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Occasional Paper

Strategic Implications of China's Cislunar Space Activities

Marc Berkowitz and Chris Williams

August 21, 2023

Table of Contents

Executive Summary

The United States and People's Republic of China (PRC) are engaged in a long-term geopolitical competition. China seeks to supplant the United States as the dominant power on Earth and alter the international system in ways favorable to its national interests. The intensifying competition is mirrored in near-Earth space and poised to extend throughout the Earth-Moon system. The PRC sees itself in a new space race with America that it intends to win. The extension of the competition to cislunar space – the region of outer space between the Earth and the Moon – is a direct outgrowth of the Chinese Communist Party's (CCP) aim to reestablish China as the world's dominant power. China considers space a "critical domain in international strategic competition."

Beijing's space programs and activities are intended to overtake the United States as the world's leading spacefaring nation by 2049, the 100th anniversary of the PRC's founding, if not sooner. China is undermining American strategic advantages in near-Earth space and pursuing a robust mix of military capabilities to contest freedom of access to and operations in near-Earth space. Concurrently, it is conducting operations in cislunar space and has even more ambitious future space plans. Lagrange points, lunar transfer orbits, lunar orbits, and the Moon's surface are "strategic key points" and "strategic thoroughfares" in cislunar space from which China could exert influence in or control over the Earth-Moon system.

The stratagems the CCP employs with respect to its space ambitions are consistent with how it pursues terrestrial objectives. Besides blandishment, inducement, and deception, the CCP uses coercion to erode established norms, undermine the rules-based international order, seize territory, and change international boundaries. China's efforts to exert influence on or control over cislunar space are likely to employ similar means and methods. This includes asserting claims of sovereignty, waging political, economic, and legal warfare, conducting grey zone operations, and developing advanced military and intelligence capabilities to coerce the U.S. and other nations to accede to the PRC's claims.

While some may discount China's cislunar space aspirations because the United States has already gone to the Moon, they are at risk of underestimating the political impact of Chinese astronauts landing on the lunar surface or working with Russian cosmonauts to build and operate the International Lunar Research Station (ILRS). When Chinese astronauts walk on the Moon or establish a base there, it is likely to be a significant event not just for the PRC but for the world with global repercussions. The potential political, diplomatic, economic, and military implications of China's cislunar space activities should not be discounted.

If the global audience perceives that the PRC has won the competition with the United States over cislunar space, it would be a historic CCP accomplishment that diminishes America's political prestige, international standing, and global influence. China's cislunar space achievement would be touted as yet another triumph of its political ideology, socioeconomic system, and symbol of its preeminent position in the international order. This would likely increase Beijing's ability to establish and sustain a sphere of influence over the foreign, economic, and security policies of other states in the Indo-Pacific region, expand its global influence and reach, and diminish the United States' standing and influence.

China's integrated coercive campaign, particularly its diplomatic, strategic communications, information and influence campaigns, and grey zone activities against U.S. interests likely would become even more aggressive in an effort to parlay the PRC's enhanced status and influence to change the global status quo and alter the dynamics of international relations. Chinese diplomats would offer various political and economic inducements, such as favorable terms for participating in the Belt and Road Initiative, Space Silk Road, and ILRS, to foreign nations to obtain their support for or acquiesce to

Beijing's positions on international governance and other issues pertinent to China's national interests in the Indo-Pacific and elsewhere around the world.

China also could use its strengthened position to shape the operating domains in ways favorable to its interests at the expense of the United States and other nations. The PRC likely would set precedents through cislunar space operations to establish a new, advantageous basis for customary international law. Indeed, China could employ political and legal warfare ("lawfare") tactics to justify multiple vectors of coercion, including the threat or use of armed force, to establish autocratic norms of behavior, undercut and change existing rules, claim territory, and in effect create its desired boundaries on Earth and in cislunar space.

China's pursuit of a dominant position in cislunar space would strengthen the economic element of its national power and weaken the United States and its allies. For example, the PRC could establish an Exclusive Economic Zone (EEZ) in cislunar space, declare a Space Defense Identification Zone (SDIZ) and "keep out" zones to protect it, conduct in-situ resource utilization to support operations on the lunar surface, and extract valuable resources such as rare Earth materials and water on the Moon to increase its international competitiveness, wealth, and military power. Indeed, the CCP could move to monopolize the market for rare minerals on the Moon as well as the use of lunar water as an energy source.

China might also attempt to enforce such astropolitical claims by purposefully interfering with the operations of U.S. and other nations' spacecraft in cislunar space. This could take the form of rendezvous and proximity operations to inspect or harass foreign spacecraft, coating or dazzling sensors, blocking or jamming communications links, grappling satellites and moving them to another orbit, and employing counterspace weapons to deny or disrupt satellites with non-kinetic weapon effects or possibly degrade or destroy spacecraft with kinetic attacks. Given the limitations of U.S. SDA and intelligence capabilities, and the possibility that China would conduct clandestine or covert counterspace operations with reversible effects, it may be difficult to determine if spacecraft anomalies were caused by deliberate acts of aggression and attribute their source.

If People's Liberation Army (PLA) forces were in a commanding position atop the Earth-Moon system's gravity wells, this could enhance their ability to deny the U.S. freedom of action to use space systems as a force multiplier to enhance the combat effectiveness of its operational forces in all domains. America could be at a strategic and operational disadvantage with regards to its ability to influence the course and outcome of a conflict with China. Furthermore, the United States could be confronted with an exponentially more difficult national defense challenge if China used its freedom of action in space to deploy military platforms and weapons systems that project power against terrestrial targets including in the U.S. homeland. American decision-makers thus could face contingencies where they would have to decide how to resist intimidation, blackmail, or other forms of coercion by the PRC or risk being deterred or coerced from acting to protect our interests.

If the United States was unwilling or unable to take the decisive steps necessary to confront such Chinese actions and thwart the CCP's space ambitions, then nations around the world would lose confidence in Washington's resolve and ability to support its political and security commitments to allies and international partners. Such a perceived lack of will would harm U.S. standing in the world. Failure to provide the necessary reassurance to allies also would undermine the credibility of U.S. extended deterrence guarantees and might even contribute to the unraveling of the alliances and the broader international order Washington and its allies constructed after World War II and have utilized to protect and advance U.S. national interests. The net result would be to gravely weaken the United States, its allies, and partners.

Strategic Implications of China's Cislunar Space Activities

By

Marc Berkowitz and Chris Williams

Introduction

The United States and People's Republic of China (PRC) are engaged in a long-term geopolitical competition. Like previous rivalries between nation-states throughout history, the U.S. and PRC are competing for political prestige, international influence, scientific knowledge, technological advancement, economic prosperity, and military power. The competition is between nations with fundamentally different cultures, languages, histories, geographies, political ideologies, and governance systems. The Sino-American rivalry is geopolitical in the classic sense that it involves the ability to influence or control the physical and human geography of the world.

China seeks to supplant the United States as the dominant power on Earth and alter the international system in ways favorable to its national interests. In contrast, the United States seeks to sustain its leadership position as well as the peace and security of the existing international order that Washington and its Western allies created in the aftermath of the victory over the Axis powers in World War II. As a nation on the Rimland or periphery of Eurasia, U.S. grand strategy since the last century has focused on ensuring that no nation or condominium of states can achieve hegemony over the Heartland of the Eurasian landmass to assure America's access to the lines of communication, resources, markets, and nations around the world essential to its economic and national security.[1]

The intensifying competition between the United States and China is mirrored in near-Earth space and poised to extend throughout the Earth-Moon system. The PRC sees itself in a

[1] See, for example, President Ronald W. Reagan, National Security Strategy of the United States, (Washington, D.C.: The White House, 1987), p. 4.

new space race with America that it intends to win. Indeed, the Chinese Communist Party (CCP) seeks to be the dominant power in space as in other domains. Beijing's space programs and activities are intended to overtake the United States as the world's leading spacefaring nation by 2049, the 100th anniversary of the PRC's founding, if not sooner. China is undermining American strategic advantages in space and pursuing a robust mix of military capabilities to contest freedom of access to and operations in near-Earth space. Concurrently, it has operated at a Lagrange point, lunar orbits, and on the Moon, and has ambitious future space plans.

An emerging and vitally important aspect of the geopolitical competition with significant strategic implications thus involves ongoing Chinese activities to monitor, operate in, utilize, and control the space domain as the ultimate high ground and a prospective theater of military operations. This includes cislunar space – the region of outer space between the Earth and the Moon. The contest over cislunar space could dominate the course and outcome of terrestrial conflict as well as control of the Earth-Moon system. Indeed, domination of cislunar space could position a nation to establish working control of near-Earth space as well as access to the Moon, asteroids, solar system, and their resources. As Lieutenant General John Shaw, Deputy Commander of U.S. Space Command, observed, "astropolitics is about geopolitics."[2]

This paper, prepared for the National Intelligence Officer for Space, examines the role of space in the PRC's grand strategy, characterizes Beijing's activities in cislunar space, and assesses the strategic implications of China's cislunar space activities, particularly their political and military aspects, for U.S. national security interests. In addition, a discussion of basic concepts about outer space pertinent to the Earth-Moon system is provided in the appendix.

China's Grand Strategy and Outer Space

Strategy is an ends-means relationship or "bridge" connecting a nation-state's policy objectives (ends) to the courses of action (ways) and resources (means) it employs to achieve

[2] Lieutenant General John Shaw, "Remarks at the National Security Space Association's Defense and Intelligence Space Conference," Chantilly, VA, January 24, 2023.

them.[3] How nations wield their diplomatic, informational, economic, and military elements of power as instruments of statecraft in attempting to realize the future end-state they envision is influenced by many factors. These include the state's history, culture, political ideology, economy, technology, and geography. The latter is of course a permanent factor that imposes both constraints on and opportunities for national policy and strategy.

China's Strategy

China's historical experience of three millennia is integral to its national psyche and an important influence on its "strategic culture" and "style" in strategy. For centuries, China was isolated from the rest of the world by natural barriers including deserts to the north (Gobi and Taklamakan), mountains to the west (Himalayan range including Mount Everest), and large expanses of water to the east (East and South China Seas and Pacific Ocean). Its geography provided fixed boundaries within which political struggles led to a turbulent early history of rivalries and recurring conflict until the unification of China under the Qin Dynasty (221-206 B.C.).[4] It also afforded protection against foreign invasion and enabled China to increase its territory through imperial expansion. Dating to the Han Dynasty (206 B.C. to 220 A.D.), China was the stronger power at the center of a series of hierarchical, tributary relationships with neighboring states including Korea, Vietnam, Laos, and Burma.[5] This tributary system reinforced Chinese emperors' view of the nation as the "Middle Kingdom" at the core of a system in which other states were subservient vassals.

While China's rulers expected comparable deference when they encountered states beyond Asia, this ended when foreign powers seized control of large parts of Chinese territory beginning in 1839 with the First Opium War. At that time, Great Britain's Royal Navy destroyed ports, sailed up the Yangtze River, and forced the Imperial Chinese government to

[3] For an insightful general theory of strategy grounded in the classical strategists see, Colin S. Gray, The Strategy Bridge: Theory for Practice (London: Oxford University Press, 2010).

[4] See, for example, Denis Twitchett and Michael Loewe, eds., The Cambridge History of China, Volume 1: The Ch'in and Han Empires, 221 BC–AD 220 (Cambridge University Press, 1986); and Albert E. Dien and Keith N. Knapp, eds., The Cambridge History of China, Volume 2: The Six Dynasties, 220–589 (Cambridge University Press, 2019).

[5] Ibid.

open its markets in a trade dispute with the Qing Dynasty.[6] In 1931, Imperial Japan invaded Manchuria in northern China, set up the puppet state of Manchukuo, and captured Nanjing (then China's capital) in 1937 leading to the infamous Rape of Nanjing.[7] Japan ruled most of China's major cities but could not defeat an insurgency and control the entire country during World War II (which China refers to as the War of Resistance against Japan). Although China's subjugation to foreign powers and its "Century of Humiliation" ended in 1949, it remains a central element of the CCP's grievances about China's victimization by "Western Imperialists" akin to the Communist Party of the Soviet Union's narrative regarding the "Great Patriotic War."

Mao's Revolution

The CCP formally established the PRC in 1949 after defeating the Republic of China's armed forces (led by Chiang Kai-shek and the Kuomintang or Chinese Nationalist Party) in the Chinese Civil War, that had begun in 1927, forcing them to relocate to the island of Taiwan about 100 miles off mainland China's southeastern coast.[8] The CCP thus inherited China's domestic and international security challenges.[9] These include maintaining internal stability despite socioeconomic discord in a large, ethnically diverse country with the additional problem caused by periodic struggles for political control among a ruling elite lacking a defined leadership succession process. It also involves deterring historic rivals, such as India, Japan, Korea, Russia, and Vietnam, along the periphery of China's extensive borders to counter threats to the CCP's rule.

Mao Zedong's rule as the "Great Helmsman" and Chairman of the CCP from 1949 to 1976 was a period which included the "Great Leap Forward" to shift the country from an

[6] See, for example, Stephen R. Platt, Imperial Twilight: The Opium War and the End of China's Last Golden Age (New York: Alfred A. Knopf, 2018).

[7] See, for example, Rana Mitter, China's War with Japan 1937-1945: The Struggle for Survival (London: Allen Lane, 2013); and Iris Chang, The Rape of Nanking: the Forgotten Holocaust of World War II (New York: Basic Books, 1997).

