



ISSUE BRIEF

# Assessing Chinese Nuclear Posture and Doctrine in 2021

NOVEMBER 2021 CHRISTOPHER P. TWOMEY, PHD

In the context of an era of great-power competition, understanding the main countries' nuclear capabilities and strategy is vitally important.<sup>1</sup> While dwarfed by Russian and US arsenals, China's strategic arsenal is growing rapidly, and strategic thought in China is also evolving in response to a wide variety of factors. As with all nuclear powers, China is also actively relying on the space and cyber domains to serve its strategic goals. This issue brief will survey these elements.

China has a history of facing coercive nuclear diplomacy from the Cold War. Crises with the United States (Korean War both early and late as well as various crises involving the islands in the Taiwan strait in the 1950s) and the Soviet Union (most prominently in 1969) put China on the receiving end of nuclear threats with limited means to deter the then-superpowers. China's nuclear arsenal historically has aimed to deter such threats in the future (and therefore, this permitted a policy of "no first use" to be at the center of China's nuclear diplomacy, historically).

In 2020, the Pentagon provided its most precise assessment of the overall size of the Chinese nuclear arsenal ever: "China's nuclear warhead stockpile [is] currently estimated to be in the low-200s."<sup>2</sup> This was a major revelation as most previous scholarly and think tank estimates had put the arsenal at 50 percent higher than that figure. While representing only some 5 percent of the arsenal size of the United States or Russia (and smaller than France's, as well), the subset of warheads within that overall number that can threaten the United States has grown about five-fold in the past twenty years, giving China the potential to contemplate new roles for its strategic force, beyond the barest "existential deterrence."

This arsenal is deployed on a diverse set of land-based and submarine-launched missiles. China's missile force—both conventional and nuclear—is

The Scowcroft Center for Strategy and Security works to develop sustainable, nonpartisan strategies to address the most important security challenges facing the United States and its allies and partners. The Center honors the legacy of service of General Brent Scowcroft and embodies his ethos of nonpartisan commitment to the cause of security, support for US leadership in cooperation with allies and partners, and dedication to the mentorship of the next generation of leaders.

*Forward Defense (FD)* helps the United States and its allies and partners contend with great-power competitors and maintain favorable balances of power. This new practice area in the Scowcroft Center for Strategy and Security produces *Forward-looking* analyses of the trends, technologies, and concepts that will define the future of warfare, and the alliances needed for the 21st century. Through the futures we forecast, the scenarios we wargame, and the analyses we produce, *Forward Defense* develops actionable strategies and policies for deterrence and defense, while shaping US and allied operational concepts and the role of defense industry in addressing the most significant military challenges at the heart of great-power competition.

1 The views presented in this issue brief represent the author's own personal views and not necessarily the views of any governmental office. This memo draws heavily on the author's "China's Nuclear Doctrine and Deterrence Concept," in Paul Bolt and James Smith, eds., *China's Strategic Arsenal: Worldview, Doctrine, and Systems* (Washington, DC: Georgetown University Press, 2021).

2 Office of the Secretary of Defense, "Military and Security Developments Involving the People's Republic of China: Annual Report to Congress" (Washington, DC: Department of Defense, 2020): p. ix.



Military vehicles carrying DF-31A long-range missiles drive past the Tiananmen Gate during a military parade to mark the 70th anniversary of the end of World War Two, in Beijing, China, September 3, 2015. REUTERS/Jason Lee.

growing and (potentially more importantly) advancing in sophistication. Again, comparing to twenty years prior, there are major changes. Until the early 2000s, China's main force to deter the United States was a few dozen liquid-fueled DF-5A intercontinental ballistic missiles (ICBMs) in fixed silos, and its only ballistic missile launching submarine did not patrol (neither routinely, nor—perhaps—ever, given issues with its reactor).<sup>3</sup> Today, China can threaten the United States with:

- ◆ a few dozen road-mobile DF-31 ICBM variants with solid-fuel propellant;
- ◆ a few dozen of the older DF-5 ICBM systems, still liquid fueled but now with multiple warheads (MIRVs)<sup>4</sup>; and

- ◆ a few dozen JL-2 missiles that could be launched from some of China's more reliable *Jin*-class submarines.<sup>5</sup>

Today's arsenal is a more survivable force to deter the United States. That said, given the growing US missile defense capabilities, discussed below, and continued limitations of its submarine force, China has some uncertainty regarding the viability of this deterrent force. That is one driver for continued modernization and development of China's force.

