

The Space Component of the People's Republic of China Long-Term Goals

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The U.S. National Defense Strategy calls out long-term strategic competition with China as “the central challenge to U.S. prosperity and security” and accuses China of seeking “Indo-Pacific regional hegemony in the near-term and displacement of the United States to achieve global preeminence in the future.”¹ China’s leaders are seen as “leveraging China’s growing economic, diplomatic, and military clout...to expand the country’s international influence”² by “undermin[ing] the international system from within by exploiting its benefits while simultaneously eroding

¹ National Defense Strategy of the United States of America, 2018, <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>, 2.

² Defense, Military and Security Developments Involving the People's Republic of China 2019., i.

the values and principles of the rules-based order.”³ Secretary of State Michael Pompeo has stated, “China wants to be the dominant economic and military power of the world, spreading its authoritarian vision for society and its corrupt practices worldwide.”⁴

One prominent aspect of China’s rise as a world power is its rise as a space power. China’s ambition to become a space power is driven by a belief that space contributes significantly to China’s national power. China’s leadership argues that since the sixteenth century every science and technology revolution has influenced the global power structure. Its space program is seen as portraying China as a modernizing nation committed to the peaceful uses of space, while at the same time serving its political, economic, and military interests.⁵ Space is also seen as contributing to China’s overall influence and helping to

³ Defense Department, Indo-Pacific Strategy Report, 2019., 7.

⁴ Edward Wong, “U.S. Versus China: A New Era of Great Power Competition, but Without Boundaries,” The New York Times, June 26, 2019,
<https://www.nytimes.com/2019/06/26/world/asia/united-states-chinaconflict.html?action=click&module=Top%20Stories&pgtype=Homepage>.

⁵ Information Office of the State Council, China's Space Activities in 2011, December 2011,
http://www.gov.cn/english/official/2011-12/29/content_2033200.htm.

maintain China's national security. Although advancing rapidly, China's space program is viewed by Chinese officials and analysts as trailing the U.S. space program. Nevertheless, China's space industry plans to surpass the United States in space by mid-century.

The pursuit of the China Dream and the role of technology in building up comprehensive national power is reflected in China's desire to transition from being a "major space power" (hangtian daguo; 航天大国) to a "strong space power" (hangtian qiangguo; 航天强国) that surpasses the United States as the leading space power by mid-century. According to Chinese leader Xi Jinping, China's space program is "a powerful force for the realization of the rejuvenation of the great Chinese nation."⁶ Much like the national-level themes, Chinese political and space industry leaders speak of a space dream (hangtian meng; 航天梦). According to Xi, building China into a strong space power is the "unremitting pursuit of the China dream."⁷ Echoing Xi Jinping, an article in Seeking Truth, a publication of the Chinese Communist Party's Central School, notes that China's space program "plays an important

⁶ 建设航天强国，习近平殷殷嘱托，2019-04-12，
http://www.xinhuanet.com/politics/xxjxs/201904/12/c_1124357478.htm

⁷ 建设航天强国，习近平殷殷嘱托，2019-04-12，
http://www.xinhuanet.com/politics/xxjxs/201904/12/c_1124357478.htm

role in standing up, being rich, and becoming strong.”⁸

China takes outer space as a domain of strategic competition.⁹ According to a 2018 CASC work report, “seizing the commanding height of space development is the consistent strategy of major spacefaring countries. Future competition will be more intense, making the mission of building a strong space power even more glorious.” The report also stated that “China’s national security situation is becoming increasingly complex and severe. The role of space weapons and equipment in supporting the construction of a world-class military is increasingly prominent and the demand is more urgent.”¹⁰

Chinese perceptions of the U.S.-China space relationship

⁸ Li Yanling and Gao Tianding,” (Yi xinshidai de hangtian jingshen jianshe hangtian qiangguo; 以新时代的航天精神建设航天强国), Seeking Truth, (Qiushi; 求实), May 21, 2018, http://www.qstheory.cn/dukan/hqwg/201805/21/c_1122853891.htm.

⁹ The State Council Information Office of the People's Republic of China, China's National Defense in the New Era, 2019.

¹⁰ “CASC Convenes 7th Work Meeting,” (Zhongguo Hangtian Keji Jituan Youxian Gongsì zhaokai di qici gongzuo hui; 中国航天科技集团有限公司召开第七次工作会议), China Satellite Communications Co. Ltd., (Zhongguo Weixingtong Jituan Gufen Youxian Gongsì; 中国卫通集团股份有限公司), August 31, 2018, <http://www.chinasatcom.com/n782724/n782804/c1918683/content.html>.

reflect the overall tenor of the U.S.China relationship. China views itself as a force for the peaceful use of space and views the United States as a malevolent force bent on seeking the dominance of space and restricting China's access to space. In the commercial realm, Chinese analysts see the U.S. commercialspace sector as an innovative force, but they also recognize the potential commercial potential in space and are seeking to expand their market. China's plan for the commercialization of space goes beyond commercial space launch and includes a vision to extract natural resources through mining of the Moon and asteroids and the development of space-based solar power.

