nuclear forces could be used against an adversary. The Chinese leadership has urged the armed forces to debate and generate innovative theories and operational concepts. The Rocket Force has also been advised to innovate its theory. If the Rocket Force is supposed to build itself as a 'strong and modern rocket army', then it has to tackle the growing challenges regarding the modernisation of its equipment, organisation, command structure, and military systems. Xi Jinping has stated that the Rocket Force would enable China to have a "secure and favourable strategic posture". It would mean that significant focus would now be given to modernising its other nuclear forces, such as sea-based and air-based. While the air-based nuclear forces have been neglected throughout the modernisation efforts, China now believes that strategic bombers would bridge the gap. More than ever, the Rocket Force would probably be involved in military diplomacy with other countries. The ongoing evolution shows that the Rocket Force are continuing to modernise, and are given similar institutional responsibility as the other services of PLA. All these point to the critical component in the Chinese leadership's quest for a "dream of a strong army".

Chinese scholars are critical of the use of the concept "deterrence" to explain China's nuclear strategy. They are of the opinion that deterrence in the Chinese language means coercion, which has a negative connotation. Now, widely, Chinese scholars are more comfortable in describing Chinese nuclear policy as a strategy of deterrence. Chinese policy is portrayed as a strategy to deter an opponent from using nuclear weapons against China.[1] Chinese scholars accept the role of deterrence in nuclear strategy — a theoretical model fraught with debates within Western scholarship about the nature of the concept itself. This study acknowledges the assumption that deterrence plays a role in nuclear strategy since the states perceive it to be so. Chinese scholars have mostly analysed their nuclear behaviour through the concept of "uncertainty", wherein they seek to explain the defensiveness and the reliability of its retaliatory strike.[2] Using the principles of deterrence, the Rocket Force deployment is following similar patterns — such as Russia and other countries — on developing a nuclear triad.

According to John M. Colins, the principles of deterrence are: preparedness, non-provocation, prudence, publicity, credibility, uncertainty, paradox, independence, change and flexibility.[3] The deployment of the Rocket Force reflects that missiles are deployed in different bases to increase survivability, improve the credibility of the retaliatory strike by diverse deployment, and the flexibility of the forces to deter diverse nuclear actors. All these principles are present in the deployment of the Rocket Force.

Chinese scholars are attempting to explain the continuing nuclear modernisation of China. In the early decades, they were reluctant to

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1 Xinhua, "Nuclear Deterrence Targeting Non-Nuclear States a Sign of Hegemonism: Chinese Ambassador", 16 May 2019, at http://www.xinhuanet.com/english/2019-05/16/c_138061422.htm (Accessed June 3, 2022).

2 Wu Riqiang, "The Certainty of Uncertainty: Nuclear Strategy with Chinese Characteristics", *Journal of Strategic Studies*, 36 (4): 2013.

3 John M. Colins (1979), "Principles of Deterrence", *Air University Review*, at http://www.airpower.maxwell.af.mil/airchronicles/aureview/1979/nov-dec/jcollins.html.

announce their strategy as a deterrence strategy, often terming it as "coercive", thus arguing that it was not suited to describe Chinese nuclear strategy. Slowly, the Chinese scholars became comfortable terming its nuclear modernisation as a part of nuclear deterrence. For instance, Xu Guangyu, a military scholar, was of the opinion that Chinese nuclear strategy was one of "having deterrence, not threat" (有威慑，无威胁).[4] After the reforms, there are more calls to describe the pursuit of the Chinese nuclear policy as effective deterrence.[5]

For the continued modernisation and effective deployment of the nuclear forces, China has to leapfrog technologies, and achieve a technology intensive force. Since Chinese nuclear strategy is subservient to the military strategy,[6] the deployment of the nuclear forces is always subservient to the overall military strategy. The overall guidance of the Rocket Force is often articulated through declarations and guidelines that are given to the Rocket Force. From Xi Jinping statements and pronouncements, the Rocket Force has to develop and innovate, and broadly align with the objectives of the leadership. After Xi became President, he visited the delegates from the Second Artillery during the Eighth Party Congress, and called for the development of "powerful and informationalised strategic missile forces (信息化战略导弹部队)".[7] Now, after the upgradation, with his slogan of 'modern rocket army', the Rocket Force has to innovate again in terms of its deployment to better service its deterrence. Thus, there are indications of the growing importance of the Rocket Force in the current military strategy of

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4 Xu Guangyu, "Have Nuclear Deterrence, Not Nuclear Threat: Analysing the Basic Characteristics of Chinese Nuclear Strategy (有威慑 无威胁—中国核战略的基本特征解析)", *Jiefangjun Bao*, at http://chn.chinamil.com.cn/xwpdxw/2010-04/20/content_4189086.htm (Accessed May 4, 2022).

