China's Military Space Capabilities and Implications for the United States

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Introduction

The rapid expansion of China's space architecture, coupled with its relative lack of transparency regarding the true intentions of these capabilities, has triggered concern among U.S. military and political leadership. The United States has historically been the state that most relies on its space capabilities and has long benefited from a significant advantage on the use of space for supporting military operations. This has enabled the United States to project power across the globe and ensure its allies' security, but it has also created a vulnerability that could be exploited by adversaries in conflict. Both the United States and China have cited space superiority as a national security goal, setting the stage for a high stakes competition that will impact the strategic balance between the United States and China.[1] China's rapid development of its own military space capabilities risks threatening long-held U.S. space dominance and puts U.S. terrestrial forces at increased risk. At the same time, China's increasing dependence on space for its own military purposes create new vulnerabilities for it. As space becomes increasingly crowded and contested, the struggle for space dominance will only intensify. This paper explores how China's space and counterspace developments pose an increasing risk for the United States —both on Earth and in space—while also identifying areas in which China's increasing space dependence could serve to increase stability in space in a U.S.-China crisis.

China's parallel space and counterspace developments provide China with a range of options for both exploiting space to hold U.S. terrestrial forces at risk and targeting U.S. space systems. This presents an interesting and complex dynamic. On the one hand, the United States remains more dependent on space than China for its military objectives. On the other hand, China is increasingly developing space capabilities that would allow it to exploit space for its own military objectives, creating a vulnerability the United States could exploit. The rapid pace of developments in space, coupled with the development and application of emerging technologies, create an uncertain and unpredictable future for U.S.-China stability. China's space strategy and capabilities development point to an increasing focus on "soft-kill" or non-kinetic counterspace weapons as a means to hold U.S. space assets at risk while reducing escalation risks. Writings from China's People's Liberation

[1] U.S. Space Force, *Space Warfighting: A Framework for Planners* (April 10, 2025). https://www.spaceforce.mil/Portals/2/Documents/SAF_2025/Space_Warfighting_-_A_Framework_for_Planners_BLK2_(final_20250410).pdf. Accessed August 20, 2025; China Aerospace Studies Institute, *In Their Own Words: China's Aerospace Security Strategic Concept* (January 30, 2023). https://www.govinfo.gov/content/pkg/GOVPUB-D301-PURL-gpo212423/pdf/GOVPUB-D301-PURL-gpo212423.pdf. Accessed August 20, 2025.

Army (PLA) strategists show that China has a broader conception of deterrence that has the potential to lead to risky situations with unintended consequences in space.

Space, Deterrence, and Crisis Stability

As the United States has raised alarm bells surrounding its vulnerability in space,[2] significant work has been done to understand how traditional concepts of deterrence and stability would apply to the space domain.[3] Recognizing that space presents unique characteristics as a military domain, scholars have analyzed what deterrence in space would seek to achieve and under what conditions it would likely hold.

General deterrence is understood as a situation that is achieved when two states are discouraged from taking hostile action—notably armed attack—against one another.[4] Efforts to achieve deterrence often include a combination of buildup in capabilities, the willingness to use those capabilities should the adversary take unwanted action, and the communication of those capabilities and willingness to the adversary. Deterrence in the space domain operates in fundamentally the same way. Deterrence in space holds when two states are each discouraged from taking action against the others' space capabilities. Deterrence in space, as in other domains, is more likely to hold when there is crisis stability. Crisis stability is a state in which there is a lack of incentives for either opponent to launch a preemptive attack in a crisis or escalate a conflict into a broader war.[5]

Any form of deterrence is only effective in the extent to which it can influence its target to behave in a certain way that the deterrer finds acceptable. This requires an understanding of how the deterrence target values and perceives the capabilities and commitment of both the deterrer and

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[2] David Vergun, "Official Details Space-Based Threats and U.S. Countermeasure," DOD News (blog), U.S. Department of Defense (April 26, 2023). https://www.defense.gov/News/News-Stories/Article/Article/3375577/official-details-space-based-threats-and-us-countermeasures/. Accessed August 20, 2025.
[3] For example, see: Stephen J. Flanagan, Nicholas Martin, Alexis A. Blanc, Nathan Beauchamp-Mustafaga, *A Framework of Deterrence in Space Operations*, RAND Corporation (August 31, 2023). https://www.rand.org/pubs/research_reports/RRA820-1.html. Accessed August 20, 2025; Alexandra T. Evans, Andrew Radin, Katie Feistel, Krista Langeland, Bruce McClintock, Howard Wang, Space Strategic Stability, RAND Corporation (May 8, 2024). https://www.rand.org/pubs/research_reports/RRA2313-1.html. Accessed August 20, 2025; Dennis M. Rice, *Deterrence and Space Strategy: A Framework from the Study of History and Theory*, Air University Press (December 6, 2023). https://www.airuniversity.af.edu/AUPress/Display/Article/3608997/deterrence-and-space-strategy-a-framework-from-the-study-of-history-and-theory/. Accessed August 20, 2025; Kevin Pollpeter, Elizabeth Barrett, and April Herlevi, Deterring China's Use of Force in the Space Domain, Center for Naval Analyses (May 20, 2025). https://www.cna.org/analyses/2025/05/deterring-chinas-use-of-force-in-the-space-domain. Accessed August 20, 2025.
[4] Michael J. Mazarr, *Understanding Deterrence*, RAND Corporation (April 19, 2018). https://www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE295/RAND_PE295.pdf. Accessed August 14, 2025.
[5] Anya Loukianova Fink, *Crisis Stability in the Twenty-First Century: Discussion Paper for a Track II Dialogue on U.S.-Russian Crisis Stability*, Center for Strategic and International Studies (September 2017). https://gotech.spp.umd.edu/sites/default/files/2019-07/180508_Fink_CrisisStability.pdf. Accessed August 14, 2025.

themselves. It's challenging to understand China's space strategy, policy, and doctrine because it continues to assert in official documents the importance of using space for peaceful purposes. China has no public official counterspace doctrine that would provide understanding of their intentions, including the role counterspace capabilities play in Chinese military strategy, when and how they would be employed, and what they would target. Writings from PLA strategists, however, do provide a degree of insight into how the Chinese military thinks about space warfare and deterrence, and are summarized in the following sections.