In the same document cited above, the Pentagon also predicted “[o]ver the next decade, China’s nuclear warhead stockpile... is projected to at least double in size” and offers similar expectations for growth in warheads that could reach the United States.<sup>6</sup> If true, the arsenal

3 Liquid-fueled missiles generally are unfueled until immediately before firing and, because fueling a missile takes time, they are therefore more vulnerable to a first strike than their solid-fueled cousins, which can launch more swiftly.

4 China has long had the capacity to equip its missiles with multiple independently-targetable reentry vehicles (MIRVs), but restrained in doing so until around 2015. In part, this development serves as a means to overwhelm US missile defenses.

5 China has five *Jin*-class subs, with a sixth nearing completion. Each has a dozen tubes for modest ranged ICBMs.

6 Office of the Secretary of Defense, “Military and Security Developments Involving the People’s Republic of China: Annual Report to Congress,” p. ix.

will remain dwarfed by the US stockpile, and it is worth nothing that the US government has a record of expecting faster growth in China's arsenal than actually comes to pass.<sup>7</sup> Nevertheless it is clear that the overall arsenal and the number of systems that have the range to reach the United States will continue to grow. Notable systems include a road-mobile system capable of deploying multiple warheads (DF-41) and a longer-ranged submarine missile (JL-3). These systems will serve to increase the viability of China's retaliatory capabilities, but they will enable other options.

China also maintains and is developing further a variety of shorter-ranged systems to cast nuclear shadows over other target sets beyond the continental United States. China has long had a significant number of solid-fueled systems (DF-15s and -21s) that might deter Russia and India and also hold at risk US forward bases in Asia. Just as with the intercontinental ballistic missile (ICBM) force, this component of the arsenal is modernizing and expanding. Upgraded DF-21s and new DF-17 and -26s provide China with more accurate and numerous intermediate-ranged systems. Additionally, China is moving toward a triad by adding a strategic role to its air force, although the precise specifics remain uncertain.

As noted above, China proclaims its "no first use" (NFU) policy vigorously and frequently. While such declaratory policy should never be relied upon to gauge a country's actual behavior in a serious crisis, it can be a way to conceptualize sizing requirements for the force in peacetime. Until recently, nearly all of China's modernization and expansion fit comfortably in this role of creating a credible retaliatory force.

As any respectable defense planner would counsel, Chinese planners engage in "worst case analysis" of US capabilities. Three are particularly worrisome. First, precision-guided munition capabilities against its silo-based force could nullify large numbers of Chinese warheads that are deliverable against the United States. Second, known acoustic vulnerabilities in Chinese submarines leave another significant portion of its arsenal

similarly at risk.<sup>8</sup> Finally, China worries about the forty-four ground-based missile defense interceptors, based mostly in Alaska, but also about the US Navy's SM-3 block IIA systems that have a proven capability against ICBM-velocity targets. Those systems might be enough, from Beijing's perspective, to "mop up" any of its surviving force in the wake of a US preemptive attack (so as to enable US coercive leverage in an escalating conflict over Taiwan, presumably). Thus, China feels continuing pressure to modernize, diversify, and increase its forces to avoid such an outcome.<sup>9</sup> Enhancing Chinese capabilities in all these areas (and particularly to overcome missile defenses) likely serves as important motivation for new systems like air launched ballistic missiles and hypersonic systems (DF-17).

Beyond that, however, there is clear evidence that this narrow emphasis is starting to change. There are the number of training regimens, emerging doctrinal and definitional discussions, and potential force posture developments, which raise questions about important shifts in China's doctrinal approach. Evidence for these changes shows up in official reports about military exercises, in military training manuals, and within military newspaper stories. The main areas of focus are how to address conventional strikes against nuclear targets, the demand for early warning, how to train for rapid implementation of a nuclear attack, discussions of launch-on-warning postures, the potential for nuclear weapons to deter conventional war, a discussion of trans-war deterrence, and the need for some degree of warfighting within a nuclear war. None of these has been codified in a declared nuclear policy, and the evidence is not overwhelming in any individual case. Many of these stem from bureaucratic influences and the 2015 reforms of the Chinese military.<sup>10</sup> However, in the aggregate, these distinct changes suggest that a significant rethinking of the role of nuclear weapons is occurring within China.

- ◆ The deliberate design of the DF-26 to be flexibly "dual capable" strongly suggests that China is trying to deter the United States from intense conventional war by use of a nuclear shadow through inadvertent

7 For nearly a dozen examples on this point, see Hans Kristensen, "DIA Estimates For Chinese Nuclear Warheads," Federation of American Scientists, May 31, 2019, <https://fas.org/blogs/security/2019/05/chinese-nuclear-stockpile/>.