5 Xia Liping (2021), "Impact of Chinese Nuclear Doctrine on International Nuclear Disarmament", Nuclear Threat Initiative, 1-11.

6 This point is referred to all the defence white papers.

7 *Xinhua*, "Xi Jinping: Constructing Powerful Informationalised Strategic Missile Forces", (习近平：建设强大的信息化战略导弹部队), at http://news.sina.com.cn/c/2012-12-06/023925740374.shtml. (Accessed May 4, 2022).

China. The transformations in the Rocket Force are carried out in a consistent manner to perform certain tasks. For instance, the 2013 defence white paper previously describe the tasks of the Second Artillery as a core of "strategic deterrence". China's focus on strategic deterrence, its nuclear force provides the background in which China could deter the ability of other states to use nuclear weapons to signal or deter China in any potential conflict.

Following the principle of building a lean and effective force, the Rocket Force has been striving to push forward its information transformation, relying on scientific and technological progress to boost independent innovations in weaponry and equipment; modernizing current equipment selectively by applying mature technology; enhancing the safety, reliability and effectiveness of its missiles; improving its force structure of having both nuclear and conventional missiles; and strengthening its rapid reaction, effective penetration, precision strike, damage infliction, protection, and survivability capabilities. The Rocket Force's capabilities of strategic deterrence, nuclear counterattack, and conventional precision strike are being steadily elevated.[8] China has been increasingly characterizing its nuclear modernisation as an aspect of nuclear deterrence, and not a component of nuclear threat. Chinese scholars are increasingly echoing the principles of deterrence to explain Chinese behaviour regarding its nuclear modernisation, especially its expanding nuclear delivery vehicles. The transformation of the Rocket Force is essential to provide a deterrent threat in local wars, in particular to the concept of "fight to win combat" (能打仗、打胜仗).

Further strengthening the nuclear and conventional combat forces, and the concept of 'winning local wars under information conditions', should fit the requirement of the nuclear and conventional forces. Moreover, Hu Jintao had four requirements for the Second Artillery: to be in the leadership of the Party; the strategic missile forces should help China maintain its strategic posture; military training should be

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[8] *Global Times*, "Chinese Rocket Force Exercise Ensures Nuclear Counterattack Capability", 17 January 2020, at http://eng.chinamil.com.cn/ARMEDFORCES/RocketForce/News_209156/15927860.html (Accessed September 6, 2023).

increased to accomplish diversified military tasks; and innovation in military theory.[9] Therefore, during the time of Hu Jintao, the then Second Artillery focused its energies on ensuring that the forces could engage in military exercises; it also started its development in the installation of the information systems. These measures provided a guideline to the Second Artillery, which was accepted as achieved during the Xi Jinping's time. Xi had further articulated for the Second Artillery to deepen these measures and to attain combat readiness. Xi Jinping, then, explicitly made the case by defining its guideline for the Second Artillery to become "informationalised strategic missile forces".

At present, the strategic guideline for the Rocket Force to incorporate information technology at all levels — as the guideline calls for the strategic missile forces to further modernise comprehensively — is not fundamentally different as it is in line with the overall military strategy. However, whether the deployment of the Rocket Force is successful will be based on the constant innovations and adjustment of the force structure to the changing battlefield environment. Any successful deployment of the nuclear forces is dependent on several factors: structure, organisation, characteristics, command centres, transportation, bases, computers, satellites, electronic support facilities, testing and launching sites, technological development, and personnel factors. The nuclear battlefield is all-encompassing, and has no borders or boundaries. The Chinese decision-makers have underscored that local wars happen under certain conditions which reflect a nuclear environment. The deployment of nuclear forces is done under these conditions: where the battlefield does not reflect a nuclear battlefield but the presence of nuclear weapons influences the security environment.