[8] https://digitalarchive.wilsoncenter.org/topics/chinese-civil-war-1946-1950

[9] For insightful examinations of China's long-term strategy and its historical underpinnings, see Michael Pillsbury, The Hundred-Year Marathon: China's Secret Strategy to Replace America as the Global Superpower (New York: Henry Holt and Co., 2015); and Michael D. Swaine and Ashley J. Tellis, Interpreting China's Grand Strategy: Past, Present, and Future (Santa Monica: RAND Corporation, 2000).

agrarian to communist society, the "Cultural Revolution" to reinvigorate the revolutionary fervor that helped the CCP win the civil war and reinforce Mao's grip on power, and use of the People's Liberation Army (PLA) in a series of confrontations with the United States.[10] Believing the threat of a global nuclear war between capitalist and socialist states was possible and concerned that the PRC's weakness increased the risk of conflict, Mao kept China on a war footing, aligned with the Soviet Union, and signed the Sino-Soviet Treaty of Friendship, Alliance, and Mutual Assistance in 1950.[11] The USSR helped the CCP to create the Chinese communist state to gain its cooperation against their common adversary, the United States and its allies. Moreover, Mao directly opposed the United States by supporting the USSR during much of the Cold War, intervening with 260,000 combat troops on the side of the Democratic People's Republic of Korea during the Korean conflict, and providing 320,000 troops as well as $20 billion to assist the Democratic Republic of Vietnam and the Viet Cong during the Vietnam War.[12]

After Soviet General Secretary Josef Stalin's death, however, China's relations with the USSR soured because of Mao's ideological and policy differences with Nikita Khrushchev over "De-Stalinization" and "Peaceful Coexistence" with the West and his dislike of China being subordinate to the Soviet Union in the global hierarchy. The rift between the world's two largest communist states produced the Sino-Soviet split in 1961 and a border conflict in 1969 that nearly escalated to nuclear war.[13] This major change in international relations led to President Richard Nixon's visit to China in 1972, the establishment of full diplomatic relations between the U.S. and PRC in 1979, and America's extension of Most Favored Nation trading status to China.[14] When President Jimmy Carter granted China full diplomatic recognition, he acknowledged the

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[10] Gao Hua, transl. Stacey Mosher and Guo Jian, How the Red Sun Rose: The Origin and Development of the Yan'an Rectification Movement, 1930–1945 (Hong Kong: The Chinese University of Hong Kong Press, 2019).

[11] https://digitalarchive.wilsoncenter.org/places/china

[12] Ibid; Jiang Chen, China's Road to the Korean War: The Making of the Sino American Confrontation (New York; Columbia University Pres, 1996); Russel Spur, Enter the Dragon: China's Undeclared War against the U.S. in Korea 1950-51 (New York: William and Morrow, 1989); Quang Zhi, China and the Vietnam Wars, 1950-1975 (Charlotte, NC: University of North Carolina Press, 2000); and "China Admits Combat in Vietnam War," The Washington Post, May 16, 2023.

[13] See, for example, Lorenz M. Liuthi, The Sino-Soviet Split: Cold War in the Communist World (Princeton, NJ: Princeton University Press, 2008).

[14] https://history.state.gov/countries/issues/china-us-relations

PRC's "One China Principle" and severed normal ties with Taiwan. The U.S. Congress subsequently passed the Taiwan Relations Act (Public Law 96-8, enacted April 10, 1979) permitting continued commercial and cultural relations between the United States and Taiwan and requiring America to provide Taiwan with defensive arms.[15]

Chairman Mao effectively employed the same stratagem with the United States as he did with the Soviet Union to pursue the CCP's objectives. China gained America's cooperation against a common rival to avoid being encircled. The PRC induced U.S. complacency about its strategic intentions to utilize America's strengths for its own advancement.[16] China also used the United States' desire to extricate itself from the Vietnam War and "triangular diplomacy" to leverage America as a counterweight against the Soviet Union. Indeed, the United States helped head off a preemptive Soviet nuclear attack on the PRC during the border conflict by placing its nuclear forces on alert. As former National Security Advisor and Secretary of State Henry Kissinger wrote in his memoirs, the United States "raised our profile somewhat to make clear that we were not indifferent to these Soviet threats."[17]

Moreover, Sino-American cooperation subsequently allowed the PRC to induce the United States to provide it with economic, technological, military, and intelligence assistance that helped to strengthen China.[18] Successive U.S. administrations expanded engagement to aid China in the belief that doing so would create constructive entanglements that would facilitate China's reintegration into the U.S.-led international order and promote political and economic liberalization within the PRC's government and society. Indeed, Chinese leaders worked assiduously to persuade Western leaders and elites that the PRC had no geopolitical aspirations, China's rise would be peaceful, and it would not come at other nations' expense.

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[15] https://www.congress.gov/bill/96th-congress/house-bill/2479

[16] Pillsbury, The Hundred-Year Marathon: China's Secret Strategy to Replace America as the Global Superpower.

[17] Henry Kissinger, White House Years, (New York: Simon and Schuster, 1979), p. 156.

[18] See, for example, David Finkelstein, The Military Dimensions of U.S. – China Security Cooperation: Retrospective and Future Prospects (Fairfax, VA: Center for Naval Analyses, 2010).

For example, Deng Xiaoping, CCP General Secretary from 1978 to 1989, declared that China is "a socialist and developing country, and not a superpower, nor will it ever seek to be one."[19]

Deng's "24 Character" Strategy

Under Deng, the CCP continued to conceal its geostrategic aims through misdirection and ambiguity while leveraging the United States to help China achieve its national objectives. Deng's "24 character strategy" directed the CCP to "observe calmly, secure our position, cope with affairs calmly, hide our capacities and bide our time, be good at maintaining a low profile, and never claim leadership."[20] This was a classic strategy for how a rising state can overtake an established hegemon as it patiently accumulates the power to do so, preferably short of war. As Sun Tzu instructed, "to subdue the enemy without fighting is the acme of skill."[21] Indeed, in The Science of Campaigns, the PLA teaches that:

> China's thousands of years' fine tradition in the art of war put a high value on stratagems. The PLA's campaign science has inherited and carried forward this fine tradition. In the organization and directing of campaigns, the PLA stresses the importance of bringing into full play the commander's wisdom and talents; it emphasizes winning by stratagem and by ingenuity – with minimal cost for maximum results.[22]

Deng asserted it was a time of "peace and development" and implemented major economic reforms as part of the "four modernizations."[23] These were targeted at the PRC's industrial, scientific and technological, agricultural, and defense sectors. Indeed, the brief 1979

[19] "Speech by Chairman of the People's Republic of China's Delegation, Deng Xiaoping, at the Special Session of the UN General Assembly," April 10, 1974.
[20] https://www.strategictranslation.org/articles/preparing-chinas-national-security-strategy-for-the-new-era
[21] Sun Tzu, transl. Samuel B. Griffin, The Art of War (London: Oxford University Press, 1983), p. 77.
[22] Zhang Yuliang, ed., The Science of Campaigns (Beijing: National Defense University Press, May 2006), transl. In their Own Words: PLA's Science of Campaigns (Montgomery, AL: China Aerospace Studies Institute, December 2, 2020), p. 13.
[23] U.S. Congress, Joint Economic Committee, China Under the Four Modernizations, Part I (Washington, D.C.: General Printing Office, 1982).

Sino-Vietnamese War, which began when the PRC invaded Vietnam as punishment for Hanoi deposing the Chinese-backed Khmer Rouge regime in Cambodia, was indecisive, exposed the PLA's weaknesses in operations planning, command and control, logistics, armaments, and tactics, and underscored the need to redress the PLA's deficiencies.[24]

President Ronald Reagan's announcement of the U.S. Strategic Defense Initiative (SDI) on March 23, 1983, aimed at creating strategic defenses that would render nuclear-armed ballistic missiles "impotent and obsolete," combined with the buildup of U.S. strategic and conventional forces, further concerned the CCP leadership about the PLA's comparative military-technological position, the viability of its nuclear deterrent, and the threat posed to China by the United States.[25] Their concern was reinforced by America's response to the Tiananmen Square Massacre in 1989, its demonstration of its warfighting prowess in the 1991 Persian Gulf conflict, the intervention of aircraft carriers from the U.S. Navy's Seventh Fleet during the PRC-Taiwan Strait crisis in 1995-1996, and the bombing campaign against Kosovo (which included the accidental bombing of China's Embassy in Serbia) in 1999.[26] This underscored the CCP's perception of the threat posed by the United States and the imperative to modernize the PLA by acquiring, fielding, and operating capabilities to increase China's military power.

Deng's successors, Jiang Zemin and Hu Jintao (who ruled from 1989-2002 and 2002-2012, respectively), continued to leverage relations with the West to advance China's economic growth and military development. Once the PRC became a member of the World Trade Organization in 2001, it was able to gain further access to global markets, become an integral trading partner, and acquire foreign technology and know-how. Whatever intellectual property

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[24] Defense Intelligence Agency, China Military Power: Modernizing a Force to Fight and Win (Washington, D.C. Defense Intelligence Agency, 2019). p. 2

[25] See, for example, Andrew Scobell, et. al., ed., Chinese Lessons from Other Peoples' Wars (Carlisle, PA, U.S. Army War College Strategic Studies Institute, 2011); and Brad Roberts, China and Ballistic Missile Defense: 1955 to 2002 and Beyond (Arlington, VA: Institute for Defense Analyses, 2003).

[26] See, for example, Major General Chang Xianqi, ed., Military Astronautics (Beijing: Academy of Military Science Publishing House, January 2005), pp. 247-266, transl. Dean Cheng, "China's Military Role in Space," Strategic Studies Quarterly, (Spring 2012); and https://ndupress.ndu.edu/Portals/68/Documents/stratperspective/china/china-perspectives-17.pdf.

or technology the PRC could not obtain through trade, it stole through espionage.[27] China's gross domestic product grew an average of over 9 percent a year.[28] This raised more than 800 million Chinese out of poverty as well as improved public access to health, education, and other services. The CCP thus was able to maintain the support of the general population by raising their standard of living as well as begin to turn the PLA into a modern armed force. Indeed, China's economic growth financed successive Five-Year Plans that facilitated a sustained military buildup.

Xi's "Strategic Opportunity"

With the USSR's dissolution, the global diffusion of political, economic, and military power, emergence of a multipolar international system, and the United States distracted by the September 11, 2001, terrorist attacks and expending substantial resources to prosecute a Global War on Terror (including long wars in Afghanistan and Iraq), the CCP leadership recognized that it was in a "period of strategic opportunity."[29] China's rapid rise enabled it to become the world's second largest economy behind America and continue to narrow the gap between the PRC and U.S. in military power. Consequently, the CCP became less ambiguous about its intentions, less risk averse, and more assertive in the advancement of the PRC's national interests. This was especially the case after Xi Jinping became General Secretary in 2012.

Under Xi, who recently gained an unprecedented third term as General Secretary at the 20th Party Congress to become the most powerful PRC leader since Mao, the CCP openly declared its aim to achieve the "great rejuvenation of the Chinese nation by 2049," the centennial of the PRC's founding.[30] In short, the CCP aims to reestablish China in its rightful "leading position," commensurate with its national power, as the dominant actor in the international

[27] See, for example, William C. Hanna et. al., China's Industrial Espionage: Technology Acquisition and Military Modernization (London: Routledge, 2013).

[28] https://www.worldbank.org/en/country/china/overview

[29] "Full Text of Jiang Zemin's Report at the 16th National Congress of the Communist Party of China," Xinhua, October 10, 2007.

[30] "The Space Dream and China Dream," China Space News, July 31, 2013, p. 3, transl. Kevin Pollpeter, et. al., "China Dream, Space Dream: China's Progress in Space Technologies and Implications for the United States," Report prepared for the U.S.-China Economic and Security Review Commission, March 2, 2015.

system. The CCP's objectives include maintaining firm political control of the state and populace, "reunifying" Taiwan with China, preserving the PRC's sovereignty and territorial integrity, and continuing the military, scientific, technological, and economic advancement necessary to increase China's prestige, influence, knowledge, wealth, and power. Their plan to return the nation to a preeminent position in global affairs involves amassing the power to alter the international order in ways favorable to the PRC's national interests, communist political ideology and authoritarian governance model, establishing a sphere of influence over the foreign, economic, and security policies of other states in the Indo-Pacific region, and expanding China's global influence and reach, all while undermining America's status and power.

China is a revanchist power with an authoritarian system of governance that concentrates political power in Xi and the small ruling elite of the CCP without checks and balances by an independent legislature, autonomous judiciary, or civil liberty protections. Its comprehensive and integrated national strategy employs all elements of national power and instruments of statecraft to achieve its objectives. The CCP enforces coercive controls on civil society, including political opposition and freedom of speech, and precludes basic human rights to maintain internal stability. In addition, nationalism and xenophobia are utilized to create fears of foreign aggression and internal subversion to justify its repressive security measures, large resource allocations for its military buildup, and an increasingly aggressive foreign policy.

While continuing to maintain high tariffs, protect its domestic industry, and manipulate its currency to build up monetary reserves, the CCP is also systematically implementing "military-civil fusion" (MCF).[31] It is eliminating barriers and requiring collaboration between its civilian research and commercial sectors and its military and defense industrial sectors to ensure scientific and technological innovations advance both China's economic and military power. The CCP believes that emerging technologies will catalyze a new technological revolution that will

[31] See, for example, Office of the Secretary of Defense, Military and Security Developments Involving the People's Republic of China 2022 (Washington, D.C. Department of Defense, 2022), p., 27-32; Alex Stone and Peter Wood, China's Miliary-Civil Fusion Strategy (Montgomery, AL: China Aerospace Studies Institute, 2020); and Alex Stone, Military-Civil Fusion Terminology: A Reference Guide (Montgomery, AL: China Aerospace Studies Institute, March 15, 2021).

transform the global economy as well as military affairs. China seeks to be the first nation to apply such advanced technology to next generation products and services as well as for "intelligentized warfare" to achieve economic and military dominance.[32] The key technologies include artificial intelligence (AI), autonomous systems, advanced computing, quantum information sciences, fifth generation (5G) wireless information and communications networking, biotechnology, and advanced materials and manufacturing. Consequently, the CCP is making massive investments in domestic research and development, recruiting and managing talent, directing academic and research collaboration, obtaining foreign technology legally, and stealing intellectual property and technology where possible. Xi personally oversees MCF as chair of the CCP's Central Military Commission and the Central Commission for MCF Development.[33]

Moreover, the CCP continues to emphasize efforts to transform the PLA into a "world class" military by 2049.[34] It is modernizing and expanding the armed forces while striving to achieve military and technological superiority. The CCP's active defense strategy is primarily oriented in the near-term on establishing regional dominance and deterring U.S. intervention, while enhancing the military power and foreign relationships necessary to advance the PRC's global interests and objectives. It is structuring and posturing the PLA to ensure China's freedom of access to and ability to maneuver within the Indo-Pacific area of operations while deterring foreign intervention by denying the same freedom of action to the United States and its allies and partners.