8 In 2009, the Office of Naval Intelligence published a chart depicting the relative acoustic quietness of Chinese SSBNs. If this assessment reflects Chinese perceptions, it would not enhance confidence of the survivability of those fifty-odd warheads.

9 See the team report I contributed to at Eric Heginbotham et al., *China's Evolving Nuclear Deterrent*, RAND Corporation, RR-1628-AF (Santa Monica, CA, 2017), [https://www.rand.org/pubs/research\\_reports/RR1628.html](https://www.rand.org/pubs/research_reports/RR1628.html).

10 Eric Heginbotham, Jacob L. Heim, and Christopher P. Twomey, "Of Bombs and Bureaucrats: Internal Drivers of Nuclear Force Building in China and the United States," *Journal of Contemporary China*, Vol. 28, No. 118 (July 4, 2019): 538–57, <https://doi.org/10.1080/10670564.2018.1557945>.



A test launch of the Ground-Based Interceptor missile. US Air Force photo by Michael Peterson/Released. <https://www.afspc.af.mil/News/Article-Display/Article/731276/missile-defense-test-completed/>.

escalation. It should not be surprising that adversaries do not go to great lengths to make the world safe for their opponents to dominate with conventional forces. But this does raise concerns for the United States.

- ◆ It has become crystal clear that a major caveat must be acknowledged regarding the NFU stance in the face of conventional strikes on Chinese nuclear forces. Other ways that the boundaries of the NFU's applicability have been blurred are also apparent. For instance, some evidence suggests that China might consider moving to a launch-on-warning or launch-on-threat posture. This raises some important questions: How would such warning be assessed? What capabilities do the Chinese have to differentiate between a nuclear and a non-nuclear attack? Indeed,
- ◆ such a scenario highlights a broader issue: What constitutes "use"?
- ◆ A number of Chinese sources suggest an increased perception in the value of nuclear weapons beyond mere deterrence of their use against China. The view that nuclear weapons somehow enhance China's major power status is new and suggests a perception that they broadly contribute to China's security, well beyond mere deterrence of an adversary's nuclear attack.
- ◆ There is clearly increased Chinese thinking about and discussion of the ways nuclear weapons limit war. At the extreme, the change could be entirely consistent with a basic articulation of a modern NFU policy that views nuclear weapons as having only the circumscribed utility to limit wars from "going nuclear." However, the contemporary Chinese discussions go further.
- ◆ Additionally, there are some signs that indicate that China's traditionally relaxed view about the pace of retaliation necessary to achieve deterrence is starting to change and that China is looking for ways to ensure timely retaliation (or attack). At a broad strategic level, the changing emphasis on the speed of response is clear. All of this suggests a growing sense that Chinese nuclear forces need to be more responsive and flexible to achieve the country's strategic goals.
- ◆ Even more interesting is the emerging evidence of Chinese thinking about trans-war deterrence that raises a number of questions. Reserving a portion of a nuclear arsenal suggests that the actor at least thinks there is a chance of nuclear warfare being controlled and limited. Other authoritative sources focus on making deliberate choices about the scale of the nuclear response.
- ◆ Another aspect of China's force development is the increasing accuracy of Chinese ballistic (and cruise) missiles. This raises additional questions about the potential for missile technology to contribute to some degree of warfighting in a nuclear conflict. Accuracy is not needed to hold the adversary's cities at risk; it is, however, important to be able to either reduce the other side's nuclear forces (particularly fixed silo-based missiles) or attack key logistics nodes vital to supplying conventional forces.



Military vehicles carrying DF-26 ballistic missiles travel past Tiananmen Gate during a military parade to commemorate the 70th anniversary of the end of World War II in Beijing Thursday Sept. 3, 2015. REUTERS/Andy Wong/Pool.

◆ Finally, the shift in the organizational structure of the People's Liberation Army has worrisome implications for the issue of nuclear use during conventional conflict. It is clear that the move toward joint force integration embodied in new, joint "theater commands" is a major undertaking. Yet there remain serious questions about the nature of the changes regarding missile forces that are entailed.

Beyond these developments in the nuclear arena, China is actively engaging in missile defense system development. China is developing its own midcourse intercept missile defense system and fields shorter ranged systems. Missile defense systems have proliferated throughout Asia, and there are strategic rationales for China to possess such a system in any conflict with India. (The United States, on the other hand, will be able to substantially overwhelm any Chinese missile defenses for the foreseeable future.) China also wants to deepen its understanding

of such systems to facilitate its own ability to deploy countermeasures to defeat them.