For successful deployment, the radar and command centres have to constantly monitor any incoming rockets, and identify whether each is a threat or not. The deployment of the nuclear forces means that the nuclear warheads are deployed along with ballistic missiles and submarines. Xi Jinping's directive towards informationalised strategic

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[9] Jing Zhiyuan and Peng Xiaofeng, ibid.

missiles then follows the logic of modernising the structural, command, control, and organisational system to ensure that Chinese forces can win combat. For China, the utmost objective is the survival of nuclear arsenal from a nuclear first strike. After surviving a nuclear first strike, the second objective is to initiate a second strike, where the remaining nuclear arsenal could be enabled through either land or sea-based delivery vehicles. The 2019 defence white paper discusses the readiness of the Rocket Forces. It declares that,

> The PLARF plays a critical role in maintaining China's national sovereignty and security. It comprises nuclear missile, conventional missile and support forces, and subordinate missile bases. In line with the strategic requirements of having both nuclear and conventional capabilities and deterring wars in all battlespaces, the PLARF is enhancing its credible and reliable capabilities of nuclear deterrence and counterattack, strengthening intermediate and long-range precision strike forces, and enhancing strategic counter-balance capability, so as to build a strong and modernized rocket force.[10]

The 2019 defence white paper, on the other hand, declares that China,

> Nuclear capability is the strategic cornerstone to safeguarding national sovereignty and security. China's armed forces strengthen the safety management of nuclear weapons and facilities, maintain the appropriate level of readiness and enhance strategic deterrence capability to protect national strategic security and maintain international strategic stability.[11]

There are two types of responses. One is a response to a potential or real nuclear threat; another is a response to an actual nuclear attack. The transformation was to make the Rocket Force move from military preparedness to combat readiness. The Rocket Force would focus on

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[10] Defence White Paper 2019, ibid.

[11] 2019 China's National Defence in the New Era, at http://www.xinhuanet.com/english/2019-07/24/c_138253389.htm

the following: flexibility and accuracy, mobile launchers; manoeuvring warheads, improved target sensors, command and control. This need for combat readiness has come due to the change in assessment of the security environment. Resultantly, the transformation of the Rocket Force has aimed at these areas, and the Chinese leadership acknowledges that improvements have been made in the above-mentioned areas.

Xi Jinping elaborated on the "new situation", and the need for the Rocket Force to adapt to it. Xi has shown importance to the PLA Rocket Force, which has elicited support from the service. The nuclear role of the Rocket Forces has become more sophisticated in the overall strategic deterrence. The construction of nuclear deterrent would continue to develop but the conventional strike has to be factored in strategic deterrence, which will be diversified, rapid and flexible. Because the US has started to asserted dominance in conventional spectrum, China's nuclear deterrent has to be placed within the context of its strategic deterrence, but in particular, the nuclear deterrent is to prevent the adversaries from launching a pre-emptive strike under any circumstances in a way that keeps the strategic stability with the US.[12] It also means the continuous modernisation of the delivery vehicles. All these factors had improved the Rocket Force in its operational campaign and nuclear deterrence.

## COUNTERSTRIKE CAPABILITY

One of the most important components of Chinese nuclear deterrence is its counter-strike capability. All statements from Chinese officials and other policy papers show the primary focus of Rocket Force to be this. As the Rocket Force is transforming, the counter-strike capability would increase. Moreover, the method in which the Rocket Force would conduct a counter-strike would also evolve. Earlier, the Second Artillery controlled only land-based nuclear missiles. But now, to what

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[12] Ge Tengfei, "Build a strong national strategic deterrent system"(打造强大的国家战略威慑力量体系), *Renmin Luntan*, 21 November, 2022, at http://www.rmlt.com.cn/2022/1121/660748.shtml (Accessed May 4, 2023).

extent the Rocket Force would control the nuclear forces is unknown. First, there are increasing signs that the Chinese leadership is focused towards fulfilling the nuclear triad of capability — the capability to have nuclear forces at land, air, and sea. They acknowledge that while these capabilities were not given consideration due to resource constraints in the past, in the future, China would have a nuclear triad. In particular, the Rocket Force may incorporate the other nuclear forces of Air Force and Navy to truly become a 'strategic rocket force'.[13] If such changes are carried out, then the Rocket Force would exponentially increase its counter-strike capability.