China has made important progress across a broad range of space technologies, including launchers, satellites, lunar exploration, human spaceflight, and counterspace technologies. China now has the second largest number of satellites in orbit. It is building a robust suite of counterspace capabilities that include direct ascent kinetic kill vehicles (KKVs), directed energy, electronic warfare, cyber, and co-orbital satellite systems.¹¹ Chinese military doctrine stresses the crucial nature of space in winning wars. Many observers in the United States are concerned that China's nascent commercial space industry may displace the U.S. commercial space industry through

¹¹ See Kaitlyn Johnson Todd Harrison, Thomas G. Roberts, *Space Threat Assessment 2019*, Center for Strategic and International Studies, 2019.

mercantilist trade policies. China has conducted robotic missions to the Moon and its space station will begin operation at a time when the International Space Station is nearing the end of its service life. China's space proponents envision a long-term plan to extract natural resources in space.¹²

China has released four space white papers, each entitled "China's Space Activities" that discuss China's space policy. Unlike the United States' National Space Policy documents, China's space white papers provide little information on how China governs the use of space nor does it include information on the organizations charged with carrying out space policy. Moreover, China has not issued a separate policy document on national security space as the United States has done with its National Security Space Strategy documents. China's space white papers, however, do contain a more detailed listing of China's space accomplishments, plans for the next five years, and its international cooperative space activities than U.S. policy documents. According to China's 2016 space white paper, China's space program: • Explores outer space and enhances understanding of the earth and the cosmos; and utilizes outer space for peaceful purposes • Promotes human

¹² Trefor Moss, "China Pushes for Primacy in Space," *The Wall Street Journal*, December 31, 2019, <https://www.wsj.com/articles/china-pushes-for-primacy-in-space-11546171206>.

civilization and social progress, and benefits the whole of mankind; • Meets the demands of economic, scientific and technological development, national security and social progress; and improves the scientific and cultural levels of the Chinese people, • Protects China's national rights and interests, and builds up its overall strength. • Provides strong support for the realization of the Chinese Dream of the renewal of the Chinese nation, • Makes positive contributions to human civilization and progress.¹³

All four white papers have stated a commitment to independence and self-reliance while at the same time welcoming cooperation with international partners. Reflecting the progress its space program has made since the initial white paper in 2001, the principles by which China has sought to achieve these aims have become more sophisticated as its technology has become more advanced. The 2001 white paper, for example, stated that China would only select a “limited number” of technological areas for breakthroughs.¹⁴ By 2006, China would instead “maintain comprehensive, coordinated,

¹³ The State Council Information Office of the People's Republic of China, China's Space Activities in 2016, 2016, <https://www.scio.gov.cn/zfbps/32832/Document/1537024/1537024.htm>

¹⁴ Information Office of the State Council of the People's Republic of China, China's Space Activities in 2000, 2000, http://www.gov.cn/english/official/2005-07/27/content_17656.htm.

and sustainable development.”¹⁵ In 2011, China stated that it would concentrate on making breakthroughs in key technologies.¹⁶ The 2016 space white paper stresses “innovative development” and “independent innovation as the core of the development of its space industry” in a reflection of its improving R&D capabilities.¹⁷

Zhang Hongtai, president of the China Academy of Space Technology, lists five characteristics of a strong space power: • A space program must be large. A country must be a world leader in launch, satellite and rocket development, and number of satellites in orbit. It must possess independent R&D capabilities, conduct stable operations, and have a complete range of systems. • A space program must provide benefits. A space program must be able to support military operations at the strategic, operational, and tactical levels. Civilian space infrastructure must have a long service life, provide continuous benefits, and be stable. • A space program must be innovative. A space power must be able to develop advanced technologies and lead in some technology areas. A space power’s technology must be at world-class levels and be competitive in

¹⁵ Information Office of the State Council of the People’s Republic of China, China’s Space Activities in 2006, http://www.gov.cn/english/200610/12/content_410983.htm.

¹⁶ Council, China’s Space Activities in 2011.

¹⁷ China, China’s Space Activities in 2016.

the global marketplace.