Maintaining deterrence in space is challenging because of the myriad of ways in which security domains are intersecting in the current international environment and how capabilities in one domain can have a range of potential impacts in others. Space as a military domain primarily serves to enable and support terrestrial militaries through information gathering, providing data links, and enabling communications. Space systems touch nearly every aspect of military operations, from navigation to communications to situational awareness. This includes both conventional and nuclear missions. In addition, security and stability in space could erode due to tensions or a burgeoning crisis on Earth; alternatively, an incident in space could spill over to the terrestrial domain.

While the general principles of deterrence apply in space, the unique characteristics of space complicate the equation. First, space is a relatively transparent operating environment. Unlike the terrestrial domain, where natural and man-made barriers exist to hide military capabilities from an adversary, most space systems are remarkably exposed. Second, this exposure is heightened by the fact that space objects move along a predictable path depending on their orbit and are thus easy for an adversary to track.[6] Third, space objects are incredibly fragile. Few reliable defenses exist that could protect space assets from being targeted. New technologies are being developed to enhance the defense of space assets against counterspace capabilities, but these are still nascent.

These conditions create the potential for crisis instability in space. If each side perceives an offensive advantage in space, each state will have an incentive to launch a pre-emptive strike against the other's counter-space capabilities to protect their own on-orbit systems and free them to disable key on-orbit capabilities of their opponent. This dynamic is heightened in the U.S.-China relationship, due to 1) U.S. dependence on space for its power projection and 2) the Chinese recognition of this vulnerability and eagerness to exploit it for China's own benefit.

[6] "Theory of Success: A Conversation with General Saltzman," Center for Strategic and International Studies (February 22, 2023). https://www.csis.org/analysis/theory-success-conversation-general-saltzman. August 14, 2025.

Space in China's Broader Military Strategy

China's space strategy, capabilities, and warfighting concepts have evolved significantly since the mid-20th century in response to international events and evolving U.S. capabilities. China's space capabilities were relatively limited until the 1990s, when China boosted investments in satellites for weather, communications, and Earth observation missions. A major turning point for the PLA was its observation of the United States' use of space capabilities during Operations Desert Shield/Desert Storm. In a 1993 government document, the PLA emphasized the need to prepare for "local wars under modern, high-tech conditions" in current warfighting and future wars.[7] Joint operations and command, control, communications, and intelligence played a central role in this context, for which space assets were critical to supporting. The PLA found that from 70 satellites, the United States received 90% of its strategic intelligence and 70% of information on its forces during the Gulf War.[8] This demonstrated to the PLA the central role of space systems in supporting military operations. Joint operations require substantial communication and navigation capabilities to coordinate mass numbers of troops and weaponry, and the PLA needed to develop capabilities to support these operations. In 2000, China launched two satellites for regional navigation purposes into geostationary earth orbit (GEO), becoming the third country to launch satellites for a global navigation satellite system (GNSS).

During the early 2000s, China started investing heavily in its space capabilities to prepare for fighting "local wars under informationized conditions."[9] In order to prepare for this type of war, the PLA developed its concept of systems confrontation warfare, which underscored the central role of counterspace in China's future military operations. This concept sees modern warfighting as hinging on conflict between opposing sides' military systems rather than armed forces.[10] In this context, military systems must be able to gain dominance in not just one but every domain. A RAND report evaluating PLA writings on this concept notes that systems confrontation "emphasizes noncontact operations and nonlinear operations," which incentivizes the ability to target enemy systems across multiple domains at various stages of crisis or war.[11]

China's Official Policy

While China has continued to assert that its space programs are entirely for peaceful purposes, some official documents provide insight into how the PRC views space from a strategic military perspective within the context of evolving international security dynamics. These documents

[7] Dean Cheng, "China's Military Role in Space," *Strategic Studies Quarterly*, Vol.6, Issue 1 (Spring 2012), p. 55-77. https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-06_Issue-1/Cheng.pdf. Accessed August 14, 2025.
[8] Ibid.
[9] Ibid.
[10] Jeffrey Engstrom, *Systems Confrontation and System Destruction Warfare*, RAND Corporation (February 1, 2018). https://www.rand.org/pubs/research_reports.html. Accessed August 14, 2025.
[11] Ibid.

emphasize the central role that space will play in strategic competition between great powers. China's 2015 Defense White Paper designated space as a domain of military conflict, noting that space has "become a commanding height in international strategic competition" and taking note of other countries "developing their space forces and instruments."[12] The latest Defense White Paper, released in 2019, reinforces the notion of outer space as "a critical domain in international strategic competition" and specifically cites the United States as driving the intensification of this competition through having "increased its defense expenditure, pushed for additional capacity in nuclear, outer space, cyber and missile defense, and undermined global strategic stability."[13] Further, the document listed one of China's national defense aims "to safeguard China's security interests in outer space."[14] Despite China's characterization of itself as a peaceful space actor, it has openly recognized the increasing militarization of the space domain and the need for China to compete. In 2024, internal PLA restructuring produced a new organization focused exclusively on space, the Aerospace Force.[15] This move consolidated all of the PLA space activities under one unified command and placed them more directly under the control of the Central Military Commission (CMC).