In this regard, it has deployed a variety of weapons systems for "anti-access/area-denial" (A2/AD) to prevent U.S. and allied forces from entering or operating effectively in the Indo-Pacific theater.[35] These include advanced land-attack and anti-ship cruise and ballistic missiles, fighter aircraft, integrated air and missile defense weapons systems, and satellite systems to enable rapid targeting of U.S. and allied military forces in the region. Moreover, China has

[32] State Council Information Office, "China's National Defense in 2004."
[33] https://www.state.gov/wp-content/uploads/2020/05/What-is-MCF-One-Pager.pdf
[34] "Full Text of Xi Jinping's Report at the 19th CPC National Congress," Xinhua, November 3, 2017.
[35] Military and Security Developments Involving the People's Republic of China 2022, pp., 79-83.

begun to establish the forces, logistics, and basing infrastructure to project power beyond the Indo-Pacific region. In addition to its base in Djibouti, the PRC is considering locating PLA facilities in Angola, Cambodia, Indonesia, Kenya, Myanmar, Pakistan, Seychelles, Singapore, Sri Lanka, Tanzania, Tajikistan, Thailand, and the United Arab Emirates.[36]

The PRC recognizes the geostrategic importance of Asia-Pacific's three island chains. The first island chain is closest to mainland China and arcs from the Kurils, the Japanese home islands, and the Ryukyus to Okinawa, Taiwan, the Philippines, and Malaysia. It includes the key chokepoints of the Bashi Channel and Miyako Strait. The second island chain stretches from Japan across Guam and Palau to Indonesia. The third island chain is closest to the United States and runs from the Aleutian Islands, through Hawaii, Samoa, Fiji, and New Zealand. The PRC's ability to deny or "break" U.S. control of the island chains is essential to prevent America and its allies from encircling China, blockading its ports, crippling its economy, and projecting power into the mainland.

Xi's Assertiveness

The CCP is systematically attempting to undermine U.S. strategic advantages in the terrestrial, cyber, and space domains, blunt its regional and global influence, offset or displace its position in the Indo-Pacific, and establish regional hegemony as the foundation to extend its reach and influence around the world. China reestablished a bilateral, "no limits" partnership with Russia, continues to expand their cooperation on political, technological, and military matters, and is strengthening what Xi and Russian Federation President Vladimir Putin term their "special relationship."[37] Xi and Putin share a common interest in seeking to undermine U.S. foreign relationships and drive wedges among America, its allies, and international partners as well as create internal political divisions within those countries to rupture U.S. alliances in

[36] Ibid., p. 145.

[37] "Joint Statement of the Russian Federation and the People's Republic of China on the International Relations Entering a New Era and the Global Sustainable Development," February 4, 2022, transl. https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-02-04%20China%20Russia%20joint%20statement%20International%20Relations%20Entering%20a%20New%20Era.pdf.

Eurasia and the Pacific. As Xi told Putin during his March 2023 visit to Moscow, "right now there are changes – the likes of which we haven't seen for 100 years – and we are the ones driving these changes together." Putin replied, "I agree."[38]

Similarly, the PRC collaborates closely with North Korea and Iran.[39] It also uses its seat on the United Nations Security Council, membership in other multilateral fora, and "wolf warrior" diplomacy to diminish U.S. leadership in regional and global institutions and exert influence on international governance issues. Concurrently, China undermines or ignores established international norms, for example, harassing U.S. and foreign vessels and aircraft in international waters and airspace and conducting provocative acts in cyberspace and outer space, and instead promotes autocratic norms.

The PRC is increasingly assertive in its foreign relations. It crushed Hong Kong's autonomy, is militarizing the South China Sea, and is pressing territorial claims in the Indo-Pacific region. [40] These involve disputes with Bhutan, Brunei, Indonesia, Japan, North Korea, South Korea, Laos, Myanmar, Mongolia, Nepal, the Philippines, Singapore, Taiwan, Tibet, and Vietnam. Taiwan is Beijing's main object of ire with whom it ostensibly seeks "peaceful reunification" but frequently harasses and tries to intimidate with displays of force and threats to blockade or invade the nation. In the South China Sea, China claims sovereignty over 90 percent of the water, seabed, islands, and airspace based on the "nine dash line." It is constructing and fortifying artificial islands in the disputed territories of the Paracel Islands contested by the PRC, Taiwan, and Vietnam as well as the Spratly Islands, contested by China, Taiwan, Malaysia, the Philippines, and Vietnam. Moreover, the PRC had tense confrontations or violent skirmishes with Japan over the Senkaku Islands in the East China Sea in 2012, the Philippines over the Scarborough Shoal in the South China Sea in 2012, Vietnam over an oil rig near the Paracel

[38] https://www.newsweek.com/trump-russia-china-xi-jinping-putin-talks-kremlin-1789735.

[39] See, for example, Ambassador Joseph R. DeTrani, "China's Relations with Taiwan and North Korea, "Testimony before the U.S.-China Economic and Security Review Commission," June 5, 2014; and Scott W. Harold and Alireza Nader, China and Iran: Economic, Political and Military Relations (Santa Monica, CA: RAND Corporation, 2012).

[40] Office of the Secretary of Defense, Military and Security Developments Involving the People's Republic of China 2022, pp., 16-18.

Islands in 2014, and India over Kashmir, Tibet, and along the Line of Actual Control in 2020. Such disputes and confrontations continue to this day.

Furthermore, Xi launched a "Belt and Road Initiative" (BRI) in 2013 to establish new secure land and sea trade routes as well as physical and information infrastructures connecting the PRC with the rest of the world that would be less susceptible to disruption by the United States as well as enhance Beijing's political influence and economic power.[41] The CCP wants greater control over the flow of goods and capital not only to enhance its wealth and competitiveness, but to be able to exert influence on or coerce other nations. China offers inducements in the form of trade agreements to provide access to its domestic markets and financing for international development. It also wields economic threats to deter or punish states for not acting in accordance with the CCP's demands. Following the Senkaku confrontation, for example, it blocked exports of rare Earth materials (REM) to Japan. The PRC has also blocked imports of goods and the provision of visas for perceived affronts such as when it restricted imports of Australian beef and wine after Canberra prevented Huawei from supplying equipment for its 5G information and communications infrastructure.

China has expanded the BRI to include Africa, the Pacific, and Latin America. The "Belt" involves revitalizing the ancient Silk Road connecting Europe and Asia via an overland network of highways, railways, energy pipelines, 5G information and communications infrastructure, and streamlined border crossings through Central and Southeast Asia. The "Road" involves investments to create a new sea trade infrastructure along Marco Polo's route connecting China, Southeast Asia, Africa, and Europe with ports, fueling stations, bridges, and other infrastructure projects from Southeast Asia, through the China-Pakistan Economic Corridor, and along the Indian Ocean. Thus far, 147 countries have signed onto the BRI in one fashion or another. This is enabling China to develop new international economic and trade relationships, access and expand export markets, and secure access to energy supplies in Central Asia and the Middle East as well as other natural resources in Africa without having to transit the

[41] Ibid., pp. 24-26; and James McBride, et. al., "China's Massive Belt and Road Initiative," Council on Foreign Relations Backgrounder, February 2, 2023.

potential geographic chokepoint of the Malacca Strait near Singapore. Moreover, debt financing deals for BRI projects are a source of financial leverage for the CCP over foreign countries.

Besides blandishment, inducement, and deception, the CCP uses coercion to erode established norms, undermine the rules-based international order, seize territory, and change international boundaries.[42] This includes espionage, information operations, influence campaigns, and other forms of political warfare, bribery, illicit technology transfer, supply chain operations, and other forms of economic warfare, as well as covert action, civil militias, and demonstrations of armed force, backed by the threat of thermonuclear escalation. In the grey zone (between peace and armed attack), China is managing perceptions, conditioning, probing, and acting to shape the operating domains.[43]

The CCP clearly recognizes the character of the ongoing geopolitical competition and the changing dynamics of international relations. Accordingly, the PLA has evolved its strategic thought to encompass the expanded scope of the competition in the terrestrial, cyber, and space domains. The PLA is teaching its military commanders, for example, that:

> The international geopolitical struggle has for a long time been manifested as a struggle between sea power and land power, and the nature of the struggle has been to fight over strategic key points, strategic resources, and strategic thoroughfares. The hot points of the struggle have been situated in Northeast Asia-Southeast Asia-South Asia-the Middle East, on the outskirts surrounding the Eurasian continent, and in the North Africa-Balkan Peninsula, the zone where the land and the sea interconnect. In the future, this will still be an important stage of international geopolitical contention. At the same time, new geopolitical struggles for control over such global public spaces as the seas, the polar regions,

[42] Policy Planning Staff, The Elements of the China Challenge (Washington, D.C.: Office of the Secretary of State, November 2020); and "The Chinese Communist Party's Ideology and Global Ambitions," Remarks by National Security Advisor Robert C. O'Brien, June 27, 2020.

[43] John A. Gentry, "Influence Operations of Russia, China, and the Soviet Union: A Comparison," Occasional Paper, Vol. 3, No. 5, National Institute for Public Policy, National Institute Press, 2023. https://nipp.org/wp-content/uploads/2023/04/Vol.-3-No.-5.pdf.

> outer space, and the network will tend to become intense, and this will inevitably tend to result in a major and profound impact on the great powers' military strategies.[44]

The PRC is building a "blue water" navy and has already surpassed the U.S. in shipbuilding, land-based conventional ballistic and cruise missiles, and integrated air defense systems.[45] It is diversifying and increasing its arsenal of nuclear delivery platforms and at least doubling its nuclear warhead stockpile, while also expanding its inventory of multi-role, mobile, ground-launched intermediate-range ballistic missiles.[46] Moreover, the number of Chinese land-based fixed and mobile intercontinental ballistic missile launchers now exceeds those of the United States.[47]

The PLA's Strategic Support Force, established in 2015 to centralize strategic space, cyber, electronic, and psychological warfare missions, is significantly improving its capabilities.[48] In addition, the PRC continues to improve cyber capabilities and can launch attacks which could disrupt U.S. critical infrastructure services including transportation and energy.[49] China has rapidly expanded ISR, navigation, and communication satellite

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[44] Academy of Military Science Military Strategy Studies Department, The Science of Military Strategy (Beijing: Military Science Press, December 2013), transl. In their Own Words: The Science of Military Strategy (Montgomery, AL: China Aerospace Studies Institute, February 28, 2021), p. 18.

[45] Office of the Secretary of Defense, Military and Security Developments Involving the People's Republic of China 2022, p., ii.

[46] Ibid., pp. 85-88.

[47] "Statement of General Anthony J. Cotton, Commander of U.S. Strategic Command, Before the Senate Committee on Armed Services," March 9, 2023, p. 6.

[48] See Defense Intelligence Agency, Challenges to Security in Space 2022: Space Reliance in an Era of Competition and Expansion (Washington, D.C.: Defense Intelligence Agency, 2022), p. 10; "Prepared Statement of Mark Stokes, Executive Director Project 2049 Institute," in U.S.-China Economic and Security Review Commission, Hearing on China in Space: A Strategic Competition? (Washington, D.C.: U.S. Government Printing Office, 2019); Kevin Pollpeter, et. al., The Creation of the PLA Strategic Support Force and Its Implications for Chinese Military Space Operations (Santa Monica, CA: RAND Corporation, 2017); Adam Ni and Bates Gill, "The People's Liberation Army Strategic Support Force: Update 2019," The Jamestown Foundation China Brief, (Vol. 19, Issue 10), May 29, 2019, pp. 13-16; and John Costello and Joe McReynolds, China's Strategic Support Force: A Force for a New Era (Washington, D.C.: National Defense University Press, 2018).

[49] Annual Threat Assessment of the U.S. Intelligence Community (Fairfax, VA: Office of the Director of National Intelligence, 2023), p. 10; and Worldwide Threat Assessment of the U.S. Intelligence Community (Fairfax, VA: Office of the Director of National Intelligence, 2020), p. 5.

constellations, and improved space launch, human spaceflight, and space exploration programs, while testing and fielding space weapon systems.[50]

Space in China's Strategy

The exploration and use of outer space is integral to and "serves the overall national strategy" for China's rejuvenation.[51] They are part of Xi's "China Dream" to create a wealthy and powerful nation as well as a source of national pride.[52] As Xi stated on China's first "Space Day" on April 24, 2016 (chosen to commemorate the launch of the PRC's first satellite *Dong Fang Hong I*), "Exploring the vast universe, developing space programs, and becoming an aerospace power have always been the dream we have been striving for."[53] Indeed, the ability to conduct space operations is both a *sine qua non* and symbol of great power status. Space exploration and use enhance all elements of China's national power. The PRC's space program reinforces the CCP's legitimacy, enhances China's international prestige, strengthens its economy and international competitiveness, advances its scientific knowledge as well as industrial and technology bases, and increases its military power.

During the Cold War space race between the U.S. and USSR, China was unable to compete because of its lack of economic and technological development. Since then, the PRC established the financial, scientific, technological, and industrial capacity to launch and operate spacecraft through indigenous development, international cooperation, and foreign espionage. The CCP allocated substantial resources over a series of Five-Year Plans to improve all aspects of the space program. The PRC moved deliberately from an initial stage of making strategic preparations to develop space prowess to having world class technology and industrial bases to research, develop, test, evaluate, procure, operate, and sustain an array of space

[50] Worldwide Threat Assessment of the U.S. Intelligence Community, p. 16.
[51] State Council of the People's Republic Of China, "China's Space Program: A 2021 Perspective," January 28, 2022.
[52] See, for example, Kevin Pollpeter, et. al., China's Space Narrative: Examining the Portrayal of the US-China Space Relationship in Chinese Sources and its Implications for the United States (Montgomery, AL: China Aerospace Studies Institute, 2020).
[53] State Council of the People's Republic Of China, "White Paper on China's Space Activities," December 28, 2016.

systems and supporting infrastructure capable of carrying out the full range of national security as well as civil and commercial missions. This has placed the PRC in position to achieve "space power in all respects,"[54] potentially overtake the United States as the world's leading spacefaring nation within the next two decades, and leverage space activities to increase its comprehensive national power. Consequently, Xi has exhorted China's space scientists and engineers to "seize the strategic opportunity" to make a greater contribution to the nation.[55]

Strategic Preparations

The extension of the geopolitical competition between the PRC and the United States to near-Earth space and cislunar space is a direct outgrowth of the CCP's aim to reestablish China as the world's dominant power. In fact, China considers outer space a "critical domain in international strategic competition."[56] The stratagems the CCP employs with respect to space are consistent with how it pursues terrestrial objectives. China began developing space capabilities in 1958 after the Soviet Union launched Sputnik; however, it did not launch a satellite into space until 1970. During the second half of the 20th century, while China was developing its space sector, the CCP used deception, indirection, and ambiguity to conceal its competitive space goals. Its strategic communications narrative regarding space was consistent with broader themes and messages regarding the PRC's lack of geopolitical aspirations, desire for China's rise to be peaceful, and for it not to come at other nations' expense. This was designed to induce complacency and facilitate international cooperation that would help the CCP achieve its objectives.