China is emerging as a major player in the militarization of space. Aside from its 2007 kinetic test of an antisatellite (ASAT) interceptor, the recently tested Chinese midcourse interceptor inherently has ASAT capabilities (as shown by the US destruction of a National Reconnaissance Office satellite with a SM-3 missile defense interceptor in the 2008 *Burnt Frost* operation). China has also deployed a maneuvering satellite in geosynchronous orbit and is working on capabilities to address space debris that would have inherent weaponization potential.<sup>11</sup> At the same time, China increasingly depends on space assets for both the conduct of its own military operations, especially any that are away from China's home territories, and for economic advantages (through the Baidou global positioning system). Finally, it is worth emphasizing that China does not have a tradition of relying on early-warning satellites

11 Thomas G. Roberts, "Unusual Behavior in GEO: SJ-17," Aerospace Security, Center for Strategic and International Studies, March 30, 2020, <https://aerospace.csis.org/data/unusual-behavior-in-geo-sj-17/>; US Defense Intelligence Agency, "Challenges to Security in Space," January 2019, [https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space\\_Threat\\_V14\\_020119\\_sm.pdf](https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf).

for launch-on-warning nuclear attacks. Although this is starting to change, such a doctrinal legacy likely means that China does not view attacks on space assets as escalatory in the same way the United States and Russia do.<sup>12</sup> As China develops a greater reliance on space assets, this debate about offense-defense dominance and advantages will evolve.

A final area that interacts with traditional strategic affairs is the cyber domain. While the Chinese have not deployed actual cyberattacks as aggressively as the Russians have, they have certainly been active collectors of intelligence.<sup>13</sup> More broadly, the Chinese military has highlighted the importance of information technology within both doctrinal discussions (the cumbersome “informationalization” term litters Chinese military writings and pronouncements) and organizational reforms (with the development of a nearly co-equal service with responsibility for such concepts, the Strategic Support Force). What this means for China’s nuclear strategy and posture is, however, rather opaque. Historically, China has not needed highly advanced command and control systems to implement its nuclear strategy. Again, this likely means that the Chinese do not view US strategic command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems as somehow sacrosanct, particularly as in many cases such systems would have relevance to both conventional and nuclear strikes. As noted above, China sees no obligation to contribute to the effectiveness of US conventional operations.

Stepping back, the major muscle movement of Chinese force modernization is explicable in the context of ensuring a robust, survivable retaliatory force against US escalation—potentially across the nuclear threshold—in a major conflict. That has the potential to create security dilemmas, generate arms races, and reify adversarial views. But even more worrisome are the emerging developments in the Chinese military that highlight additional roles for nuclear weapons that might expand such concerns.

## About the Author

**Christopher P. Twomey** is an associate professor in the Department of National Security Affairs at the Naval Postgraduate School, where he focuses on Chinese foreign policy and East Asian security issues. He authored *The Military Lens: Doctrinal Differences and Deterrence Failure in Sino-American Relations* (Cornell University Press, 2010) and articles in journals such as *Security Studies*, *Journal of Contemporary China*, and *Asian Survey*. Dr. Twomey received his PhD in Political Science from the Massachusetts Institute of Technology, his undergraduate and MA degrees from UC San Diego, and conducted postdoctoral research at Harvard.

## Acknowledgements

The Scowcroft Center for Strategy and Security’s work on nuclear and strategic forces has been made possible by support from our partners, including: Los Alamos National Laboratory, Northrop Grumman Corporation, Norwegian Ministry of Defense, the United States Department of Defense, the United States Department of Energy, as well as general support to the Scowcroft Center. The partners are not responsible for the content of this report, and the Scowcroft Center maintains a strict intellectual independence policy.

12 On the importance of such legacies, see Christopher Twomey, *The Military Lens: Doctrinal Differences and Deterrence Failure in Sino-American Relations* (Ithaca, NY: Cornell University Press, 2010).

13 Andy Greenberg, *Sandworm: A New Era of Cyberwar and the Hunt for the Kremlin’s Most Dangerous Hackers* (New York: Anchor, 2019).