Chinese discourse on counter-strike capability began with the concept of 'nuclear blackmail'. The Chinese leadership accused the US of threatening to use nuclear weapons on China during 1950–55, during the Korean War and Taiwan Crises. This part of history has affected Chinese nuclear transformation, thus affecting its deployment patterns. The patterns suggest that land-based and sea-based nuclear forces are enough; therefore, the survivable nuclear forces could be used for second-strike. China's counterstrike was kept small, as the rationale remained that as long as survivability was ensured, then a modest nuclear force was sufficient for nuclear deterrence. For China, the principal strategy was to contain the enemy's threat of use, or use of nuclear weapons against China. The strike capability is generally aimed towards military bases, command centres, military airports, and political centres.

Nevertheless, improvements in US Global Prompt strike have left many analysts contemplating changes in Chinese nuclear deterrence and strategy. This has led to discussions on incorporating deterrence behaviour, such as launch on warning and launch on attack.[14] One of the discussions that has dominated the state of counterstrike capability is the presence of missile defence. The installation of missile defence

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[13] Xia Liping and Tian Bo, "Nuclear Arms Control From the Perspective of China's Nuclear Strategic Doctrine" (中国核战略学说视阈下的核军控), *The Paper*, 15 June 2020, at https://www.thepaper.cn/newsDetail_forward_7847883 (Accessed June 3, 2023).

[14] For a discussion, See Li Bin, 2001, ibid.

has been observed as the most significant development to affect Chinese nuclear deterrence. However, the Chinese responses to missile defence shows a far complex picture, where it is not necessarily threatened by the battlefield performance of missile defence, rather the US ability to threaten the efficiency of the Chinese deterrence, which is largely driven by missile-based deterrent identity.[15]

## CONCLUSION

Chinese nuclear deterrence and campaign science are undergoing changes. Due to the result of change in organisation, capabilities, deployment, and upgradation, the role of campaigns of the Rocket Force is also transforming, and the capability to conduct a nuclear strike is increasing because of strategic bombers and submarines. However, while Chinese nuclear forces might have an effective land-based nuclear capability, its technological limitations of air and sea-based nuclear deterrence lags behind that of the US or Russia. Since its nuclear deterrence is predominantly geared towards the US, then the success of its deterrence would depend on its capability to defeat US naval, air, and space-based capabilities. Therefore, the uncertainty of survivable nuclear weapons would prevent the US from using nuclear first strike. However, the use of its nuclear forces against US forces deployed in the Pacific would not be optimal. The Chinese leadership understands these constraints. Therefore, the move towards new strategic bombers and newer strategic submarines point to efforts to solidify existing capabilities.

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[15] M. S. Prathibha, "Missile Defence and China", MP-IDSA Monograph Series No. 81, August 2023, Pentagon Press.

*Chapter 7*

# ASSESSING NUCLEAR CAPABILITIES AND IMPLICATIONS

The deployment of nuclear forces in Chinese deterrence policy has been mixed. While the land-based nuclear forces and the Rocket Force are improving at their combat capability, the development in terms of air-based deterrence is very low. However, China is keen on developing its strategic submarines as an addition to land-based forces. This would ensure that it has second-strike capability, and the survival of its nuclear weapons. This is not to say that there have been no developments in the field of nuclear weapons. Research that could have implications for fourth generation nuclear weapons is already underway.[1] The Rocket Force is also suffering from the impact on the arms embargo on China that has been effective since the Tiananmen Square protests. Many of the western technologies that could have been useful in raising the general military technology level of Chinese military industrial complex are not available to China. China has to rely on its domestic industry, and its own technical and scientific community to mitigate challenges.

Though China is integrating its civil and military — therefore enabling it to produce weapons for the Chinese armed forces and increase licensing for enterprises — the implementation of this policy would depend on the domestic industry's ability to transform and develop the needed weapons systems and equipment. The Rocket Force is also part of this. The Rocket Force Equipment department has been involved in using domestic industries for its weapons systems. In addition, as the defence budget allocation for the PLA Army is

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1 *CGTN*, "China makes breakthrough in controllable nuclear fusion technology for new-generation 'artificial sun, 28 August 2023, at https://news.cgtn.com/news/2023-08-27/China-makes-breakthrough-in-controllable-nuclear-fusion-tech-1mBx4sW4gtW/index.html (Accessed September 5, 2023).

decreasing, the allocation for other military services is increasing, including for the Rocket Force.