With the end of the Cold War, U.S. policy was modified so that space cooperation with the former Soviet Union and China could be used as an incentive to dissuade those countries from contributing to the proliferation of ballistic missile technology as well as encourage them to liberalize their governance systems and societies. The 1995 U.S. and China Commercial Space

[54] Ibid.

[55] "Backgrounder: Xi Jinping's Vision for China's Space Development," Xinhua, April 24, 2017.

[56] State Council Information Office, "China's National Defense in the New Era, 2019," Xinhua, July 24, 2019, pp. 13–14.

Launch Trade Agreement, for example, facilitated the PRC's access to the international commercial space launch services market.[57] This enabled China to earn hard currency as well as gain access to Western high technology through the provision of launch services. Despite technology security safeguards, the PLA was able to use the export of U.S. commercial communications satellites for launch on Chinese Long March boosters to exploit U.S. space technology that helped to improve its military space and missile programs. [58]

While developing the foundation for China to increase its space power, the PRC also used diplomatic measures in an effort to blunt the United States' stronger position in space. Concerned about the threat posed by SDI and U.S. military space power, for example, China reaffirmed its commitment to the peaceful uses of outer space and pursued international agreements through the United Nations to prevent the "weaponization of space." It has supported Russian proposals to negotiate a multilateral treaty on the "Prevention of an Arms Race in Outer Space" in the Conference on Disarmament since 1981. Subsequently, China and Russia jointly introduced a proposed "Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects" at the Conference on Disarmament in 2008 and 2014.[59] The PRC continues to espouse such positions, although it has not joined the Biden administration's moratorium on destructive, ground-based direct-ascent ASAT tests.

Similarly, China has used international cooperation to enhance its own space capabilities and posture. The PRC negotiated arrangements with countries including Argentina, Brazil,

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[57] https://aerospace.org/sites/default/files/policy_archives/MoA%20on%20Launch%20Services%20Trade%20-%20China%20Mar95.pdf

[58] See, for example, U.S. Congress, Senate Select Committee on Intelligence, Report on Impacts to U.S. National Security of Advanced Satellite Technology Exports to the People's Republic of China (PRC) and Report on the PRC's Efforts to Influence U.S. Policy (Washington, D.C.: U.S. Government Printing Office, 1999).

[59] Report of the Conference on Disarmament to the General Assembly of the United Nations, U.N. Doc CD/1879, Feb. 29, 2008; Letter dated 10 June 2014 from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disarmament addressed to the Acting Secretary-General of the Conference transmitting the updated Russian and Chinese texts of the draft treaty on prevention of the placement of weapons in outer space and of the threat or use of force against outer space objects (PPWT) introduced by the Russian Federation and China, U.N. Doc. CD/1985, June 12, 2014; and Ministry of Foreign Affairs of the People's Republic of China, "China and Russia Jointly Submitted the Draft Treaty on PPWT to the Conference on Disarmament," February 2, 2008.

Chile, Namibia, and Venezuela for satellite tracking stations and space surveillance telescopes which can cover the Southern Hemisphere.[60] This provides the PRC with an enhanced ability to monitor and collect intelligence on U.S. and other nation's space activities. In addition, China increased bilateral cooperation with Russia on various space projects. Since 1994, they have signed more than a dozen space cooperation agreements. These involve collaboration, among other things, on rocket engines, navigation satellite systems, orbital debris monitoring, human spaceflight, and deep space exploration.[61]

Moreover, the PRC added a "Space Silk Road" as a component of the BRI to develop an information infrastructure which connects China with Europe and Africa via its Beidou navigation satellite system and other space assets.[62] China aims for the Space Silk Road to provide a range of space goods and services for a global infrastructure, enabled by satellites, launch services, and associated ground systems, at less risk of disruption than relying on foreign space capabilities such as the U.S. Global Positioning System and Europe's Galileo system. Indeed, the PRC has offered BRI member nations priority and free access to navigation satellite data and services as an inducement for countries to join the initiative as well increase its political and economic influence.[63]

Chinese military analysts assert that the militarization of space is the "most important direction in the development of military power in the 21st century" and that breakthroughs in space technology will "determine the global balance of power."[64] They evidently arrived at this conclusion after assessing U.S. military prowess in Operations Desert Storm (Kuwait and Iraq, 1991), Allied Force (Balkans), Enduring Freedom (Afghanistan, 2001), and Iraqi Freedom

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[60] Matthew P. Funaiole, et. al., "China's Eyes on the Skies; China's Growing Space Footprint in South America," Hidden Reach, Issue 4, (October 4, 2022); Julieta Pelcastre, "China's Ground Stations in South America Raise Concerns," Dailogos Americas, November 21, 2022.

[61] Kevin Pollpeter, et. al., China-Russia Space Cooperation: The Strategic, Military, Diplomatic, and Economic Implications of a Growing Relationship (Montgomery, AL: China Aerospace Studies Institute, 2023).

[62] See, for example, John Dotson, "The Beidou Satellite Network and the 'Space Silk Road' in Eurasia," The Jamestown Foundation China Brief, Vol. 20, Issue 12, (July 15, 2020); and Jan Robinson, et. al., China Deploys Beidou to Project Power and Influence (Prague: Prague Security Studies Institute, 2021).

[63] Ibid.

[64] Gao Yan, "Direction in the Development of China's Space Strategy," Hong Kong Kuang Chiao Ching, November 16, 2003, pp. 6-9.

(2003). Those combat operations demonstrated how the U.S. employed space capabilities as the leading edge of information-based, network-enabled, joint operations.

The PLA carefully studied how the integration of satellite systems which collect, generate, and relay information with military platforms and weapon systems enabled the U.S. armed forces to project power with greater speed, precision, and lethality. Accordingly, the Chinese leadership shifted the focus of military planning from "waging local wars under high technology conditions" to focus on "waging local wars under informationized conditions."[65] Indeed, PLA officers asserted that the impact of space on land, sea, and air battles will continue to increase and "will be a major component of future conflict."[66] In the 2006 edition of the PLA's textbook The Science of Campaigns, the space domain was recognized as the "new strategic high ground."[67] Similarly, the PLA's text on the Science of Military Strategy, asserted that "space has become a strategic elevation point and space-based assisting-support and support systems are an indispensable strategic brace-support in winning informationized wars."[68]

Consequently, the PRC invested in space capabilities and associated infrastructure to support military operations in the terrestrial and electromagnetic domains as part of the plan to create the "world class" military force required to achieve the CCP's strategic objectives and change the international order.[69] The PLA developed operations concepts involving "system destruction warfare" and "multi-domain precision warfare" for waging "informationized" armed conflict.[70] These concepts involve the employment of terrestrial and spaceborne command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities to enable kinetic and non-kinetic long-range strikes with precision guided munitions,

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[65] Dean Cheng, "China's Military Role in Space," p. 61.

[66] Chinese Military Encyclopedia Committee, Chinese Military Encyclopedia, Vol. 2, (Beijing: Academy of Military Science Publishing House, 1997), p. 455, transl. Dean Cheng, "China's Military Role in Space."

[67] Zhang Yuliang, ed., The Science of Campaigns, p. 87.

[68] Academy of Military Science Military Strategy Studies Department, The Science of Military Strategy, p. 13.

[69] See, for example, Mark A. Stokes and Dean Cheng, "China's Evolving Space Capabilities: Implications for U.S. Interests," Report Prepared for The U.S.-China Economic and Security Review Commission, April 26, 2012.

[70] Jeff Wuthrow, System Destruction Warfare and the PLA (Washington, D.C.: Institute for National Strategic Studies, 2023); Jeff Engstrom, Systems Confrontation and System Destruction Warfare (Santa Monica, CA: RAND Corporation, 2023); and Mark Cozad, et. al., Gaining Victory in Systems Warfare (Santa Monica, CA: RAND Corporation, 2023.

electronic warfare, space weapons, and offensive cyber capabilities against key links and nodes in the enemy's systems of military platforms, weapons, and supporting C4ISR network in order to disrupt, paralyze, or destroy its operational capability.

In addition to robust space industrial and technology bases, China's space infrastructure includes space launch ranges, satellite control centers, telemetry, tracking, and commanding stations (TT&C), data reception stations, and space domain awareness (SDA) sites dispersed across the mainland to access space, explore and utilize the domain, and compete in the international commercial space market. The PRC operates a series of light (capable of boosting into space < 2 metric tons), medium (2-20 metric tons), and heavy-lift (20-50 metric tons) space launch vehicles (SLVs) from its four launch sites.[71] It is also developing additional light-, medium-, and heavy-lift SLVs, including the super heavy-lift Long March-9 (> 50 metric tons) mainly for missions to the Moon and Mars.[72]

China's main satellite control center is in Xian, while its primary control center for human space flight and lunar missions is in Beijing.[73] In addition to five TT&C stations and four data reception stations on its mainland, China has TT&C capabilities around the world to support missions in near-Earth space, cislunar space, and deep space. There are such ground stations located in Argentina, Australia, Brazil, Canada, Chile, Ethiopia, France, Greenland, Kenya, Kiribati, Namibia, Norway, Pakistan, South Africa, Spain, and Sweden.[74] There are also four sites in Antarctica for similar mission support and a Beidou reference station.[75]

China's SDA network includes various telescopes, radars, and other sensors that support such missions as intelligence collection, counterspace tracking, targeting, and combat effects assessment, ballistic missile early warning, spaceflight safety, satellite anomaly resolution, and space debris monitoring. In addition, the PLA operates space tracking ships to support space

[71] Defense Intelligence Agency, Challenges to Security in Space 2022: Space Reliance in an Era of Competition and Expansion, p. 14.
[72] Ibid.
[73] Ibid., p. 15.
[74] Ibid., p. 16.
[75] Ibid.

operations from the Pacific, Indian, and Atlantic Oceans. Moreover, the PRC has used its leadership in the Asia-Pacific Space Cooperation Organization for a collaborative space surveillance project to provide coverage of LEO and GEO.[76] The multilateral organization, with rotating leadership, includes China, Bangladesh, Indonesia, Iran, Mexico, Mongolia, Pakistan, Peru, Thailand, and Turkey. China provided Iran, Pakistan, and Peru 15-centimeter telescopes as part of the project. Space surveillance tasking and observations go through the Chinese Academy of Science's National Astronomical Observatory.

The PRC now operates hundreds of satellite systems in near-Earth space to support CCP decision-makers, intelligence activities, and military operations.[77] ISR systems provide situational awareness of global and regional conditions, activities, and events. This includes monitoring rivals within the Indo-Pacific region such as Australia, India, Japan and Taiwan as well as hot spots on the Korean peninsula, in the East and South China Seas, and Indian Ocean. Such capabilities also provide the PLA with the means to monitor, track, and target U.S. and allied force deployments and maneuvers of aircraft carrier strike groups, surface action groups, amphibious ready groups, marine expeditionary units, and expeditionary air wings beyond line of sight, past the first and second island chains, out to the western Pacific Ocean, and the continental United States. Similarly, satellite communications systems enable worldwide command and control of espionage, covert operations, and PLA forces. The Beidou navigation satellite system provides global positioning, navigation, and timing services which enable PLA maneuvers and delivery of precision guided munitions. In sum, the PRC's on-orbit systems provide the information backbone to support intelligence activities and military operations throughout the Indo-Pacific and extend its reach worldwide.

Asymmetric Space Warfare

In its quest to overtake the United States (which it assessed as having superior military power), the PLA determined it was imprudent to confront U.S. armed forces head-on in force-

[76] Ibid.

[77] Ibid., p. 1; and Mark Stokes, et. al., "China's Space and Counterspace Capabilities Activities," Prepared for the U.S.-China Economic and Security Review Commission, March 30, 2020.

on-force engagements. Simply matching U.S. national security space capabilities was insufficient to deter or defeat the threat of American intervention. Instead, asymmetric approaches that leveraged emerging technologies were required to exploit U.S. weaknesses. As one Chinese military analyst explained:

> An effective active defense against a formidable power in space may require China to have an asymmetric capability against the powerful United States. Some have wondered whether a defensive policy applied to space suggests that China's possession of a robust reconnaissance, tracking, and monitoring space system would be sufficient for China to prevent an attack in space and would be in line with China's "doctrinal" position of "defensive" capabilities. An effective active defense strategy would include the development of these systems but would also include anti-satellite capabilities and space attack weapon systems if necessary. In essence, China will follow the same principles for space militarization and space weapons as it did with nuclear weapons. That is, it will develop anti-satellite and space weapons capable of effectively taking out an enemy's space system, in order to constitute a reliable and credible defense strategy.[78]

Chinese planners recognized that U.S. dependence upon space C4ISR capabilities for power projection presented a strategic weakness and vulnerability or "soft ribs" that could be exploited to undermine the force multiplication advantages the United States gained by employing space assets for deterrence and warfighting.[79] Indeed, they concluded that "for countries that can never win a war with the United States by using the method of tanks and planes, attacking the U.S. space system may be an irresistible and most tempting choice."[80]

Consequently, the PLA is pursuing offensive space control weapons systems to contest freedom of access to and operations in near-Earth space and hold space assets at risk of prompt

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[78] Bao Shiziu, "Deterrence Revisited: Outer Space," China Security, Vol. 2, No. 1, (Winter 2007), p. 9, transl. Ashley Tellis, "China's Military Space Strategy," Survival, Vol. 49, No. 3 (Autumn 2007), pp. 41-72.
[79] Wang Hucheng, "The U.S. Military's 'Soft Ribs' and Strategic Weaknesses," Xinhua, July 5, 2000, transl. Ashley Tellis, "China's Military Space Strategy."
[80] Ibid.

neutralization.[81] While China's efforts to deny the United States a sanctuary in space pre-dates the SDI program, they were given impetus as part of the 998 State Security Project or "Assassin's Mace" program to develop asymmetric capabilities to countervail U.S. military power.[82] Space denial is an integral part of the PLA's A2/AD approach. Anti-satellite (ASAT) and counterspace weapons systems are key tools to deny U.S. and allied forces freedom of action in space to access denied territory, leverage forward presence to project power against PRC interests, and achieve information and decision superiority. Indeed, the PLA is developing, testing, and has begun operating space weapons with reversible (temporary) effects as well as irreversible (permanent) effects.[83] These include terrestrial and orbital weapons with non-kinetic and kinetic kill mechanisms.[84]

Notwithstanding its diplomacy and strategic communications opposing the weaponization of space, the PRC developed and in 2007 conducted its first successful test of a direct-ascent, kinetic energy ASAT weapon against its non-operational *Fengyun* meteorological satellite.[85] The destructive test generated more than 3,000 pieces of orbital debris. More than 2,700 pieces of debris remain in orbit. Most will continue orbiting the Earth for decades until friction with Earth's atmosphere creates drag that will cause reentry and burn-up. Despite international opprobrium over the destructive, debris-generating test, which created collision hazards on-orbit and harmed the sustainability of the space environment, the PLA ASAT program continues and is expanding. It is now operational and military units train to employ it against targets in LEO.