### CHAIRMAN

\*John F.W. Rogers

### EXECUTIVE CHAIRMAN EMERITUS

\*James L. Jones

### PRESIDENT AND CEO

\*Frederick Kempe

### EXECUTIVE VICE CHAIRS

\*Adrienne Arsht

\*Stephen J. Hadley

### VICE CHAIRS

\*Robert J. Abernethy

\*Richard W. Edelman

\*C. Boyden Gray

\*Alexander V. Mirtchev

\*John J. Studzinski

### TREASURER

\*George Lund

### DIRECTORS

Stéphane Abrial

Todd Achilles

\*Peter Ackerman

Timothy D. Adams

\*Michael Andersson

David D. Aufhauser

Barbara Barrett

Colleen Bell

Stephen Biegun

\*Rafic A. Bizri

\*Linden P. Blue

Adam Boehler

Philip M. Breedlove

Myron Brilliant

\*Esther Brimmer

R. Nicholas Burns

\*Richard R. Burt

Teresa Carlson

James E. Cartwright

John E. Chapoton

Ahmed Charai

Melanie Chen

Michael Chertoff

\*George Chopivsky

Wesley K. Clark

\*Helima Croft

Ralph D. Crosby, Jr.

\*Ankit N. Desai

Dario Deste

\*Paula J. Dobriansky

Joseph F. Dunford, Jr.

Thomas J. Egan, Jr.

Stuart E. Eizenstat

Thomas R. Eldridge

Mark T. Esper

\*Alan H. Fleischmann

Jendayi E. Frazer

Courtney Geduldig

Meg Gentle

Thomas H. Glocer

John B. Goodman

\*Sherri W. Goodman

Murathan Günal

Amir A. Handjani

Frank Haun

Michael V. Hayden

Tim Holt

\*Karl V. Hopkins

Andrew Hove

Mary L. Howell

Ian Ihnatowycz

Mark Isakowitz

Wolfgang F. Ischinger

Deborah Lee James

Joia M. Johnson

\*Maria Pica Karp

Andre Kelleners

Henry A. Kissinger

\*C. Jeffrey Knittel

Franklin D. Kramer

Laura Lane

Jan M. Lodal

Douglas Lute

Jane Holl Lute

William J. Lynn

Mark Machin

Mian M. Mansha

Marco Margheri

Michael Margolis

Chris Marlin

William Marron

Gerardo Mato

Timothy McBride

Erin McGrain

John M. McHugh

Eric D.K. Melby

\*Judith A. Miller

Dariusz Mioduski

\*Michael J. Morell

\*Richard Morningstar

Georgette Mosbacher

Dambisa F. Moyo

Virginia A. Mulberger

Mary Claire Murphy

Edward J. Newberry

Thomas R. Nides

Franco Nuschese

Joseph S. Nye

Ahmet M. Ören

Sally A. Painter

Ana I. Palacio

\*Kostas Pantazopoulos

Alan Pellegrini

David H. Petraeus

W. DeVier Pierson

Lisa Pollina

Daniel B. Poneman

\*Dina H. Powell

McCormick

Ashraf Qazi

Robert Rangel

Thomas J. Ridge

Gary Rieschel

Lawrence Di Rita

Michael J. Rogers

Charles O. Rossotti

Harry Sachinis

C. Michael Scaparrotti

Ivan A. Schlager

Rajiv Shah

Gregg Sherrill

Ali Jehangir Siddiqui

Kris Singh

Walter Slocombe

Christopher Smith

Clifford M. Sobel

James G. Stavridis

Michael S. Steele

Richard J.A. Steele

Mary Streett

\*Frances M. Townsend

Clyde C. Tuggle

Melanne Verveer

Charles F. Wald

Michael F. Walsh

Ronald Weiser

Olin Wethington

Maciej Witucki

Neal S. Wolin

\*Jenny Wood

Guang Yang

Mary C. Yates

Dov S. Zakheim

### HONORARY DIRECTORS

James A. Baker, III

Ashton B. Carter

Robert M. Gates

James N. Mattis

Michael G. Mullen

Leon E. Panetta

William J. Perry

Colin L. Powell

Condoleezza Rice

Horst Teltschik

William H. Webster

*\*Executive Committee Members*

*List as of August 26, 2021*



The Atlantic Council is a nonpartisan organization that promotes constructive US leadership and engagement in international affairs based on the central role of the Atlantic community in meeting today's global challenges.

© 2021 The Atlantic Council of the United States. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means without permission in writing from the Atlantic Council, except in the case of brief quotations in news articles, critical articles, or reviews. Please direct inquiries to:

Atlantic Council

1030 15th Street, NW, 12th Floor,  
Washington, DC 20005

(202) 463-7226, [www.AtlanticCouncil.org](http://www.AtlanticCouncil.org)