Views from PLA Strategists

Writings from PLA strategists provide much more detailed insights into the PLA's thinking about space as a military domain. In 2020, the PLA National Defense University released an updated version of its strategic document titled "The Science of Military Strategy," outlining the PLA's current strategic thinking on the full spectrum of strategic issues.[16] In describing the role of space in future military conflict, one author not only highlighted how space systems will provide information support during crisis and conflict, but also argued that space will be the "core means for the struggle for dominance" in a future conflict and will be "key to defeating the enemy in information warfare." Further, he notes that "without space control, information control will be impossible, and air control, sea control, and land control will also be like dominoes, and fall quickly one after another."[17] This highlights the inextricable linkage in Chinese thinking between the role of space and information warfare. Space serves as the key enabler for all other aspects of

[12] The State Council Information Office of the People's Republic of China, *China's Military Strategy* (May 27, 2015). https://english.www.gov.cn/archive/white_paper/2015/05/27/content_281475115610833.htm. Accessed August 14, 2025.
[13] The State Council Information Office of the People's Republic of China, *China's National Defense in the New Era* (July 24, 2019). https://english.www.gov.cn/archive/whitepaper/201907/24/content_WS5d3941ddc6d08408f502283d.html. Accessed August 20, 2025.
[14] Ibid.
[15] Ying Yu Lin, "How China Integrated the PLA's Aerospace-related Forces," The Diplomat (February 20, 2025). https://thediplomat.com/2025/02/how-china-integrated-the-plas-aerospace-related-forces/. Accessed August 19, 2025.
[16] China Aerospace Studies Institute, *In Their Own Words: Science of Military Strategy 2020* (January 26, 2022). https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-01-26%202020%20Science%20of%20Military%20Strategy.pdf. Accessed August 14, 2025.
[17] Ibid.

military confrontation; without space dominance, the PLA believes it is less likely to succeed in its mission in any terrestrial domain.

PLA space writings in these documents have focused on how to deter escalation and conflict in space to protect their space assets.[18] A RAND report noted that China's view of space deterrence focuses on "the threat or actual limited use of force in space, supported by powerful counterspace forces, to curb an adversary's military operations" which are "not necessarily or exclusively designed to deter actions in the space domain."[19] The United States' counterspace capabilities are designed primarily to deter attacks on its own space assets and ensure their use is never denied.[20] China's space capabilities are not purely designed to deter attacks against its own space assets; they are one component of China's broader strategy in pursuit of its political and military goals, both on Earth and in space.[21] A 2012 document titled "Lectures on the Science of Space Operations" published by the Chinese Academy of Military Sciences[22] notes that:

> "Space deterrence is like nuclear deterrence or conventional forces deterrence: they all are a form of military deterrence. Since space deterrence in terms of use has a strategic quality, convenience, and controllability, it thus will become the main form of military deterrence, and the frequency of its use will grow increasingly frequent."[23]

Further, Western analysts have noted that China's objectives for deterrence go beyond simply dissuading certain actions and seeks to compel its adversary to behave in ways that it finds advantageous.[24] Consequently, China may use its military capabilities in an attempt to compel its adversary to take a certain action, which the adversary could perceive as threatening or escalatory, even if that was not China's intention.[25] Space is just one tool that China can use to achieve its

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[18] Ibid.
[19] Stephen J. Flanagan, Nicholas Martin, Alexis A. Blanc, and Nathan Beauchamp-Mustafaga, *A Framework of Deterrence in Space Operations*, RAND Corporation (August 31, 2023). https://www.rand.org/pubs/research_reports/RRA820-1.html. Accessed August 14, 2025.
[20] Jennifer DiMascio, *U.S. Counterspace Capabilities*, Congressional Research Service (September 11, 2024). https://www.congress.gov/crs-product/IN12420. Accessed August 14, 2025.
[21] Dean Cheng and John Klein, "A Comprehensive Approach to Space Deterrence," The Strategy Bridge (March 31, 2021). https://thestrategybridge.org/the-bridge/2021/03/31/a-comprehensive-approach-to-space-deterrence. Accessed August 14, 2025.
[22] China Aerospace Studies Institute, In Their Own Words: Lectures on the Science of Space Operations (August 8, 2022). https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-08-12%20Lectures%20on%20the%20Science%20of%20Space%20Operations.pdf. Accessed August 20, 2025.
[23] Ibid.
[24] Dean Cheng and John Klein, "A Comprehensive Approach to Space Deterrence," The Strategy Bridge (March 31, 2021). https://thestrategybridge.org/the-bridge/2021/03/31/a-comprehensive-approach-to-space-deterrence. Accessed August 14, 2025.
[25] Dean Cheng and John Klein, "A Comprehensive Approach to Space Deterrence," The Strategy Bridge (March 31, 2021). https://thestrategybridge.org/the-bridge/2021/03/31/a-comprehensive-approach-to-space-deterrence. Accessed August 14, 2025.

larger military and political objectives. China's willingness to move across different domains to achieve its objectives could create significant uncertainty and unpredictability for the United States.

The "Lectures on the Science of Space Operations" outlines a method of "gradual escalation" in space to "constantly increase the degree of force in deterrence of the enemy" in order to achieve China's deterrence objectives in space.[26] One strategist outlines four steps in this escalation process: "show of space strength, space military exercises, disposition of space forces, and overawing space strike." The author stresses that these can be applied at any time and multiple can be applied at once. To address the increasingly tense space environment, the Science of Military Strategy organizes the development of military space capabilities into the following four functions: "spatial information support capabilities," "space control ability," "space offensive and defensive capabilities," and "support capability for space military activities."[27] Spatial information support capabilities encompass all assets that can support joint operations on Earth, including reconnaissance and surveillance and weather monitoring. Space control ability includes kinetic and non-kinetic counterspace capabilities and SSA. Space offensive and defensive capabilities include "strategic early warning and surveillance capabilities, ballistic missile long-range precision strike capabilities, space-to-ground fire strikes, and anti-space defense capabilities." Support capabilities for space military activities include all support required for conducting combat in space.

China's Military Space Developments and Implications for the United States

The writings of PLA strategists help explain China's rapid expansion in space and counterspace capabilities. China's growing military space capabilities undoubtedly pose challenges for the United States in ensuring the security of its own space assets and military forces. The following table summarizes the types of capabilities China is developing, their military applications, and the potential stabilizing effects they could serve.

[26] China Aerospace Studies Institute, *In Their Own Words: Science of Military Strategy 2020* (January 26, 2022). https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-01-26%202020%20Science%20of%20Military%20Strategy.pdf. Accessed August 14, 2025.
[27] Ibid.