The Rocket Force is slowly changing its organisation, structure, and training programmes, along with other services. However, there would several challenges that would emerge once China attempts to operationalise sea deterrence patrols. The command and control of nuclear warheads, and the authorisation to use those codes, would have to be transferred to the field officer. Whether the Rocket Force or the PLA Navy would have ultimate authority has to be decided, and the role of the theatre command in this has to be underscored. Thus, when the theatre command meet on any occasion, the chain of command on a nuclear decision has to be taken into consideration for sea-based nuclear deterrence. If it changes, the information countermeasures for nuclear command and control have been increased. The general safety of the nuclear authorization procedures has been modernised to improve the decision-making process.

The Rocket Force is a highly centralised organisation, which controls the missiles and the associated warheads. The troops have been trained in nuclear emergency situations, as also in nuclear deterrence and launch operations. The nuclear warhead storage and transport is a centralised system, with tight control by the political authority. The political control of nuclear weapons is important to the Chinese leadership. The 'absolute leadership of the Party' is supposed to be accepted within all the organisations, more so in the Rocket Force. When China moves away from land-based deterrence, the position and deployment of nuclear warheads will not be on land but at sea. This places the control of the warheads with the theatre commander. The warheads travel with the submarine, ensuring that a high level of coordination should remain within the leadership structure to manage the deployment of these nuclear warheads. Moreover, the leadership should have considerable confidence in the strategic submarine troops and the commanders in the submarine. The challenge for the Rocket Force is to identify its role and its position in the changing nuclear capability of China, to either influence the leadership in taking more nuclear roles or coordinate with other military services to conduct nuclear operations. Unlike other nuclear powers, such as the US and Russia, wherein nuclear weapons technology has developed enough to be delivered through different kinds of ways, Chinese nuclear forces are still evolving.

Unless China can accommodate these changes, the capability to deploy more than land-based nuclear forces effectively remains diminished. The recent shuffles in the leadership of the Rocket Forces point to such challenges. The Chinese leadership has fundamentally looked at nuclear counterstrike capability for an effective deterrence. The land-based forces have matured enough to provide some counterstrike efforts. But, in the Chinese perspective, a truly sufficient counterstrike cannot function without SSBN deployment. In this context, Chinese deployment is an ongoing process, and requires political will and vast technological and human resources.

The PLA Rocket Force might increasingly adopt a limited nuclear role as it is subjected to limitations enforced by the leadership and as well as the broadening of its role in conventional missile capability. After upgradation, the duties and responsibilities of the service are becoming complex as the leadership wants it to become a 'modern rocket army' as well as contribute to the leadership's political and military objectives.

As of now, it is clear that without more sophisticated SSBNs, and newer strategic bombers, the Chinese nuclear forces are pursuing effective deterrence through changing patterns of deployment, ensuring robustness through faster coordination and response between the nuclear forces and between nuclear and conventional forces. However, diversified deployment is clearly the choice that the Chinese leadership is moving towards by spreading its nuclear forces from land to seas. The challenge is to maintain a limited arsenal without decreasing stability. The composition of the nuclear forces would be to predominantly rely on the land-based nuclear forces in the short term for effective deterrence and then concentrate on its sea-based deterrence once it can safely trust the command and control structures of the Rocket Forces in an event of a nuclear threat against accidental and unauthorised uses. Overall, the PLA's nuclear forces are facing compelling choices as to enhance the robustness of its posture without being dragged into an arms race.

# TABLE 1
# PREVIOUS ADMINISTRATIVE LEVEL ORGANISATION

*Administrative Level*
*Second Artillery Headquarters*
↓
*Headquarters Department*
*Political Department*
*Logistics Department*
*Equipment Department*
↓
**Missile Base (+ Support Regiments)**
↓
*Head Quarters Department*
*Political Department*
*Logistics Department*
*Equipment Department*
↓
**Missile Brigade**
↓
*Head Quarters Department*
*Political Division*
*Logistics Divison*
*Equipment Divison*
↓
**Launch Battalion**
↓
*Headquarters Department*
*Political Division*
*Logistics Organisation*
*Equipment Organisation*