The PLA's space arsenal also includes electronic warfare and offensive cyberspace capabilities to deceive, deny, and degrade space systems.[86] Electronic warfare assets could jam

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[81] For a survey of China's examination of space weapons concepts, see Michael Pillsbury, "An Assessment of China's Anti-Satellite and Space Warfare Programs, Policies, and Doctrines," Report Submitted to the U.S.-China Economic and Security Review Commission, January 19, 2007; and Larry Wortzel, The Chinese People's Liberation Army and Space Warfare (Washington, D.C.: American Enterprise Institute, 2007).

[82] See, for example, Michael Pillsbury, China Debates the Future Security Environment, (Washington, D.C: National Defense University Press, 2000); and Tellis, "China's Military Space Strategy."

[83] Defense Intelligence Agency, Challenges to Security in Space 2022: Space Reliance in an Era of Competition and Expansion, p. 17.

[84] Ibid.

[85] Ibid.

[86] Ibid.

or spoof satellite communications links, radar systems, and positioning, navigation, and timing services that support force maneuver, synchronization, and precision weapons delivery. Similarly, computer network attacks targeted against space C4ISR assets' ground and space segments could adversely impact terrestrial force mobilization, deployment, and logistics as well as intelligence collection, command and control, targeting, and weapons delivery. In addition, China has fielded multiple ground-based laser weapons systems of varying power levels to deny, disrupt, degrade, or damage satellite sensors and components.[87] Long-range precision-strike weapons systems and special forces also could be employed by the PLA to attack space launch ranges, ground stations, and other supporting infrastructure. While treaties prohibit mass destruction weapons placement and nuclear testing in space, electromagnetic pulse and other nuclear effects also may be plausible options for the PLA to counter U.S. and allied space assets in certain contingencies.

Moreover, the PRC is pursuing "near space" (upper atmosphere) and orbital platforms for armed reconnaissance, offensive space control, and force projection. In 2020, for example, a PLA researcher asserted that near-space vehicles are "an important link connecting the air and space battlefields…near-space vehicles will play a crucial role in the future integrated air-and-space joint operations."[88] He discussed how they can provide high-quality over-the-horizon intelligence and communications, surveil very large areas, and carry weapons to "strike both land targets and space-based targets." Some of the PLA's work on orbital warfare platforms is likely being conducted under cover of space servicing and debris removal. These include spacecraft with robotic arms to grapple other satellites.[89] In addition to such complex robotic systems, other potential orbital weapons concepts include space mines, kinetic kill vehicles, radiofrequency weapons, lasers, chemical sprayers, and high-power microwave weapons.[90] China has also conducted two orbital missions of its Shenlong spaceplane. The second mission

[87] Ibid.

[88] Official Chinese Sources Disprove China's Claims that its Balloons are for Meteorological Research, (Washington, D.C.: MEMRI China Media Studies Project, 2023), p. 7.

[89] Defense Intelligence Agency, Challenges to Security in Space 2022: Space Reliance in an Era of Competition and Expansion, p. 18.

[90] Ibid., p. 47.

of the reusable space vehicle landed at the Jinguan Satellite Launch Center on May 8, 2023, ending a 276-day mission in LEO.[91]

Furthermore, China is exploring space weapons concepts to strike targets on Earth's surface and in the atmosphere. This weapons research includes delivery vehicles, payload separation, transfer orbits, and reentry modes. According to PLA officer Wu Tianfu, opening up a space battlefield "would make strategic strike even more direct and profound, increasing the ease with which targets at different levels and in different directions could be destroyed.[92] In 2021, the PLA conducted the first test of a fractional orbital bombardment system with a hypersonic glide vehicle.[93]

Controlling the Space-Enabled Information Environment

The threat the PLA can pose to other nations' freedom of access to and operations in near-Earth space is multi-faceted, full spectrum, and across all near-Earth space orbital regimes. Its offensive space control weapons systems will provide capabilities to attempt to seize and maintain control of the space-enabled information environment. According to the PLA's Academy of Military Science's Lectures on the Science of Space Operations, the strategic and operational value of such control is that:

> Whoever seizes command of space will be able to look down on and control the other battlefields from on high, and will be able to use space information systems in an effective manner to ensure that weapons systems on land, at sea, and in the air are able to operate in a stable manner; if it is the opposite, then without command of space or local command of space, it will be very difficult to seize and hold command of the air and command of the sea; you probably will be put

[91] https://spacenews.com/chinas-mystery-reusable-spaceplane-lands-after-276-days-in-orbit/#:~:text=HELSINKI%20%E2%80%94%20China's%20secretive%20reusable%20spaceplane,late%20May%208%20Beijing%20time.

[92] Wu Tianfu "The 21st Century will be a 'Space Force' Century," Jiefangfun Bao, November 25, 2004.

[93] https://breakingdefense.com/2021/11/its-a-fobs-space-forces-saltzman-confirms-amid-chinese-weapons-test-confusion/

> on the defensive in war, and it will be difficult for your space information systems to operate effectively, and it will be even less use to talk about support to weapons systems on land, at sea, and in the air.[94]

By threatening or applying force to deny adversaries use of satellite systems essential to the conduct of "informationized warfare" involving integrated, joint, multi-domain combat operations, ASAT and counterspace weapons are integral to PLA campaign plans. Chinese military planners recognize that the interrelationships among the space, cyber, and electromagnetic domains are critical to the achievement of information dominance. PLA theoreticians, for example, assert that:

> Struggling for dominance in space information will inevitably become a focus of operational actions, and the two hostile sides will inevitably mobilize all means to cut off information links between the opponent's space and other battlefield spaces. Therefore, the two combatants' powerful struggle for space information dominance will inevitably increase the level of intensity in information confrontations.[95]

Indeed, space control operations involving non-kinetic and/or kinetic weapons effects likely will be a course of action in any campaign to deter or counter United States power projection into the Indo-Pacific region and intervention in a conflict by attacking space C4ISR assets to "blind and deafen" U.S. forces and compel America to capitulate before the war's onset.[96] As one PLA officer observed, "the struggle to seize the strategic commanding height in future wars will first be unfolded in outer space."[97]

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[94] Jiang Lianju, ed., Lectures on the Science of Space Operations (Beijing: Military Science Press, January 2013, transl. In their Own Words: Lectures on the Science of Space Operations, Foreign Military Thought (Montgomery, AL: China Aerospace Studies Institute, August 12, 2022).

[95] Ibid., p. 40.

[96] Office of the Secretary of Defense, Military and Security Developments Involving the People's Republic of China 2022, p. 88.

[97] Zhao Shuanlong, "The Initial Battle is the Decisive Battle, and Preparations for Military Struggle in the New Period," Jiefangjun Bao, August 18, 1998, p. 6, in FBIS-CHI-98-257, September 14, 1998.

Furthermore, as noted above, the CCP's MCF initiative is focused on developing and adopting emerging technologies to support future "intelligentized" warfare. China believes that technologies including AI, cloud computing, big-data analytics, quantum information, and autonomous systems will create a new military technical revolution. This will entail the collection, processing, fusion, and dissemination of large quantities of data and information for rapid decision-making as well as command and control. The PLA's Strategic Support Force was created to integrate such information-related space, cyber, and electronic warfare assets into joint military operations. It is comprised of a Space Systems Department responsible for space operations and a Network Systems Department responsible for cyberspace and electronic warfare operations.

The Great Game in Cislunar Space

The CCP believes that the geopolitical competition with the United States involves a new space race, extending beyond near-Earth space to cislunar space including the Moon, that it intends to win.[98] Establishing a dominant position in space is a critical element of the CCP's strategy to unseat and replace America as the preeminent power on Earth. The PRC's space program is managed by the PLA and state-owned enterprises in the space sector are allocated substantial resources by the government to provide the goods and services necessary to achieve Xi space dream "to make China stronger."[99] With the PRC's rising national power, it is moving aggressively to undermine U.S. strategic advantages in the space domain while leveraging space activities to achieve a comparative national advantage.

Cislunar space operations will increase the PRC's prestige and influence, access to valuable resources, and enable control over key orbits, locations, and lines of communication that would enhance its geostrategic and astrostrategic positions. The domestic and international political benefits from mastering cislunar space operations as well as exploring and occupying territory on the Moon include reinforcing the CCP's legitimacy, enhancing China's national

[98] See, for example, PRC State Council Information Office, "China's National Defense in the New Era," July 2019, p. 19.

[99] Ministry of National Defense of the People's Republic of China, "Xi Stresses Military-Civilian Integration in a New Era," March 3, 2018.

pride, and demonstrating to the international community the triumphant success of its political ideology and authoritarian governance model. Moreover, Chinese operations in cislunar space will enable it to shape the domain beyond GEO, establish operational precedents, reinforce autocratic norms of operating behavior, and provide a basis for establishing customary international law. In this regard, it is noteworthy that the PRC's efforts to promote autocratic norms and undermine or ignore established international norms have already extended to cyber space and outer space where it has conducted provocative acts in the grey zone.

The potential economic benefits for the PRC's exploration and utilization of cislunar space are driven by the valuable, non-renewable natural resources on the Moon and asteroids which could be extracted and used in-situ or returned to Earth and utilized to enhance China's prosperity and power. There are, of course, substantial technological, logistical, and operational obstacles to realizing the potential value involved in mining and exploiting such resources.[100] Nonetheless, human ingenuity and will can overcome them with the right incentives, time, and resources. Aside from the substantial intrinsic value of gold and platinum, other REMs on the lunar surface and asteroids could be used in manufacturing the next generation of electronics to generate wealth.[101] Computer hard drives, cell phones, medical imaging equipment, and electric vehicles are essential for both national security and civilian applications. As their name implies, such metals are rare on Earth and sources are being depleted. The value of such metals on the Moon will increase, of course, as their supply on Earth diminishes. China estimates that it may run out of REMs supplies in the next 15-20 years.[102] The motivation for mining asteroids is similar. An asteroid two kilometers wide is estimated to contain nickel and iron worth $8 trillion, cobalt worth $6 trillion, and other precious metals and gold worth $6 trillion.[103]

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[100] See, for example, https://www.nasa.gov/directorates/spacetech/niac/2019_Phase_I_Phase_II/Thermal_Mining_of_Ices_on_Cold_Solar_System_Bodies/

[101] See, for example, Richard M. Harrison, et. al., "Space is an Untapped Resource," in Richard M. Harrison and Peter A. Garretson, eds., The Next Space Race: A Blueprint for American Primacy (Santa Barbara, CA: Praeger, 2003).

[102] See, for example, Laura Duffy and James Lake, "Cislunar Spacepower The New Frontier," Space Forces Journal, (Issue 11), December 31, 2021.

[103] See, for example, Andrew M. Thorpe, The Commercial Space Age: Conquering Space Through Commerce, (Bloomington, IL: Author House, 2003), p. 149.

In addition, the lunar regolith (a thick layer of fragmented and unconsolidated rock material covering the Moon's surface) is estimated to contain one million tons of Helium-3.[104] Non-radioactive Helium-3 could be used in the future as fuel to power nuclear fusion reactors. Chinese analysts estimate that the Moon has one to five million tons of Helium-3.[105] Given that 100 tons of Helium-3 could supply the world's electrical needs for one year, these analysts conclude mining Helium-3 could be profitable at a price of $4–10 billion per ton.

Another potentially valuable resource on the Moon is water. Frozen water is mostly located at permanently shadowed regions within craters near the Moon's poles in small grains of ice mixed into the regolith.[106] Estimates of the amount of ice on the Moon's surface range from 600 million to 1 billion metric tons. Water could be used to sustain life on future lunar habitats as well as provide a source for rocket fuel to conduct spaceflight operations from the Moon to Mars and other destinations.[107] Indeed, the Moon could provide an efficient launch and operating base for conducting exploration and resource extraction missions into the solar system given that it has significantly less gravity than Earth. Consequently, just as China is using the BRI to enhance its political and economic influence via secure access to resources and markets on Earth, cislunar space operations are a means to gain access to the natural resources on the Moon and eventually other celestial bodies in the solar system.

Moreover, China could strengthen its national power by conducting intelligence and military operations in cislunar space. This includes intelligence collection and SDA missions as well as deployment of clandestine or covert space capabilities, including orbital weapons, to enforce "keep out" zones and support combat operations. The PLA is teaching its future military space commanders that:

> The mission in future space operations will be mainly reflected in two areas. On the one hand, they will seize and hold command of space, that is, at the same time

[104] https://www.nasa.gov/sites/default/files/atoms/files/05_1_snoble_thelunarregolith.pdf

[105] Pollpeter, et. al., "China Dream, Space Dream," p. vii.

[106] https://moon.nasa.gov/inside-and-out/water-on-the-moon/;

[107] See, for example, "Cislunar Spacepower The New Frontier;" and Neel V. Patel, "Here's How we can Mine the Moon for Rocket Fuel," MIT Technology Review, May 19, 2020.

> that they ensure that their own side's space strengths fully bring their effectiveness into play, they will limit, weaken, and destroy the enemy's space strengths. This will not only include carrying out offensive and defensive actions in space against the enemy's space strengths, but they will also include offensive actions carried out against the various kinds of installations of the enemy's space strengths, situated on the land, at sea, and in the air, by using such means as long-range firepower attacks, information warfare, and in-depth assaults by special units of the land, sea, and air operational strengths, as well as defensive actions that are adopted against such attacks by the enemy. On the other hand, they will use command of space, that is, they will use space strengths not only to provide reconnaissance and surveillance, missile early warning, and communications relay, and such battlefield information support for their own side's land, sea, and air operational strengths as navigation and positioning, weather observations, and battlefield mapping, but they will also engage in firepower attacks against important enemy targets in the air, at sea, and on land.[108]

Lagrange points, lunar transfer orbits, lunar orbits, and the Moon's surface are "strategic key points" and "strategic thoroughfares" in cislunar space from which China could exert influence on or control over the Earth-Moon system. As Lieutenant General Zhang Yulin, deputy chief of the armament development department of the Central Military Commission, stated, "the earth-moon space will be strategically important for the great rejuvenation of the Chinese nation."[109] Indeed, the ability to ensure freedom of action at such strategic points as well as along the information and transportation lines of communication between the Earth and Moon while denying an adversary comparable freedom of action would provide China a formidable, potentially decisive, advantage from which to influence the course and outcome of conflict on Earth and in space. According to PLA military theoreticians, space control is "the capability of one belligerent in a state of war, in a specified period of time, in a defined area of space, to carry out its own operations with freedom while hindering or preventing an enemy from

[108] Jiang Lianju, ed., Lectures on the Science of Space Operations, p. 10.