Table 1. China's Military Space and Counterspace Capabilities

Capability	Types	Function	Military Applications	Potential Stabilizing Effects
Kinetic Anti-Satellite (ASAT) Weapons	Direct Ascent, Co-Orbital	Kinetically destroy adversary's satellites	Hit-to-kill to destroy adversary's satellites, either from ground-launched system or on-orbit system	Deterrence signaling
Non-kinetic ASAT Weapons	Electronic Warfare (EW), Directed Energy Weapons (DEW), Cyber Weapons	Jamming, spoofing, dazzling, disabling adversary's satellites	Disable adversary's satellites, either reversibly or irreversibly	Deterrence signaling
Space Situational Awareness (SSA)	Ground-based optical telescopes and radars, satellites on-orbit	Track objects in space	Support targeting for ASAT weapons, collect intelligence on-orbit	Create symmetric vulnerability with the United States, support space security and sustainability
Intelligence, Surveillance, and Reconnaissance (ISR)	Remote sensing	Optical and spectral imaging, synthetic aperture radar (SAR), electronic intelligence (ELINT)	Military reconnaissance, situational awareness on Earth, targeting of U.S. assets on Earth	Create symmetric vulnerability with the United States
Command, Control, and Communications (C3)	Communications, missile warning	Data relay, radar	C3 of PLA forces at further distances, integration of joint operations	Create symmetric vulnerability with the United States
Positioning, Navigation, and Timing (PNT)	Global Navigation Satellite System (GNSS)		Independent PNT capabilities for the PLA and redundant coverage of China's near seas, project power further from Chinese territory	Create symmetric vulnerability with the United States

Sources: Victoria Samson and Laetitia Cesari, *Global Counterspace Capabilities: An Open Source Assessment*, Secure World Foundation (April 2025). https://drive.google.com/file/d/1FA8aLXiQeAEK1Z8mTpHFls_c27Ne50qa/view. Accessed August 14, 2025; *Military and Security Developments Involving the People's Republic of China*, U.S. Department of Defense (December 18, 2024). https://media.defense.gov/2024/Dec/18/2003615520/-1/-1/0/MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA-2024.PDF. Accessed August 15, 2025; U.S. China-Economic and Security Review Commission, *China's Remote-Sensing* (December 2024). https://www.uscc.gov/sites/default/files/2024-12/Chinas_Remote_Sensing.pdf. Accessed August 19, 2024.

China’s Offensive Capabilities

China is actively developing a suite of counterspace capabilities that will give it the ability to hold U.S. space assets at risk.[28] U.S. defense officials have asserted that these capabilities are specifically designed to “use space to challenge the U.S. military's ability to intervene in a regional conflict in the Indo-Pacific. China is not only developing systems to kill our satellites; it is building a wartime space architecture to fight and win a modern military conflict.”[29] Counterspace weapons can be distinguished between kinetic and non-kinetic capabilities. Kinetic capabilities include co-orbital anti-satellite (ASAT) weapons and direct-ascent ASAT weapons. Based on open-source reporting, China has significant capabilities to target space objects in low Earth orbit (LEO) through co-orbital and direct-ascent ASAT.[30] Direct-ascent ASAT weapons have been particularly concerning for the United States, especially since China’s successful destructive direct-ascent ASAT test in 2007.[31] Researchers have assessed that China has between one and three direct-ascent ASAT weapons that they have been testing since 2005.[32] Co-orbital ASAT is a capability that can maneuver a weapon into the same orbit as the target satellite and conduct rendezvous and proximity operations (RPOs). The ability to get close to a satellite allows China to target it either kinetically, by colliding the co-orbital object into the target satellite, or non-kinetically, using electronic, cyber, or other weapons to damage or destroy the satellite. China has conducted several co-orbital tests demonstrating its ability to carry out close approaches in LEO and GEO, the first known test being in 2010.[33] In 2022, a Chinese satellite maneuvered close to its non-operational BeiDou satellite and dragged it into a higher graveyard orbit.[34] Because of the dual-use application of this capability, China could have been testing its ability to maneuver near and move an adversary’s satellite. In 2025, one U.S. military official reported observing synchronized maneuvers among five Chinese satellites, which he labeled “dogfighting.”[35] While the intentions of

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[28] Victoria Samson and Laetitia Cesari, *Global Counterspace Capabilities: An Open Source Assessment*, Secure World Foundation (April 2025). https://drive.google.com/file/d/1FA8aLXiQeAEK1Z8mTpHFls_c27Ne50qa/view. Accessed August 14, 2025.

[29] John F. Plumb, “Assistant Secretary of Defense Dr. John F. Plumb Remarks at the Space Foundation's 38th Space Symposium, Colorado Springs, Colorado,” DOD News (blog), U.S. Department of Defense (April 18, 2023). https://www.defense.gov/News/Speeches/Speech/Article/3367036/assistant-secretary-of-defense-dr-john-f-plumb-remarks-at-the-space-foundations/. Accessed August 21, 2025.

[30] Ibid.

[31] Shirley Kan, *China’s Anti-Satellite Weapon Test*, Congressional Research Service (April 23, 2007). https://apps.dtic.mil/sti/pdfs/ADA468025.pdf. Accessed August 14, 2025.

[32] Victoria Samson and Laetitia Cesari, *Global Counterspace Capabilities: An Open Source Assessment*, Secure World Foundation (April 2025). https://drive.google.com/file/d/1FA8aLXiQeAEK1Z8mTpHFls_c27Ne50qa/view. Accessed August 14, 2025.

[33] Brian Weeden, “Dancing in the dark: The orbital rendezvous of SJ-12 and SJ-06F,” The Space Review (August 30, 2010). https://www.thespacereview.com/article/1689/1. Accessed August 19, 2025.

[34] Brett Tingley, “A Chinese Satellite Just Grappled Another and Pulled It Out of Orbit,” TWZ (January 27, 2022). https://www.twz.com/44054/a-chinese-satellite-just-grappled-another-and-pulled-it-out-of-orbit. Accessed August 14, 2025.

[35] Simone McCarthy, “China is practicing ‘dogfighting’ with satellites as it ramps up space capabilities: US Space Force,” CNN (March 21, 2025). https://www.cnn.com/2025/03/21/china/china-space-force-dogfighting-satellites-intl-hnk. Accessed August 14, 2025.

such a maneuver could be non-military, without effective communications to clarify intent, the United States is left to fill in the gaps and assume the worst-case scenario.