# TABLE 2
# MISSILE DEPLOYMENT CHART AFTER REFORMS

1) Base 61(火箭军第61基地) - Huangshan - 96151 Unit

611 Brigade - Chizhou (池州) - 96711 Unit - DF-21A

612 Brigade - Leping (乐平) - 96712 Unit - DF-21A

613 Brigade - Shangrao (上饶) - 96713 Unit - DF-15B

614 Brigade Yongan (永安) - 96714 Unit - DF-11A

615 Brigade Meizhou (梅州) - 96715 Unit - DF-11A

616 Brigade Gangzhou (赣州) - 96716 Unit - DF-15

617 Brigade Jinhua (金华) - 96717 Unit - DF-16A

Testing and Training Group - Unit 96166, Chizhou,

Training Regiment - Unit 96171, Jiangshan, Zhejiang

Technical Service Regiment - Unit 96172, Huangshan, Anhui

Assembly and Inspection Regiment - Unit 96173, Jingdezhen, Jiangxi

Repair Regiment - Unit 96714, Xiuning, Anhui

Communication Regiment - Unit 96715, Huizhou, Anhui

Guided-Missile Equipment Warehouse/Depot - Unit 96716 Shangrao, Jiangxi

2) Base 62 (火箭军62基地) Kunming, Yunnan

621 Brigade – Yibin, (宜宾) - Unit 96721- DF-21A? DF-15B?

622 Brigade – Yuxi, (玉溪市) – Unit 96722 - DF-31A

623 Brigade – Liuzhou (柳州) – Unit 96723 - DF-10A

624 Brigade – Danzhou (儋州) – Unit 96724 - DF-21C/D

625 Brigade – Jianshui (建水) – Unit 96725 - DF-26

626 Brigade – Qingyuan (清远) – Unit 96726 - DF-26

627 Brigade - Puning (普宁) – Unit 96727 - DF-17

Training Regiment – Unit 96221 (Chenggong / Kunming, Yunnan)

Technical Service Regiment – Unit 96222 (Kunming)

Assembly and Inspection Regiment - Unit 96223, Dehua, Yunnan

Repair Regiment - Unit 96224, Kunming.

Communication Regiment, Unit 96225, Kunming

2) Base 63 (火箭军63基地) Unit 96301 Huaihua, Hunan

631 Brigade - Jinzhou (荆州) - DF-5B

632 Brigade - Shaoyang (邵阳) - DF-31AG

633 Brigade - Huitong (会同) Unit 96315 - DF-5A

634 Brigade - Tongdao (通道) – Unit 96313 – DF-26

635 Brigade – Yichun (宜春) - DF-10

636 Brigade - Shaoguan (韶关) - DF-16

637 Brigade – DF-100

Training Regiment – Unit 96321, Dongkou (洞口), Hunan

Technical Service Regiment – Unit 96322 – Jingzhou (靖州), Hunan

Assembly and Inspection Regiment – Unit 96323 – Huaihua, Hunan

Repair Regiment – Unit 96324 – Huaihua

Communication Regiment – Unit 96325 – Huaihua

3) Base 64 (火箭军64基地) – Xining (西宁), Qinghai

641 Brigade - Hancheng (韩城) – Unit 96741 - DF-31

642 Brigade - Datong (大通) – Unit 96742 - DF-31

643 Brigade -Tianshui (天水) – Unit 96743 - DF-31AG

644 Brigade - Hanzhong (汉中) – Unit 96744 - DF-10A

645 Brigade - Yinchuan (银川) – Unit 96745 - DF-16

646 Brigade - Korla (库尔勒) – Unit 96746 - DF-2C

647 Brigade - Xining (西宁) – Unit 96747 - DF-41

Plateau Training Base– Unit 96367 – Delingha (德令哈)

Training Regiment – Unit 96371 – Xining

Technical Service Regiment – Unit 96372 – Xining

Assembly and Inspection – Unit 96373 – Xining

Repair Regiment – Unit 96374 – Chengbei District, Xining

Communication Regiment – Unit 96375 – Xining

Troops Training Base – Unit 96367 – Delingha, Qinghai / Ruoqiang, Xinjiang (若羌)