[109] "Exploiting Earth-Moon Space: Chinese Ambitions after Space Station," Xinhua, March 8, 2016.

carrying out its own operations or using space."[110] Such physical control of key regions in cislunar space could position China to control access to the Moon, asteroids, solar system, and beyond.

China's view of cislunar space as part of the geopolitical and astropolitical competition was exemplified by Ye Peijian, the head of China's lunar exploration program, who explained the rationale for the PRC's exploration and use of cislunar and deep space:

> The universe is an ocean, the moon is the Diaoyu Islands, Mars is Huangyan Island. If we don't go there now even though we're capable of doing so, then we will be blamed by our descendants. If others go there, then they will take over, and you won't be able to go even if you want to. This is reason enough.[111]

Ye's reference to the Diaoyu Islands (called the Senkaku Islands and claimed by Japan) and Huangyan Island (called Scarborough Shoal and claimed by the Philippines) is both breathtaking and dire in its potential implications. It implies a desire to establish cislunar space as Chinese territory. It also suggests that the PRC believes thwarting American operations in cislunar space is essential to prevent the U.S. and its allies from controlling the Earth-Moon system, blockading China's spaceports, harming its economy, threatening its territorial integrity, and undermining the CCP's control of the country.

Given the magnitude of the stakes involved, China can be expected to use all elements of its national power and tools of statecraft to win the astropolitical aspects of the ongoing Sino-American competition. The PRC's behavior in pressing its territorial claims in the Indo-Pacific region may be indicative of how it intends to pursue its interests in cislunar space. It may conduct space activities, for example, to establish operational precedents and an international legal rationale to support claims of its "right" to control access to, use of, and territory in cislunar space.

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[110] Cai Fengzhen, et. al., Integrated Aerospace Operations (Beijing: People Liberation Army Press, 2006), p. 57, transl. Larry Wortzel, The Chinese People's Liberation Army and Space Warfare.

[111] Brendon Hong, "China's Looming Land Grab in Outer Space," Daily Beast, June 22, 2018.

A noteworthy parallel is China's treatment of international norms in the East and South China Seas. Under international law, nations have sovereign rights over their territorial waters 12 nautical miles beyond their shores. Additional claims on the seas generally are limited to a country's exclusive economic zone (EEZ), which extends to 200 nautical miles, and provides the right to existing natural resources. China has repeatedly violated these norms by making claims to uninhabited islands in the South China Sea and creating artificial islands to enhance its territorial claims as well as extend its military power. China also has asserted that freedom of navigation (e.g., through the Taiwan Strait) and surveillance operations (e.g., above the East and South China Seas) within its claimed EEZ are illegitimate. In 2001, for example, a PLA Air Force F-8 fighter collided with a U.S. Navy EP-3 surveillance aircraft in airspace over the South China Sea sparking an international incident. More recently, General Li Shangfu, the PRC's Minister of Defense, stated at the Shangri-La Dialogue that the U.S. was provoking China and "deceiving and exploiting nations in the Pacific region". He also said Beijing "must prevent attempts that try to use those freedom of navigation, that innocent passage, to exercise hegemony of navigation." China likely will make similar assertions about U.S. cislunar space operations.[112]

Indeed, Lieutenant General Romeo Browner, commanding general of the Philippine Army, recently explained, "Whenever we fly in our own territorial waters, we are challenged by the Chinese, challenged because they say we are in their territory, when in fact it is our territory."[113] Furthermore, the CCP has consistently demonstrated its disdain for international jurisprudence in territorial disputes. It has refused to comply with a 2016 ruling by an Arbitral Tribunal constituted under the 1982 Law of the Sea Convention regarding conflicting maritime claims in the South China Sea by the Philippines and China. The Tribunal delivered a unanimous decision, which is final and binding on both countries, that firmly rejected the PRC's expansive South China Sea maritime claims as having no basis in international law.[114]

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[112] https://www.defenseone.com/threats/2023/06/the-d-brief-june-05-2023/387108/; https://www.youtube.com/watch?v=iWwdxxzMR7Q

[113] Colin Clark, "Philippine Army Head Sees China Threat Every Day in the South China Sea," Breaking Defense, May 19, 2023.

[114] https://www.state.gov/sixth-anniversary-of-the-philippines-china-south-china-sea-arbitral-tribunal-ruling/

Given the limits of the existing international space legal regime and more broadly the PRC's general disregard for established international norms and law, it is conceivable that China may seek to occupy and fortify positions at Lagrange points, establish a Space EEZ in cislunar space including on the Moon, protect access to it by declaring a "space defense identification zone" (SDIZ) or a "keep out" zone at one or more Lagrange points or other locations, or possibly assert outright sovereignty.[115] In fact, Bao Weimin, an academician at the Chinese Academy of Sciences and Director of the Science and Technology Commission at the China Aerospace Science and Technology Corporation (a state-owned enterprise which is the main contractor to China's space program that was sanctioned by the U.S. Government for its close ties to the PLA), said that the PRC should establish a "space economic zone," estimated to be worth $10 trillion annually, in cislunar space by 2050.[116] Furthermore, Chinese legal scholars have made "vertical sovereignty" arguments asserting that the PRC's terrestrial borders extend indefinitely upward through outer space and that all the space within those perimeters is China's sovereign territory.[117]

China's Cislunar Space Activities

During the 20th century, America's victory over the Soviet Union in the first space race was decided when the Apollo program landed the first humans on the Moon in 1969. That historic accomplishment symbolized the triumph of America's political ideology and socioeconomic system and its preeminent international standing. Cislunar space is again central to the strategic competition between major powers. While various nations are conducting or planning to conduct cislunar space activities, the main competitors are China and the United

[115] See, for example, Wang Xiji, Building on China's Space-Based Infrastructure (Beijing: Chinese Academy of Sciences, 2002).

[116] Andrew Jones, "From a Far Side First to Cislunar Dominance? China Appears to Want to Establish a Space Economic Zone Worth Trillions," Space News, February 15, 2020.

[117] See, for example, Philip A. Meek, "Testimony before the U.S. – China Economic and Security Review Commission Hearing: China's Views of Sovereignty and Methods of Access Control," February 27, 2008; Bret Austin White, "Reordering the Law for a China World Order: China's Legal Warfare Strategy in Outer Space and Cyberspace, Journal of National Security Law and Policy, Vol. 11, No. 455, (February 2, 2021), pp. 458-461; and Larry Wortzel, The Chinese People's Liberation Army and Space Warfare.

States.[118] At stake in the competition are the strategic value of key orbits, lines of communication, and natural resources in the Earth-Moon system.

Since China became a spacefaring nation in 1970, it put in place a robust space launch and support infrastructure to enable the full range of missions in near Earth and cislunar space. The infrastructure supports both defense and intelligence space operations as well as the human space flight and space exploration missions integral to the PRC's cislunar space plans. Indeed, China's human space flight program, including construction and operation of space stations in LEO, have served as an essential stepping stone for its move into cislunar space. As its 2021 white paper China's Space Program: A 2021 Perspective stated, China's human spaceflight program plans to "continue studies and research on the plan for a human lunar landing, develop new-generation manned spacecraft, and research key technologies to lay a foundation for exploring and developing cislunar space."[119]

After four uncrewed test flights between 1999 and 2002, China launched its first astronaut, PLA Lieutenant Colonel Yang Liwei, aboard the Shenzhou-1 (Divine Vessel) spacecraft in 2003, becoming the third nation after Russia and the United States to launch a human into space. Shenzhou-7, launched in 2008, carried three astronauts and its commander, Zhai Zhigang, made China's first extravehicular activity or spacewalk. In 2011, China launched the Tiangong-1 space station to LEO and Shenzhou-11 carried the first crew to that station in 2012.

The PRC began constructing the larger Tiangong-2 space station in 2021 and completed it 18 months later. The station can support a crew of 6 astronauts and is built to last up to 15 years. The Tianhe core module as well as the Wentian and Mengtian modules for life sciences and physics experiments, respectively, were launched during 2021 and 2022. China thus is now the third nation, along with the United States and Russia, to establish and maintain a continuous human presence in LEO. According to Zhou Jianping, chief designer of the human spaceflight

[118] See, for example, Kaitlyn Johnson, Fly Me to the Moon: Worldwide Cislunar and Lunar Missions, (Washington, D.C.: Center for Strategic and International Studies, February 15, 2022.
[119] "China's Space Program: A 2021 Perspective," (Beijing: State Council Information Office, 2022).

program, "China plans to build the space station into a state-level space lab supporting long astronaut stays and large-scale scientific, technological and application experiments."[120]

The PRC's lunar program is named after the Chinese Moon deity Chang'e. The multi-phase program ("orbit, land, return") involves a series of orbiter, lander, rover, and sample-return missions which will lead to human landings and habitation. The first phase of the lunar program entailed 2 orbital missions, Chang'e-1 and -2, launched in 2007 and 2010, respectively, which imaged and mapped the Moon. After departing the Moon's orbit, Chang'e-2 went to Lagrange Point 2 to test China's TT&C network before doing a flyby of an asteroid and heading into deep space.

The second phase entailed soft landers and rovers. Chang'e-3 landed on the Moon in 2013 and deployed the 140 kilogram Yutu-1 (Jade Rabbit) rover to analyze the lunar surface. The rover was supposed to cover about 3 km during its planned three month mission but suffered mechanical problems. Chang'e-4 conducted the first ever soft landing on the lunar South Pole's Aitken Basin in 2019 and deployed the Yutu-2 rover to explore the far side of the Moon. It operated in Low Lunar Orbit before landing on the Moon's surface. Yutu-2 explored the lunar surface for more than two years. China deployed two Queqiao (Magpie Bridge) communications relay satellites in a halo orbit around the Earth-Moon Lagrange Point 2 to support the Chang'e-4 lander and rover.[121]

The third phase of China's lunar program involved a sample-return mission, Chang'e-5, which included an orbiter and lander. After landing near Mons Rumker on the Moon in 2020, the lander reascended to rendezvous and conduct a robotic docking in lunar orbit. Chang'e-5 ejected a capsule to return about 2 kg of lunar samples to Earth. China's future lunar plans include the Chang'e-6 sample return mission and Chang'e-7 lunar South Pole mission during this decade. The Chang'e-7 mission will involve a telecommunications relay, orbiter, lander, rover, and rocket-propelled flying probe. After a soft landing on the Moon's surface, the rover will

[120] "China's Manned Space Program 30 Years of Success, Xinhua, September 22, 2022.

[121] Lihua Zhang, "Development and Prospect of Chinese Lunar Relay Communications Satellite," Space: Science and Technology, Vol. 2021, April 27, 2021.

deploy to perform in-situ experiments, while the flying probe will detect water molecules and hydrogen isotopes. Chang'e-8 is planned to be a precursor mission for the establishment of a lunar base.

China intends to land astronauts on the Moon by the end of this decade as well as establish an International Lunar Research Station (ILRS) in cooperation with the Russian Federation based on a Memorandum of Understanding signed in 2021. The ILRS is scheduled to become operational in the 2030s and will have "the capability of long-term autonomous operation, built on the lunar surface and/or on the lunar orbit that will carry out multidisciplinary and multi-objective scientific research activities, such as the lunar exploration and utilization, lunar-based observation, basic scientific experiment, and technical verification."[122] It is intended to support both robotic and crewed missions.

The PRC, as noted above, is building the super heavy-lift Long March 9 for missions to the Moon and Mars. The initial version of the three-stage, reusable SLV will be 114 meters long. It will have a mass at liftoff of 4,400 tons and generate 6,100 tons of thrust.[123] Gu Mingkun, a senior rocket designer at the China Academy of Launch Vehicle Technology (CALT), the PRC's leading rocket manufacturer, said the booster will be used to transport spacecraft "weighing up to 50 tons to an Earth-moon transfer trajectory for lunar missions, such as the construction of a large-scale science outpost or mining."[124] Its first flights are scheduled for 2033.

China is pursuing communications, navigation, and surveillance operations in cislunar space with dual (civilian and military) applications. Communications could enable command and control of military space operations, navigation could enable orbital maneuvers and weapons delivery, and surveillance could enable SDA, intelligence collection, targeting, and battle

[122] Jian Hui, Division Director, Department of International Cooperation, China National Space Agency, "International Lunar Research Station: Guide for Partnership," August 2021.
[123] Andrew Jones, "China Plans for Full Reusability for its Super Heavy Long March 9 Rocket," Space News, April 27, 2023.
[124] Zhao Lei, "Structural Details of Long March 9 Revealed," China Daily, January 19, 2023.

damage assessment. Similarly, China's spacelift capacity could be employed to deliver space C4ISR or orbital warfare capabilities to support military operations in cislunar space.

It is reasonable to consider whether U.S. Government policies, programs, or actions are prompting an action-reaction cycle that is leading to an unnecessary or dangerous competition with China in cislunar space. Would curbing U.S. cislunar space plans or "toning down the rhetoric" about that region of outer space result in less competition with the PRC in cislunar space?