China has also invested in non-kinetic means to disrupt space systems, including electronic warfare (EW) and directed-energy weapons (DEW).[36] EW allows China to jam systems on adversary satellites supporting communications, navigation, and remote sensing. In addition, Western observers have asserted that China likely has cyber capabilities that could be employed against space systems, particularly the ground components, yet public information is limited.[37] China likely has some DEW capabilities, which use a beam of energy to disable satellites, yet there is little public information on their status.[38] China's space situational awareness (SSA) network provides it with an improved picture of the space domain and enables better monitoring of space objects, both for targeting of an adversary's assets as well as protection of its own constellations.

Non-kinetic capabilities give China greater flexibility in what objects it can target, to what degree it can damage them, and how many objects it can target at once. Non-kinetic means can also be better concealed from the adversary and can have either reversible or irreversible effects. Recent analysis indicates that Chinese strategists favor non-kinetic weapons for these reasons.[39] Compared to kinetic weapons, which risk creating substantial debris that could damage China's own satellites, non-kinetic weapons could allow China to narrowly or broadly target U.S. assets depending on the message it wants to send and the type of system it wants to disable However, China could inadvertently target more sensitive U.S. systems that could be perceived as escalatory by the United States. For example, the United States has expressed concern about China targeting its missile early-warning or communications satellites during a conflict,[40] which has been validated as a legitimate concern by Chinese statements in track-1.5 dialogues.[41] While China might not intentionally target the United States' ability to detect or launch its own nuclear weapons, the United States might view an attack on certain satellites as an attempt to threaten its nuclear capabilities and react accordingly. This issue is exacerbated by the fact that it's very difficult to distinguish between satellites based on the function they serve. China might attempt to

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[36] Victoria Samson and Laetitia Cesari, *Global Counterspace Capabilities: An Open Source Assessment*, Secure World Foundation (April 2025). https://drive.google.com/file/d/1FA8aLXiQeAEK1Z8mTpHFls_c27Ne50qa/view. Accessed August 14, 2025.
[37] Ibid.
[38] Ibid.
[39] Jonas Vidhammer Berge and Henrik Stalhane Hiim, "Killing them softly: China's counterspace developments and force posture in space," Journal of Strategic Studies, Vol. 47, Issue 6-7 (Summer 2024). https://doi.org/10.1080/01402390.2024.2388658. Accessed August 14, 2025.
[40] *Military and Security Developments Involving the People's Republic of China*, U.S. Department of Defense (December 18, 2024). https://media.defense.gov/2024/Dec/18/2003615520/-1/-1/0/MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA-2024.PDF. Accessed August 15, 2025.
[41] Lora Saalman, *Multidomain Deterrence and Strategic Stability in China*, SIPRI (January 2022). https://www.sipri.org/sites/default/files/2022-02/sipriinsight2202_multidomain_deterence_china.pdf. Accessed August 15, 2025.

temporarily disable satellites used for conventional military communications to slow the U.S. intervention in a Taiwan contingency but accidentally target nuclear-related satellites.

China's Military-Enabling Space Capabilities

In parallel, China has been launching more satellites into orbit that have the capability to support its military. Most notably, China has made a concerted effort to develop its space-based ISR capabilities. According to a Congressional Research Service report, to have a complete picture of its maritime region, China "must build a maritime and air picture covering nearly 875,000 square nautical miles."[42] This is a massive area that presents significant challenges for the PLA, particularly given the U.S. presence in the region. In 2006, the PRC released its "Medium and Long Term National Science and Technology Development Program," which called for the development of a "high-resolution Earth observation system based on satellites, stratospheric airships and aircrafts, and improve relevant ground systems to carry out application demonstration."[43] The resulting state-sponsored system, known as the China High-resolution Earth Observation System (CHEOS), aimed to "provide all-weather, all-time, and global earth observation capability."[44]

While it's still a relatively new capability, China's rapid advances in recent years are indicative of its interest in pursuing information dominance in the military domain. Over the past decade, China has added 818 satellites to orbit,[45] exceeding 1,000 total satellites as of September 2024, according to the U.S. Space Force.[46] A recent government report estimates that the PLA operates over 510 ISR-capable satellites carrying a wide range of sensors for remote sensing and earth observation.[47] In just 2024, China successfully launched 67 ISR capable satellites into orbit.[48] ISR satellites primarily include those designed for Earth observation and electronic intelligence.[49] The ability to monitor and surveil its surrounding maritime environment has been a key focus of China's

[42] *China Naval Modernization: Implications or U.S. Navy Capabilities*, Congressional Research Service (August 1, 2018). https://www.congress.gov/crs_external_products/RL/PDF/RL33153/RL33153.222.pdf. Accessed August 15, 2025.
[43] China National Space Administration, "China High-resolution Earth Observation System (CHEOS)" (May 31, 2022). https://www.cnsa.gov.cn/english/n6465715/n6465716/c6840357/content.html. Accessed August 15, 2025.
[44] Ibid.
[45] "Space Threat Fact Sheet," National Security Space Association (May 16, 2025). https://nssaspace.org/wp-content/uploads/2025/05/20250516-S2-Space-Threat-Fact-Sheet-v8-RELEASE.pdf?utm_source=ts2.tech. Accessed August 20, 2025.
[46] Greg Hadley, "USSF Intel Boss: China Now Has 1,000 Satellites on Orbit," Air and Space Forces Magazine (September 16, 2024). https://www.airandspaceforces.com/ussf-intel-boss-china-1000-satellites-space-domain-awareness/. Accessed August 15, 2025.
[47] "Space Threat Fact Sheet," National Security Space Association (May 16, 2025). https://nssaspace.org/wp-content/uploads/2025/05/20250516-S2-Space-Threat-Fact-Sheet-v8-RELEASE.pdf?utm_source=ts2.tech. Accessed August 20, 2025.
[48] Ibid.
[49] Thomas D. Taverney, "The Evolution of Space-Based ISR," Air and Space Forces Magazine (August 10, 2022). https://www.airandspaceforces.com/article/the-evolution-of-space-based-isr/#:~:text=Warfighter%20Support,ability%20to%20provide%20global%20persistence. Accessed August 15, 2025.