4) Base 65 (火箭军65基地) - Shenyang (沈阳) – Unit 96101

651 Brigade - Dalian (大连) - DF-21A

652 Brigade - Tonghua (通化) – Unit 96115 - DF-21C

653 Brigade - Laiwu (莱芜) – Unit 96117 - DF-21D

654 Brigade - Dalian (大连) – Unit 96113 - DF-26

655 Brigade - Tonghua – DF-31AG

656 Brigade - Laiwu – DF-10

657 Brigade – DF-100

Technical Service Regiment – Unit 96122 - Tonghua

Assembly and Inspection – Unit 96123 - Liuhe

Repair Regiment – Unit 96124 - Tonghua

Communication Regiment – Unit 96125 – Tonghua, Jilin / Shenyang, Liaoning

Missile Equipment Warehouse – Unit 96126 – Wuhan, Hubei

5) Base 66 (火箭军66基地) – Luoyang (洛阳) – Unit 96251

661 Brigade - Lushi (卢氏) – DF-5B

662 Brigade – Luanchuan (栾川) – DF-41

663 Brigade - Nanyang (南阳) – Unit 96265 - DF-31A

664 Brigade - Xinyang (信阳) – Unit 96267 - DF-31AG

665 Brigade - Xinxiang (新乡) – DF-10A

666 Brigade - Xinyang - DF-26

667 Brigade – DF-17

Technical Service Regiment – Unit 96271 – Yiyang (宜阳), Henan

Assembly and Inspection – Unit 96272 – Luoyang, Henan

Repair Regiment – Unit 96273 – Lushi, Henan

Communication Regiment – Unit 96234 - Luoyang

Missile Equipment Warehouse – Unit 96235 – Sanmenxia (三门峡), Henan

Base 67 (火箭军67基地) – Unit 96401 – Baoji (宝鸡), Shaanxi (Logistics Support, Nuclear Bomb Storage)

671 Brigade

672 Brigade

673 Brigade

674 Brigade

675 Brigade

676 Brigade

Missile Technical Service Regiment – Unit 96411 - Baoji

Assembly and Inspection Brigade – Unit 96412 – Baoji

Training Regiment – Unit 96421 – Baoji

Special Transport Regiment – Unit 96422 – Baoji

Assembly and Inspection Regiment – Unit 96423 – Baoji

Teaching Group – Unit 96432

Special Vehicle Maintenance/Repair Factory – Unit 96434 – Baoji

Communication Regiment – Unit 96425 – Baoji

Chemical Defence Regiment – Unit 96426 – Baoji

Early Warning Troops – Unit 96441 – Shantou (汕头), Guangdong

Base 68 (火箭军68基地) – Unit 96531 – Luoyang, Henan

681 Brigade

682 Brigade

683 Brigade

684 Brigade

685 Brigade

686 Brigade

Engineering Installation 1 Regiment – Unit 96542 - Luoyang

Engineering Installation 2 Regiment – Unit 96544 – Luoyang

Engineering Installation 3 Regiment – Unit 96546 - Luoyang

Communications Engineering Regiment – Unit 96548 - Sanmenxia

Assembly and Inspection Regiment – Unit 96552- Luoyang

New Recruits Training Regiment – Unit 96537 – Guangzhou; Unit 96541- Baishan, Jilin; Unit 96543 - Sanmenxia

Military Training Regiment – Unit 96550 – Luoyang

Base 69 (火箭军69基地) – Unit 96451 – Jingyu, Baishan City, Jilin

691 Brigade

692 Brigade

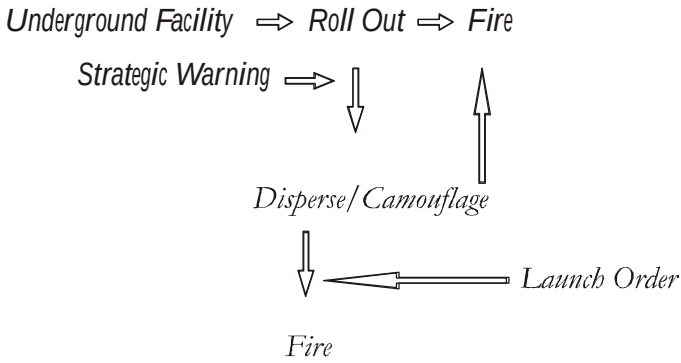
693 Brigade

694 Brigade

695 Brigade

696 Brigade

# TABLE 3
# DEPLOYMENT MODE OF CHINESE NUCLEAR MISSILES[1]




[1] Wu Riqiang, "The Certainty of Uncertainty", ibid.

China's deployment of nuclear forces are diversifying in an effort to achieve effective deterrence against its adversaries. Whereas the robustness of its nuclear posture might mean that it is moving away from its limited arsenal, however, its strategies and patterns of deployment indicate the PLA Rocket Forces are focused on improving its response and coordination for a seamless and rapid counter-strike, updating its strategy of deployment of missile systems to reduce its vulnerabilities in the post-missile defence nuclear environment and integrate its nuclear responses to portray an effective deterrence.

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