Over the past several years, the U.S. Government has focused more attention on cislunar space. In 2017, for example, President Trump issued a Space Policy Directive committing the United States to go back to the Moon. It stated that the U.S. shall "Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities. Beginning with missions beyond low-Earth orbit, the United States will lead the return of humans to the Moon for long-term exploration and utilization, followed by human missions to Mars and other destinations."[125] And in December 2021, the Biden administration published the United States Space Priorities Framework which stated that:

> The United States will maintain its leadership in space exploration and space science. The United States will remain a global leader in science and engineering by pioneering space research and technology that propels exploration of the Moon, Mars, and beyond. U.S. human and robotic space exploration missions will land the first woman and person of color on the Moon, advance a robust cislunar ecosystem, continue to leverage human presence in low-Earth orbit to enable people to live and work safely in space, and prepare for future missions to Mars and beyond.[126]

[125] https://trumpwhitehouse.archives.gov/presidential-actions/presidential-memorandum-reinvigorating-americas-human-space-exploration-program/

[126] https://www.whitehouse.gov/wp-content/uploads/2021/12/united-states-space-priorities-framework-_-december-1-2021.pdf

Moreover, the National Science and Technology Council published the National Cislunar Science & Technology Strategy in November 2022. That document states that "The United States will lead the world in responsible, peaceful, and sustainable exploration and utilization of Cislunar space." It went on to state that, "The growth of current and planned activities in cislunar space is driven by decreasing launch costs, advanced and increasingly commodified space technologies, growing commercial interest in space activities, new missions by national space programs that are motivated by national and geopolitical ambitions, and the utility of cislunar activities as a programmatic step toward some future missions into the solar system. These trends have opened cislunar space as a new domain of diverse human activities, and spacefaring actors will begin to set important new precedents across the next decade." [127] The strategy also highlighted four objectives for realizing U.S. leadership in cislunar space: support research and development to enable long-term growth in cislunar space; expand international science and technology cooperation in cislunar space; extend U.S. space situational awareness capabilities to cislunar space; and implement cislunar communications and positioning, navigation, and timing capabilities with scalable and interoperable approaches. [128]

The National Aeronautics and Space Administration (NASA) published a Moon to Mars Strategy and Objectives Development plan that details NASA's goals and objectives, designed to achieve the Agency's vision of exploration throughout the solar system. According to NASA Administrator Bill Nelson, "We will return to the Moon to stay. To learn and live and create. To do incredible science we can do nowhere else…. This strategy was developed to return to the Moon in a steady cadence of increasingly difficult missions, ultimately enabling our goal to send humans to Mars and beyond." A central element of NASA's plans for cislunar space exploration is the Artemis Accords, which is NASA's multinational program to return astronauts to the lunar surface. [129]

[127] https://www.whitehouse.gov/wp-content/uploads/2022/11/11-2022-NSTC-National-Cislunar-ST-Strategy.pdf
[128] Ibid.
[129] https://www.nasa.gov/sites/default/files/atoms/files/m2m_strategy_and_objectives_development.pdf

In addition, the Department of Defense is pursuing various cislunar space-related research and development projects and taking action to enhance its awareness of activities in cislunar space. For example, the Air Force Research Laboratory in 2022 awarded a contract to demonstrate space situational awareness, object detection and tracking in the region of the Moon, in support of commercial and international space agencies.[130] The proposed system would operate in a halo orbit around the L1 Lagrange Point between the Earth and Moon. The Defense Advanced Research Projects Agency also is pursuing the Demonstration Rocket for Agile Cislunar Operations project to demonstrate a nuclear thermal rocket in orbit.[131]

In 2020, the NASA Administrator and the U.S. Space Force (USSF) Chief of Space Operations signed a Memorandum of Understanding that references NASA's plans to extend human presence beyond the International Space Station to the lunar surface and interplanetary destinations and states that the USSF will seek to provide resources to protect U.S. interests so astronauts can operate "safely and securely on these distant frontiers."[132] And the Space Force recently designated the 19th Space Defense Squadron (SDS), a new unit based at Dahlgren, Virginia, to take over the mission for cislunar surveillance. According to the unit's mission statement, "The 19 SDS is responsible for providing continuous Space Domain Awareness for government, civilian and international users and to maintain continuous and transparent SDA to assure global freedom of action in space."[133]

These policy statements, activities, and investments make clear that the U.S. has an interest in cislunar space and plans to operate in this region for scientific, economic, and security purposes. At the same time, as important and impressive as each of these projects and activities may be, they do not constitute, nor do they stem from, an integrated U.S. strategy to achieve dominance in cislunar space, nor are they intended or designed to counter China's cislunar space

[130] https://www.afrl.af.mil/News/Article-Display/Article/3216493/afrl-awards-contract-for-pioneering-spacecraft-in-region-of-moon/

[131] https://www.darpa.mil/program/demonstration-rocket-for-agile-cislunar-operations

[132] https://breakingdefense.com/2022/04/kendalls-message-to-space-force-support-missions-are-central-role/

[133] https://breakingdefense.com/2022/04/to-infinity-and-beyond-new-space-force-unit-to-monitor-xgeo-beyond-earths-orbit/; https://spacenews.com/u-s-space-force-sees-future-demand-for-surveillance-beyond-earth-orbit/; and https://breakingdefense.com/2022/04/to-infinity-and-beyond-new-space-force-unit-to-monitor-xgeo-beyond-earths-orbit/

ambitions. In this regard, it is worth noting that neither the aforementioned United States Space Priorities Framework nor the National Cislunar Science & Technology Strategy explicitly mention China as a competitor in cislunar space.

Furthermore, there are continuing disagreements over the extent to which the Defense Department in general, and the USSF in particular, should devote scarce resources to cislunar space-related programs and activities. Secretary of the Air Force Frank Kendall, for example, emphasized that the primary mission of the USSF is to support terrestrial operations as opposed to projecting power throughout the heavens. He said the role of space "derives from the value of the services to the rest of the joint and combined force that are provided from space, and the devastating effect that loss of control of space would have on terrestrial forces, their ability to survive and perform their missions. Ultimately, the success of the USSF will be determined by how our contribution to the joint and combined team fight is valued by other members of the team."[134] Even more pointedly, Assistant Secretary of the Air Force for Space Acquisition and Integration Frank Calvelli stated, "I think we need to stay focused on our current missions and get those done really well. There's been talk of what our role in cislunar space is. That's an important talk down the road but right now what's important is tackling our core mission areas, and making sure the architecture is resilient, making sure the architecture is integrated so that [U.S. military operators] can use it effectively."[135] These statements were offered in response to suggestions that the USSF should play a more prominent role in cislunar space.

CCP leaders as well as military and scientific officials undoubtedly pay close attention to U.S. policy statements, plans, and investments for cislunar space activities, including the ongoing debate about the role of the U.S. military in cislunar space. They also probably engage in "worst case" planning about U.S. capabilities and intentions not only in cislunar space but in parts of other operating domains as well. They may view the public comments of Secretary Kendall and Assistant Secretary Calvelli as part of an elaborate campaign to deceive China about America's true intentions in cislunar space and point to the USSF budget for "classified programs" and other activities as indicative of a secret U.S. plan to militarize cislunar space. In

[134] https://breakingdefense.com/2022/04/kendalls-message-to-space-force-support-missions-are-central-role/
[135] https://spacenews.com/supporting-military-operations-on-earth-to-remain-u-s-space-forces-top-priority/

fact, similar arguments are regularly made by both Chinese and Russian delegates in various United Nations and other international fora that seek to address space security issues.

However, to be clear, U.S. policies, plans, and programs clearly are not the sole or even leading contributor to China's strategy and plans for cislunar space. Rather, as discussed above, the PRC's cislunar space aspirations are driven by foundational principles derived from Chinese history and the CCP's ideology. Indeed, were America to stand down on exploration or other plans and activities in cislunar space for whatever reasons, it is highly unlikely that would cause China to lessen its emphasis on or abandon its plans for cislunar space. Instead, it is reasonable to postulate that such a U.S. decision or gesture would likely cause Beijing to view it as a strategic opportunity and further accelerate its efforts to gain a decisive and potentially irreversible advantage in cislunar space.

It is highly likely that Xi views establishing China's preeminence in cislunar space as an important, indeed vital, element of the CCP's vision of returning China to its rightful place at the center of world affairs – it may soon be comparable to controlling Taiwan, the South China Sea and various island chains, monopolizing critical technologies, materials, and supply chains, and more. Under Xi's increasingly autocratic rule, the desire to expand China's power, influence, and control knows no geographical bounds and clearly extends to near-Earth and cislunar space. Simply put, America's efforts in cislunar space have only a marginal impact on China's bold ambitions for cislunar space.

Strategic Implications

China's activities in cislunar space are a course of action and its space infrastructure, launch and support mission capabilities, and spacecraft are part of the means by which the CCP's is seeking to increase its comprehensive national power to influence and control the physical and political geography of the Earth-Moon system. Both in and of themselves and as an expression of China's strategic intentions, the CCP's plans for and activities in cislunar space have profound implications for U.S. national interests, including collective security and mutual defense arrangements with America's allies and international partners.

U.S. leaders and the American public are only beginning to take note of the potential implications of China's cislunar space plans and activities. Indeed, lack of awareness or understanding of China's strategic objectives in space may be inhibiting the formulation of comprehensive U.S. space policy, guidance, and integrated strategy to address the challenge. While some may discount China's cislunar space aspirations because the United States has already gone to the Moon, they are at risk of underestimating the political impact of Chinese astronauts landing on the lunar surface or working with Russian cosmonauts to build and operate the ILRS. When Chinese astronauts walk on the Moon or establish a base there, it will be a significant event not just for the PRC but for the world with global repercussions. Indeed, the potential political, diplomatic, economic, and military implications of China's cislunar space activities should not be discounted.

If the global audience perceives that the PRC has won the competition with the United States over cislunar space, it would be a historic accomplishment that diminishes America's political prestige, international standing, and global influence. China's cislunar space achievement would be touted as yet another triumph of its political ideology, socioeconomic system, and symbol of its preeminent position in the international order. This could increase Beijing's ability to establish and sustain a sphere of influence over the foreign, economic, and security policies of other states in the Indo-Pacific region, expand its global influence and reach, and diminish the United States' standing and influence. The United States would have to contend with a weakened hand in its efforts to reestablish its international standing and return to the status quo ante.

Moreover, China's integrated coercive campaign, particularly its diplomatic, strategic communications, information and influence campaigns, and grey zone activities against U.S. interests likely would become even more aggressive in an effort to parlay the PRC's enhanced status and influence to change the global status quo and alter the dynamics of international relations. Chinese diplomats most likely would offer various political and economic inducements, such as favorable terms for participating in the BRI, Space Silk Road, and ILRS, to foreign nations to obtain their support for or acquiesce to the Beijing's positions on international

governance and other issues pertinent to China's national interests, including space-related matters. In addition, the PRC would likely ratchet up pressure to undermine and splinter U.S. alliances in the Indo-Pacific and elsewhere around the world thereby reducing U.S. diplomatic, informational, and military power.

China also could use its strengthened position to shape the operating domains in ways favorable to its interests at the expense of the United States and other nations. The PRC likely would set precedents through cislunar space operations to establish a new, advantageous basis for customary international law. Indeed, the U.S. should expect that China will employ political and legal warfare ("lawfare") tactics to justify multiple vectors of coercion, including the threat or use of armed force, to establish autocratic norms of behavior, undercut and change existing rules, claim territory, and in effect create its desired boundaries on Earth and in cislunar space. Combating such tactics effectively would take persistent and clever U.S. diplomacy backed by economic and military power as well as a sustained information campaign.

In this regard, it is important to note that governance structures for space – and especially for cislunar space – are far more limited and immature than those governing activities on the Earth's surface or airspace. Only modest restrictions apply to government and commercial space activities, and even those limitations include no enforcement mechanisms.[136] This would make it easier for China to take bold and aggressive actions to promote its interests and claims in cislunar space and to defend itself using lawfare and other political, economic, and military measures to pressure or coerce nations that oppose or seek to inhibit Beijing's claims – similar to the way the PRC is conducting integrated coercive campaigns to pressure Taiwan, lay claim to various islands and water rights on its periphery, and more. The CCP playbook is well rehearsed in this regard.

[136] These include United Nations treaties on outer space (e.g., the 1967 Outer Space Treaty, 1968 Rescue Agreement, 1972 Liability Convention, 1976 Registration Convention) and declarations (e.g., 1962 Declaration of Legal Principles, 1982 Broadcasting Principles, 1986 Remote Sensing Principles, 1992 Nuclear Power Sources Principles, and Benefits Declaration).

China in principle rejects any notion of a Western-conceived "rules-based international order" in cislunar space, just as it seeks to undo the international political, economic, and security order established by the United States and its allies following the Second World War. Such a U.S.-dominated order is anathema to the CCP's strategic culture and global ambitions. Beijing may feign "playing nice" in various bilateral and multilateral fora (when it suits their purposes), but they have no intention of joining or abiding by Western rules they had no role in creating or international norms that they believe disadvantage China. No current or conceivable "norms of behavior," "rules of the road," or decisions by international bodies or tribunals are likely to dampen or constrain China's interest in establishing a dominant position in near-Earth and cislunar space and using it to enhance the prestige and power of the CCP.

U.S. policymakers will soon be faced with having to decide how to counteract China's intensified political and legal warfare activities on Earth and in cislunar space. Given its distance from Earth and other pressing domestic and international security concerns, dealing with provocative Chinese actions in cislunar space could pose a serious challenge for the United States. Moreover, such a challenge likely will be exacerbated by PRC deception as well as clandestine or covert space operations, likely including activities conducted under civil or commercial cover, in the grey zone. This has major implications regarding national security space roles and missions. It also has significant implications for the U.S. Intelligence Community, including prioritization and allocation of intelligence resources on cislunar space topics. Competition for such scarce resources within the IC could be severe particularly if such provocative Chinese actions occur during other global crises or conflicts.

In addition, China's achievement of a competitively advantageous position in cislunar space would strengthen the economic element of its national power and weaken the United States and its allies. The PRC, as discussed above, could establish an EEZ in cislunar space, declare a SDIZ to protect it, conduct in-situ resource utilization to support operations on the lunar surface, and extract valuable resources such as REMs and water on the Moon to increase its international competitiveness, wealth, and military power. Indeed, the CCP could move to monopolize the market for rare minerals on the Moon as well as the use of lunar water as an energy source. If

China achieved hegemony of the Moon's resources, it might be able to position itself as the world's premier economy for the foreseeable future.

Given the vastness of cislunar space and the operational limitations of U.S. SDA capabilities, it will be difficult to detect, identify, characterize, and assess the PRC's activities in the region. In fact, detecting objects operating in or transiting cislunar space is more challenging than in near-Earth space because of the greater distances, the Moon's albedo, solar exclusion angles, and lack of continuous coverage from Earth.[137] China could gain an intelligence or military advantage by conducting operations in cislunar orbits or on the lunar surface where it is difficult for the U.S. to monitor.