remote-sensing development.[50] These systems provide China greater independence in its space-based ISR, reducing the security risks that come with relying on foreign systems or purchasing images from foreign sources. No matter the official designation of a particular remote sensing satellite, because of China's military-civil fusion, any data that it collects could be used for civilian and/or military purposes.[51]

Improved ISR capabilities provide critical support to PLA military operations. China can conduct better surveillance of U.S. forces in the Indo-Pacific in peacetime. The expanded coverage provided by China's ISR satellites, due to higher orbit and increased revisit rates, would allow for better monitoring of U.S. force movements and allow the PLA to identify patterns in their activities. Further, peacetime surveillance would allow the PLA to better identify the locations of fixed targets of interest in the region, including ports and airfields, which could be stored and used for targeting in a future conflict. For example, in 2024, China was able to take detailed radar images of U.S. Naval Station Norfolk, including three aircraft carriers present at the time.[52] The most important advantage of China's ISR is its improved ability to find, track, and target U.S. military forces in conflict, enhancing its anti-access/area denial (A2/AD) architecture and bolstering its counter-intervention posture against the United States. While space is certainly not the only avenue through which China is seeking to enhance A2/AD, it is a key enabling component of counter-intervention. While exact capabilities are unknown, Western analysts report that China is increasingly able to track U.S. aircraft carriers.[53] As the cornerstone of U.S. power projection in the Pacific, tracking aircraft carriers is of particular interest to China.[54] The application of emerging technologies will only enhance these capabilities. The satellite that captured images of Norfolk reportedly included artificial intelligence (AI) processing technology for data processing to improve its target characterization.[55] As AI is further integrated into remote sensing systems, they will be able to identify and track increasingly smaller targets at faster rates.

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[50] Andrew S. Erickson, "Chinese Air- and Space-Based ISR: Integrating Aerospace Combat Capabilities over the Near Seas," in *China Near Seas Combat Capabilities*, Andrew S. Erickson, Ryan D. Martinson, Peter A. Dutton, eds. (Newport, Rhode Island: China Maritime Studies Institute, U.S Naval War College, 2014), pp. 87-138. https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1010&context=cmsi-red-books. Accessed August 15, 2025.

[51] U.S. Department of State, "Military-Civil Fusion and the People's Republic of China" (May 2025). https://www.state.gov/wp-content/uploads/2020/05/What-is-MCF-One-Pager.pdf. Accessed August 15, 2025.

[52] Harrison Kass, "China's Satellites Can Easily Spy on 3 U.S. Navy Aircraft Carriers," The National Interest (April 25, 2024). https://nationalinterest.org/blog/buzz/chinas-satellites-can-easily-spy-3-us-navy-aircraft-carriers-210745. Accessed August 15, 2025.

[53] https://ordersandobservations.substack.com/p/how-the-pla-finds-us-ships-at-sea; https://asiatimes.com/2024/07/new-china-algorithm-puts-us-warships-in-clearer-view/

[54] https://www.scmp.com/news/china/science/article/3290477/pla-releases-electronic-warfare-kill-list-us-carrier-groups; https://news.usni.org/2021/11/07/china-builds-missile-targets-shaped-like-u-s-aircraft-carrier-destroyers-in-remote-desert

[55] Parth Satam, "China Scans 'World's Largest Naval Base' In USA; US Navy's Norfolk Naval Station 'Unmasked' By Spy Satellite," The Eurasian Times (April 25, 2024). https://www.eurasiantimes.com/china-scans-worlds-largest-naval-base/#:~:text=Appearing%20first%20on%20China's%20domestic,and%20land%20and%20maritime%20mapping.%E2%80%9D. Accessed August 19, 2025.

Other space capabilities, including positioning, navigation, and timing (PNT), communications, and early warning, are also benefiting China's military. China has developed its own independent global navigation satellite system (GNSS), BeiDou. Following the Taiwan Strait Crisis in 1995, when disruption in GPS led to the PLA losing track of missiles it was launching over the strait, China determined that an independent GNSS that they could have complete control over was necessary, particularly for its military.[56] While the final satellite for BeiDou was only launched in 2020, the PLA has been relying on BeiDou as early as 2014.[57] This system supports several key military activities. First, it eliminates the dependence the PLA previously had on foreign GNSS systems, notably GPS, and reduces the risk of its PNT services being disrupted during a conflict. Further, it would allow China to target U.S. GPS in a conflict without risking its own navigation capabilities.[58] Second, it allows the PLA to project power much further than before, when it was dependent on ground-based systems for navigation. This enhances the PLA's situational awareness and command and control of its own military forces. Third, it will likely improve the PLA's precision-strike capabilities through better targeting, which will serve to further enhance its counter-intervention posture in the Indo-Pacific.[59] In sum, these improvements to China's terrestrial military capabilities through space-based systems enhance the PLA's operational picture of the regions of strategic interest to China and bolster its counter-intervention posture against the United States. Further, China's increased confidence in counter-intervention posture due to these capabilities could embolden more aggressive behavior in its region.

Potential Stabilizing Effects

While China's increased reliance on space capabilities is worrisome insofar as they will enable improve military operations, it may also have a stabilizing effect in crisis, reducing the incentive for China to conduct counter-space operations. As China's dependence on space grows, it will likely be disincentivized to take any particularly aggressive actions in space that would risk its own space assets, both military and commercial. This could help counter the incentive to go first in space and take advantage of offense dominance. Use of kinetic counterspace weapons would create substantial debris that would threaten not only U.S. but also Chinese and third country satellites.

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[56] David H. Millner, Stephen Maksim, and Marissa Huhmann, "BeiDou: China's GPS Challenger Takes Its Place on the World Stage," *Joint Force Quarterly* 105, 2nd Quarter (April 2022), pp. 23-31. https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2999161/beidou-chinas-gps-challenger-takes-its-place-on-the-world-stage/. Accessed August 15, 2025.
[57] Ibid.
[58] Kevin Pollpeter, Eric Anderson, Jordan Wilson, and Fan Yang, *China Dream, Space Dream: China's Progress in Space Technologies and Implications for the United States*, U.S.-China Economic and Security Review Commission (March 2, 2025). https://www.uscc.gov/research/china-dream-space-dream-chinas-progress-space-technologies-and-implications-united-states. Accessed August 15, 2025.
[59] Kevin Pollpeter, To Be More Precise: BeiDou, GPS, and the Emerging Competition in Satellite-Based PNT, China Aerospace Studies Institute (May 2024). https://www.airuniversity.af.edu/CASI/Display/Article/3778910/to-be-more-precise-beidou-gps-and-the-emerging-competition-in-satellite-based-p/. Accessed August 15, 2025.

This shift towards parallel dependence and resulting vulnerability mirrors the concept of mutually assured destruction that underpins nuclear deterrence. While use of non-kinetic weapons would reduce the risk of a strike having unintended impact on non-U.S. satellites, the United States has substantial non-kinetic counterspace capabilities as well, so China would have to consider the likelihood of in-kind retaliation.[60] China's growing reliance on its own space systems would likely force its leadership to seriously consider the ramifications of any form of counterspace attack on the United States. Because of their perceived vulnerabilities, both the United States and China are also making efforts to enhance the resiliency of their space architectures, which would further reduce first-strike incentives.[61]

Further, as China's space programs matures, it is likely to place growing importance on its role as a leader in space. As a result, China may be hesitant to initiate hostilities in space, fearing it will tarnish its reputation. China's space program is a source of national pride for its population and leadership. Beyond the military-relevant capabilities outlined above, China is also making scientific and technological advances in space to support manned spaceflight. These include China's own space station, the Tiangong, as well as pursuit of Moon and Mars missions. Success in space is an important contributor not only to China's national power, but also the Chinese Communist Party's (CCP) international prestige and credibility among the domestic population.[62] President Xi Jinping has consistently described China's "space dream" within the narrative of China's national rejuvenation,[63] further stating that "to explore the vast cosmos, develop the space industry and build China into a space power is our eternal dream."[64] In addition, China's commercial space industry is rapidly expanding, and the government has emphasized the growing role of domestic space companies in driving China's space program.[65] Maintaining stability in space in ways that

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[60] "Counter Communications System Block 10.2 achieves IOC, ready for the warfighter," U.S. Space Force (March 13, 2020). https://www.spaceforce.mil/News/article/2113447/counter-communications-system-block-102-achieves-ioc-ready-for-the-warfighter/. Accessed August 19, 2025.

[61] Bruce W. MacDonald, Dennis Blair, Dean Cheng, Karl Mueller, Victoria Samson, and Brian Weeden, *Crisis Stability in Space: China and Other Challenges*, Foreign Policy Institute of the Johns Hopkins School of Advanced International Studies (2022). https://static1.squarespace.com/static/6463bfb83d77656c7431be0c/t/6536b8905351b7035cf34846/1698085009122/Crisis_Stability_in_Space_China_and_Other_Challenges.pdf. Accessed August 15, 2025.

[62] Parimal Saraf, "Analyzing the Chinese Space Programme and Its Relevance in Geopolitics," Organisation for Research on China and Asia (November 17, 2022). https://orcasia.org/article/153/analyzing-the-chinese-space-programme-and-its-relevance-in-geopolitics#:~:text=Moreover%2C%20the%20leadership%20believes%20that,Flight%20on%20April%2024%2C%202016. Accessed August 15, 2025.

[63] "Xi calls for accelerating progress in China's space endeavors," The State Council Information Office of the People's Republic of China (September 23, 2024). https://english.www.gov.cn/news/202409/23/content_WS66f15475c6d0868f4e8eb2cf.html. Accessed August 20, 2025.

[64] China Aerospace Studies Institute, *In Their Own Words: China's Space Program: A 2021 Perspective, The State Council Information Office of the People's Republic of China* (January 2022). https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-02-16%20ITOW%20China's%20Space%20Program-%20A%202021%20Perspective.pdf. Accessed August 20, 2025.

[65] Li Qiang, *Report on the Work of the Government* (March 5, 2025). https://npcobserver.com/wp-content/uploads/2025/03/2025-Government-Work-Report_NON-FINAL_EN.pdf. Accessed August 20, 2025.

allow for China to continue these activities will be of increasing interest to Chinese leadership. As China becomes more entangled in space, it will face increasing international pressures to behave in ways that do not risk disrupting the use of space for other states.

Another way counterspace capabilities could contribute to stability is by serving as a means of deterrence signaling. Non-kinetic weapons, in particular, could serve as a signal that would be less threatening or escalatory than a kinetic demonstration and would be kept out of the public eye, thus reducing domestic and international pressures to respond with a show of force. Kinetic demonstrations would be perceived as much more escalatory. Yet their signaling effect may explain China's recent orbital behavior. This avenue of signaling would be susceptible to misinterpretations, however. As a result, these signals would need to be coupled with some channel of communications between the United States and China, so the intentions of these signals could be communicated and clarified to the other side. Otherwise, such signals would be susceptible to miscalculation and risk significant escalation.

Future Considerations for the United States

China's growing space and counterspace capabilities provide military capabilities that could present significant security risks for the United States. China's counterspace capabilities will be a growing threat to U.S. space capabilities, while China's own space architecture will play an increasing role in enabling PLA operations. While China's growing dependence on space could be somewhat stabilizing, it's unclear when or under what specific conditions those effects could materialize substantially enough to reduce the perceived U.S. advantage. To both strengthen deterrence and enhance stability, the United States should prioritize is space investments and seek key advantages, not broad dominance, pursue a space security dialogue with China, and expand cooperation and partnerships with allies and partners.