China, as noted, has already stationed communications relays at Lagrange points, operated in lunar orbits, as well as landed and operated on the non-Earth facing side of the Moon where the United States has limited means of situational awareness. This could provide the PRC with the opportunity to conduct scientific or military activities, such as monitoring U.S. space activities or deploying clandestine or covert space assets for warfighting or as war reserves, without being observed. The 1967 Outer Space Treaty permits the use of military personnel for scientific research or for any other peaceful purposes.[138] While the Treaty prohibits the establishment of military bases, installations, and fortifications, the testing of any type of weapons, and the conduct of military maneuvers on the Moon or other celestial bodies, it lacks compliance or enforcement mechanisms.[139]

Chinese efforts to influence or control part or all of cislunar space could take multiple forms. China could assert exclusive claim to large swaths of territory on the Moon to enhance its prestige and lay the basis for setting up outposts and exploiting minerals, water, and other valuable materials. This would be consistent with and supportive of efforts to establish a Space EEZ. The PRC could assert primacy and control over some or all Lagrange points and station satellites to observe and ward off foreign spacecraft. Furthermore, Beijing could seek to impose

[137] See, for example, Duffy and Lake, "Cislunar Spacepower The New Frontier."
[138] https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html
[139] Ibid.

various reporting, inspection, and other requirements upon nation-states, international organizations, and commercial enterprises in exchange for safe transit through its SDIZ, Space EEZ, and use of lunar orbit.

China might also attempt to enforce such astropolitical claims by purposefully interfering with the operations of U.S. and other nations' spacecraft in cislunar space. This could take the form, for example, of rendezvous and proximity operations (RPO) to inspect or harass foreign spacecraft, coating or dazzling sensors, blocking or jamming communications links, grappling satellites and moving them to another orbit, and employing counterspace weapons to deny or disrupt satellites with non-kinetic weapon effects or possibly degrade or destroy spacecraft with kinetic attacks. Some of the weapons systems China is pursuing for near-Earth space could be capable of operating in cislunar space. Given the limitations of U.S. SDA and intelligence capabilities, and the possibility that China would conduct clandestine or covert counterspace operations with reversible effects, it might be difficult to determine if spacecraft anomalies were caused by deliberate acts of aggression and attribute their source.

U.S. political and military leaders would have to decide on response options if the PRC threatened or used force in cislunar space in an attempt to seize command or establish control over key orbits (such as at Lagrange points, transfer orbits, and lunar orbits) as well as the transportation and information lines of communications between the Earth and Moon. It would be imprudent to allow the PRC to gain even "working control" of the ultimate high ground of cislunar space flanking near-Earth space and lunar orbits. China's ability to deny freedom of action at strategic chokepoints and along the space lines of communication would provide it a formidable advantage from which to influence the course and outcome of conflict on Earth and in space. Such a strategic advantage might be used by the CCP to undermine U.S. political will, societal cohesion, and morale, harm America's economic vitality, thwart its intelligence activities, and reduce the combat effectiveness of U.S. space forces. Moreover, the stakes of a future contest over cislunar space extend beyond the ability to dominate terrestrial conflict to control of the Earth-Moon system. Domination of cislunar space could position a nation to gain working control of near-Earth space as well as access to the Moon, asteroids, solar system, and their resources.

If PLA forces were in a commanding position atop the Earth-Moon system's gravity wells, they could be able to deny the U.S. freedom of action to use space systems as a force multiplier to enhance the combat effectiveness of its operational forces in all domains. America might still be able to launch and operate small numbers of satellites in a constellation as well as harass or interfere with PLA spacecraft in near-Earth space. America would be at a strategic and operational disadvantage, however, with regards to its ability to influence the course and outcome of a conflict with China. Furthermore, the United States could be confronted with an entirely different and exponentially more difficult national defense challenge if China used its freedom of action in space to deploy military platforms and weapons systems that could project power against terrestrial targets including in the U.S. homeland. American decision-makers thus could face contingencies where they would have to decide how to resist intimidation, blackmail, or other forms of coercion by the PRC or face being deterred or coerced from acting to protect our interests.

If the United States was unwilling or unable to take the decisive steps necessary to confront such Chinese actions and thwart the CCP's space ambitions, then nations around the world would lose confidence in Washington's resolve and ability to support its political and security commitments to allies and international partners. Such a perceived lack of will, of course, would harm U.S. standing in the world. Failure to provide the necessary reassurance to allies also would undermine the credibility of U.S. extended deterrence guarantees and might eventually lead to the unraveling of the alliances and other international mechanisms Washington constructed after World War II and has utilized to protect and advance U.S. national interests. The net result would be to gravely weaken the United States, its allies, and partners. Consequently, the risk of inaction would be at least as severe as the risk of acting to confront China. Provocative Chinese actions in cislunar space thus could precipitate a deepening political crisis between nuclear-armed great powers. The CCP, however, undoubtedly would have done its own risk-reward calculus before authorizing the PLA to initiate such military space operations and planned ahead to manage the contingency.

In sum, the CCP's strategic objectives on Earth and in space (including cislunar space), the role of space activities in the courses of action and lines of operations it employs to execute

the strategy, and the space capabilities which provide the means to achieve its objectives are designed to provide the PRC with the dominant power to prompt or, if necessary, compel other nation-states, their enterprises, and citizens to defer and behave in accordance with China's interests. Achievement of "national rejuvenation" and China's "space dream" are intended to enable the CCP to alter the geopolitical and astropolitical status quo to change the international system to accomplish its national objectives. The CCP's aspirations may even involve reestablishing the tributary system of centuries past when weaker vassal states were coerced by China to pay tribute in recognition of its superior position in the international order. This would, of course, have profound implications for U.S. national security interests.

APPENDIX

Outer Space Concepts

Outer space is the void beyond the atmosphere of Earth and other celestial bodies. It contains electromagnetic radiation, electric and magnetic fields, and charged particles. Space begins at an altitude about 60 kilometers (km) above Earth's mean sea level (the Karman line) where the physics of flight in the air gives way to the physics of flight in the vacuum of space.[140] The Earth is in a solar system comprised of a star (the Sun), seven other planets, moons, and smaller bodies such as asteroids and comets. The Sun is the center of the solar system. Its large gravitational mass holds the system together and keeps all the other celestial objects in the system orbiting around it. The Sun is a yellow dwarf star, about 4.5 billion years old, that is 26,000 light years from the center of the Milky Way galaxy.[141] The Milky Way is a spiral galaxy with two main arms composed of at least 100 billion stars.[142] It is 100,000 light years across the galaxy.

Earth is the third planet in the solar system, about 150 million km from the Sun, and travels around the Sun every 365.25 days in a nearly circular orbit.[143] The Moon is about 382,500 km from Earth and travels around the planet in an elliptical orbit every 27.3 days.[144] The Earth and Moon are a system held together by gravity as they orbit the Sun. The Moon orbits the Earth because the planet's mass is much greater than the Moon's. Indeed, the Moon's mass is just one percent of Earth's. The Earth, Moon, and other planets in the solar system and their natural satellites orbit the Sun because of its greater mass and gravitational pull.

Near-Earth space is the region of space closest to the planet. It includes several orbital regimes: low Earth orbit (LEO), medium Earth orbit (MEO), highly elliptical orbit (HEO), and geosynchronous Earth orbit (GEO).[145] In addition, polar orbits are a type of LEO, geostationary

[140] https://science.nasa.gov/edge-space
[141] https://solarsystem.nasa.gov/solar-system/sun/overview/
[142] https://solarsystem.nasa.gov/resources/285/the-milky-way-galaxy/
[143] https://solarsystem.nasa.gov/planets/earth/in-depth/
[144] https://moon.nasa.gov/inside-and-out/overview/
[145] https://earthobservatory.nasa.gov/features/OrbitsCatalog

orbit is a type of GEO, and transfer orbits are those between the orbital regimes. Objects in near-Earth space move faster the closer they are to Earth and slower the further away they are from the planet because of its gravity. All orbits have operational advantages and disadvantages.

LEO is up to about 2,000 km above Earth and is the regime closest to the planet. Spacecraft in LEO typically orbit Earth about every 90 minutes. The advantages of LEO are that spacecraft require less power to transmit information, smaller apertures for higher-quality remote sensing, and communicate to terrestrial ground stations and users' receivers with less latency than satellites in higher orbits. Spacecraft in LEO have the disadvantage, however, of limited coverage since they are moving very quickly and only overhead any location on the Earth for a short period of time. LEO is typically used to operate satellites with intelligence, surveillance, and reconnaissance (ISR), environmental monitoring, Earth science, and human spaceflight missions.

MEO is approximately 2,000 to 35,000 km above Earth. Spacecraft in MEO usually orbit Earth every 12 hours and have intermittent coverage of a large region. MEO includes nearly circular semi-synchronous orbits. Such orbits are about 20,000 km above Earth. MEO is consistent and predictable because spacecraft complete an orbit every 12 hours and cross over the same 2 spots above the planet's equator every day. MEO is mostly used to operate satellites with position, navigation, and timing missions.

HEO is shaped like an ellipse. At its closest approach to the Earth (perigee), a satellite in this orbit is as close to Earth as satellites in LEO and, accelerated by Earth's gravity, travel very quickly. At its most distant point in the orbit (apogee), the satellite may be about 40,000 km from Earth and moves very slowly. Spacecraft in HEO take 12 hours to complete an orbit. They pass over the same ground trace every 24 hours, depending on inclination (angle of the orbit in relation to Earth's equator), and have "dwell times" over northern latitudes and the Arctic that are nearly 10 hours of a 12-hour long orbit. Thus, HEO is typically used for satellites with ISR, missile warning, and communications missions in the far north.

GEO is about 36,000 km above Earth's surface. Spacecraft in GEO may have any inclination and travel at the same rate as the Earth rotates on its axis. Therefore, they have a 24-hour orbit around Earth and continuous coverage over a very large region. Satellites in geostationary orbit are directly over the equator at zero inclination and appear to remain at a fixed point above the Earth. There are also orbits at various distances beyond GEO known as XGEO. GEO is typically used for spacecraft with communications, ISR, missile launch detection, and environmental monitoring missions.

Cislunar space is the region of outer space from the Earth out to and including the region around the Moon and its surface.[146] It generally is considered to begin beyond GEO. The volume of cislunar space is more than 2,000 times larger than the entire region of space within GEO.[147] The furthest region of cislunar space is more than 12 times the distance from Earth to GEO. Spacecraft can operate in various trajectories in cislunar space including Lunar orbit, trans-lunar trajectories, and in families of orbits in the regions of space around Earth-Moon Lagrange points.

There are five Lagrange points or regions in cislunar space where the gravity of the Earth and Moon create an equilibrium which enables spacecraft to remain in a fixed position relative to those celestial objects.[148] Several Lagrange points are unstable orbits (L1, L2, and L3), while two (L4 and L5) are stable. Lagrange points can be used by spacecraft, among other things, to reduce the fuel consumption required for them to maintain position.

Lunar orbit is the region of space closest to the Moon. Most lunar orbits are unstable because of the perturbation effects of Earth's gravity. Low lunar orbits (LLO) are at altitudes below 100 km.[149] They are important for robotic and human exploration. There are a few

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[146] See, for example, National Science and Technology Council, National Cislunar Science & Technology Strategy, (Washington, D.C.: The White House, 2022).

[147] See, for example, M. J. Holzinger, et. al., A Primer on Cislunar Space, (Kirtland, NM: Air Force Research Laboratory, 2021).

[148] Ibid.

[149] Kurt W. Meyer, et. al., Lifetimes of Lunar Satellite Orbits, NASA Technical Paper 3394, (Hampton, VA.: Langley Research Center, 1994).

orbital inclinations for "frozen orbits" with minimal drift, however, that would enable lengthy stays in LLO.

The Moon has a radius of about 1,740 km and is about one third the size of the Earth.[150] It has a solid iron inner core surrounded by a partially liquid mantle which is covered by a crust. The Moon has valuable natural resources including aluminum, titanium, and calcium. It may also contain ores of rare elements such as beryllium, lithium, zirconium, niobium, and tantalum. In addition, there is frozen water distributed across the Moon's surface and at its poles.

Asteroids are smaller rocky bodies ranging in size from 1,000 km in diameter to dust-sized particles. There are currently 1,282,097 known asteroids in the solar system primarily located in a belt between Mars and Jupiter.[151] Asteroids are categorized as C-type or chondrite asteroids comprised of clay and silicate rocks, S-type or stony asteroids made of silicate materials and nickel-iron, and M-type or metallic asteroids made of nickel-iron. M-type asteroids contain 10 times the minerals found in S-type. The types of valuable minerals in asteroids include iron, nickel, iridium, palladium, platinum, gold, and magnesium. Comets are frozen rocks of ice and dust. They heat up close to the Sun and spew gasses and dust in their wake. Most are in the outer solar system beyond the planet Neptune in the Kuiper belt.

Accessing and operating in outer space requires space systems comprised of multiple (launch, ground, orbital, and user) segments or networks of links and nodes. These include launch ranges and vehicles for deploying and recovering spacecraft, mission and data relay satellites, mission ground stations, telemetry, tracking, and commanding as well as data relay stations, and communications, data, and command links (up, down, and cross) among ground stations, space vehicles, and user terminals that are employed on the land, sea, and air. Space systems thus operate concurrently in the terrestrial, cyber, and space domains.

[150] https://moon.nasa.gov/inside-and-out/what-is-inside-the-moon/

[151] https://solarsystem.nasa.gov/asteroids-comets-and-meteors/asteroids/overview/?page=0&per_page=40&order=name+asc&search=&condition_1=101%3Aparent_id&condition_2=asteroid%3Abody_type%3Ailike

Space systems perform a myriad of civil, defense, intelligence, and commercial missions. Civil missions include space and Earth science, space exploration, environmental monitoring, weather forecasting, and space traffic management. Defense space missions include ISR, missile warning, tracking, and defense, command, control, and communications, positioning, navigation, and timing, space domain awareness (SDA), space command and control, and offensive and defensive space control. Intelligence space missions include global situational awareness, indications and warning (I&W), monitoring compliance with international treaties and agreements, and support to military operations and intelligence activities. Commercial space missions include launch services, telecommunications, remote sensing, navigation, space situational awareness, tourism, on-orbit servicing, and mining.

ABOUT THE AUTHORS

Marc Berkowitz is a member of the National Security Space Association's Advisory Board and an independent consultant. Previously, he served as the Assistant Deputy Under Secretary of Defense for Space Policy and Vice President for Strategic Planning at Lockheed Martin Corporation.

Chris Williams is Chair of the Moorman Center for Space Studies at the National Security Space Association and an independent consultant. Previously, he served in senior positions in the Executive and Legislative branches of the U.S. Government.

The views expressed herein are solely those of the authors.

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