First, a more clearly tailored U.S. space security strategy is necessary to address this complex environment. So far, the U.S. approach has been to condemn China's pursuit of destructive ASAT testing, make efforts to transform the U.S. space architecture to be more resilient and redundant, and continue stating "space superiority" as a U.S. defense objective.[66] At the same time, U.S. Space Force officials are increasingly characterizing space as a warfighting domain. In March of 2025, the U.S. Space Force released "Space Warfighting: A Framework for Planners," which outlines how the United States plans to maintain space superiority through orbital warfare,

[66] U.S. Department of Defense, *Defense Space Strategy Summary* (June 2020). https://media.defense.gov/2020/Jun/17/2002317391/-1/-1/1/2020_defense_space_strategy_summary.pdf. Accessed August 15, 2025.

electromagnetic warfare, and cyberspace warfare.[67] The continued characterization of space as a warfighting domain is likely to intensify the ongoing arms race in space and force the United States to develop capabilities across the space and counterspace spectrum to ensure the security of its space assets. The United States should consider whether its traditional policy of space superiority fits the evolving space security environment, where not only China but a host of other states are becoming increasingly involved. U.S. officials and the broader policy community should also make more of a concerted effort to understand how China thinks about space as a military domain, deterrence in space, and space warfare. This understanding is critical for interpreting China's space activities as accurately as possible and guiding U.S. space developments so that they can credibly deter any Chinese aggression in space.

In an increasingly contested environment, the United States is unlikely to be able to maintain superiority in all areas of space security. As a result, the United States may have to selectively choose where to invest its resources in order to stay ahead of China in those areas. Resources should be concentrated in areas where the United States competition is advantageous to the United States. One area in which the United States maintains an advantage is electronic warfare. Developing a broader range of non-kinetic counterspace capabilities could better deter China's use of its non-kinetic counterspace capabilities, where the likelihood for use right now is highest. Further, revealing some of these capabilities to China, either through public statements or demonstration, could strengthen the deterrent effect.

Not surprisingly, China's suspicious orbital maneuvers are driving an interest of some in Washington in the fielding of orbital warfare capabilities. While developing the ability to maneuver effectively on-orbit remains important, particularly for non-military purposes, specifically developing and deploying co-orbital capabilities for U.S. military purposes could intensify the burgeoning arms race in space. To the degree possible, it is in the U.S. interest to attempt to channel military competition toward reversable counterspace capabilities, which would come with less risk of significant escalation and collateral damage that could cause lasting damage to the space environment. With further investment, effective electronic warfare capabilities may be enough to effectively deter, and if necessary, defeat, Chinese aggression terrestrially and in space.

Second, there is an opportunity for the United States to leverage China's space dependence to initiate a space dialogue. All space-faring states have an interest in keeping the domain safe and secure for their space assets. The United States used to have several space dialogues with China under the Obama Administration, including the U.S.-China Civil Space Dialogue focused on civil

[67] U.S. Space Force, Space Warfighting: A Framework for Planners (April 10, 2025). https://www.spaceforce.mil/Portals/2/Documents/SAF_2025/Space_Warfighting_-_A_Framework_for_Planners_BLK2_(final_20250410).pdf. Accessed August 20, 2025.

and commercials space, and the Space Security Exchange focused on security issues in space.[68] Despite the exponential expansion of China's presence in space in the last ten years, these types of dialogues have not been held since. Recent analysis suggests that PLA strategists are beginning to understand that China's dependence on space will create the same vulnerabilities that exist for U.S. space architecture.[69] To spread this awareness further within the military and policy community in China, the United States might identify certain topics for dialogue that could highlight space as a domain of mutual interest and increasing risk to both U.S. and Chinese satellites. For example, the growing amount of space debris threatens all space powers. As commercial space companies massively proliferate satellites in LEO, usable orbits in space will grow increasingly crowded. While dialogue in this area presents political challenges due to the dual-use nature of many space debris removal technologies, this remains an area of mutual interest for both sides.

Finally, the United States should prioritize working with its allies and partners to build up their space programs. China is pursuing a broad range of partnerships with other countries on space that serve to both provide resilience to China's own space architecture and expand China's international influence. According to the Chinese National Space Administration, China has "signed 149 space cooperation agreements or memorandums of understanding with 46 national space agencies and 4 international organizations [and] established 17 space cooperation mechanisms."[70] For example, China has a robust technology partnership with Brazil through the China-Brazil Earth Resource Satellite (CBERS) program, which operates a fleet of remote-sensing satellites. China also partnered with Russia in the development of its International Lunar Research Station (ILRS), a lunar base. China is also increasingly working with African countries to support their space capabilities. U.S. space industry leaders have raised concerns about the limited number of launch sites available for commercial space launch.[71] Enhanced cooperation with U.S. allies and partners could provide opportunities for building up launch infrastructure that is available to the United States. In the event that U.S. satellites are targeted and disabled, more expansive launch infrastructure would allow the United States to more quickly launch satellites to restore their services. Cooperation will also provide redundancy to the United States' space architecture and reduce its vulnerability to attack by China.

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[68] Craig Kafura, "Renew Space Dialogue with China," War on the Rocks (February 10, 2022). https://warontherocks.com/2022/02/renew-space-dialogue-with-china/#:~:text=The%20initial%20U.S.%2DChina%20Space,a%20crisis%20before%20it%20escalates. Accessed August 20, 2025.

[69] Jonas Vidhammer Berge and Henrik Stalhane Hiim, "Killing them softly: China's counterspace developments and force posture in space," Journal of Strategic Studies, Vol. 47, Issue 6-7 (Summer 2024). https://doi.org/10.1080/01402390.2024.2388658. Accessed August 14, 2025.

[70] Chinese National Space Administration, "International Cooperation in outer space." https://www.cnsa.gov.cn/english/n6465668/n6465670/c6840364/content.html. Accessed August 20, 2025.

[71] David Cavossa, *Testimony for Hearing on "The Rocket's Red Glare: China's Ambitions to Dominate Space,"* U.S.-China Economic and Security Review Commission (April 3, 2025). https://www.uscc.gov/sites/default/files/2025-04/David_Cavossa_Testimony.pdf. Accessed August 21, 2025.

Conclusion

The future of security in space remains uncertain. While China's increased reliance on space capabilities is concerning insofar as they will enable improve military operations, it may also have a stabilizing effect in crisis, reducing the incentive for China to conduct counter-space operations. Yet, while there are some potential stabilizing effects, current trends point towards continuation of offense advantage in space, which will lead both sides to keep trying to get the upper hand. To maintain stability, the United States should leverage its existing advantages in space to safeguard its space assets while leaving the door open dialogue and cooperation on space security with China in the future.