- A space program must have an advanced industrial base. A country's space industrial base must be capable of independent innovation. It must drive the creation of new industries and play a role in the global supply chain.
- A space program must have a broad-based effect. A space program must have a strategic effect on a country's social and economic development. It must be able to attract industry and its competitiveness and accomplishments must be recognized by other countries.¹⁸

The rise of China's space program poses military, economic, and political challenges to the United States. In March 2019, Vice President Michael Pence stated that the United States and China are in a new space race "with even higher stakes" than the space race between the United States and the Soviet Union, and that China has an "ambition to seize the lunar strategic high ground and become the world's preeminent spacefaring nation." He then committed the United States to the goal of being the first country to land humans on

¹⁸ "Strong Space Power: "Our journey is the Sea of Stars"," (Hangtian qiangguo: "Women de zhengtu shi xingchen; 航天强国：“我们的征途是星辰大海”） China Academy of Space Technology, (Zhongguo hangtian jishu yanjiuyuan; 中国航天技术研究院), March 7, 2018, <http://www.cast.cn/3g/show.asp?m=1&d=6281>

the Moon in the 21st century.¹⁹ In December 2018, Vice President Pence linked the proposal to establish a space force within the U.S. military to China's counterspace program and stated that the United States "must be as dominant in the heavens as it is on Earth."²⁰

Chinese perceptions of the U.S.-China space relationship are a surpass of the overall U.S.-China relationship. Chinese sources weave a space narrative that portrays China as a modernizing nation committed to the peaceful uses of space and serving the broader interests of advancing humankind through international space cooperation, economic development, and scientific discovery. Chinese sources minimize the military role of China's space program. In contrast, the same sources portray the United States as the leading space power bent on dominating space, restricting access to space, and limiting international space cooperation to

¹⁹ Michael Pence, "Remarks by Vice President Pence at the Fifth Meeting of the National Space Council | Huntsville, AL," (The U.S. Space and Rocket Center, Huntsville, Alabama, March 26, 2019), <https://www.whitehouse.gov/briefings-statements/remarks-vice-president-pence-fifth-meeting-national-spacecouncil-huntsville-al/>.

²⁰ Michael R. Pence, "America Will Return to the Moon—and Go Beyond," The White House, October 4, 2017, <https://www.whitehouse.gov/articles/america-will-return-moon-go-beyond/>.

countries with similar political systems and level of economic development.

To date, China's success in space can be attributed in large part to top-level leaders' recognition of the benefits of space power, consistent planning, and stable and ample funding. According to a 2012 Chinese source, China has invested less than 0.1 percent of its GDP on its space program or less than \$8.227 billion annually.²¹ By way of comparison, the entire U.S. space budget in 2017 was a little over \$43 billion.²² U.S. success in competing with China will rely on the same fundamentals.

China intends to surpass the United States as the leading space power. Chinese space industry officials depict their country as a major space power behind Russia and the United States and assert that China intends to surpass Russia as a leading space power by 2030 and replace the United States as the leading space power by midcentury. Space industry five-year plans and "megaplanes" indicate that China intends to build an even more capable space program by 2030 that will provide a foundation for achieving the space industry's goal of surpassing the United States by midcentury.

²¹ Feng Shuxing, 我国空间力量发展与空间安全的思考 [Reflection on Development of Space Power and Space Security] 装备学院学报 [Journal of Academy of Equipment], October 2012, 9.

²² Space Foundation, The Space Report 2018, 8.

China's space proponents envision an ambitious and unique space program. China's space proponents depict space as an essential component of modern war that also has the potential to meet their country's economic and natural resource needs. They envision a space program that by midcentury exploits cislunar space through space-based remote sensing, satellite navigation, and communications capabilities; a human presence in space through the operation of a space station and human exploration of the Moon; and natural resource extraction through asteroid and Moon mining and space-based solar power. Many of these proposed projects are unprecedented.

It is unknown to what extent China's top leadership has accepted this vision of space, however. Research found no evidence that the Chinese government has officially approved many of the aspects of this expansive vision. In order to carry out this vision, China would need to devote significantly more financial and human resources to China's space program. The allocation of these resources would come at the same time that China's economic growth is slowing and its population is aging, increasing the opportunity costs for the pursuit of expensive and risky projects.

Many of the space objectives proposed in Chinese sources would also present technological challenges for China's space industry. To date, China has been able to leverage its advantage as a "fast follower" by making use of foreign experience and

technology to advance its space program. In order to accomplish many of the objectives stated in Chinese sources, however, China would need to become the world's technological leader across a broad swath of space technologies as it attempts to concurrently solve many immensely complicated technical challenges unprecedented in the history of spaceflight. It is uncertain to what extent China's space program can overcome these challenges, especially by midcentury.

The primary motivation for China's space program is national security. Regardless of China's future space ambitions, China's space program is primarily focused on protecting China's national security interests. China's top national security issues are terrestrially-based and space is characterized as an essential component of modern warfare. Its command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) components provide critical capabilities necessary to fight "informatized local wars" and its counterspace components threaten the ability of adversaries to conduct space operations. China's plans to build a global, 24-hour, all-weather remote sensing system and a global satellite navigation system by 2020; a space-ground integrated information network by 2030; and a counterspace architecture designed to threaten an adversary's space capabilities from the ground to geosynchronous orbit reflect this emphasis on national security.

China views the United States as a destabilizing and threatening force in space. Chinese statements depict the United States as undermining outer space as a peaceful frontier that can benefit all humanity. Chinese analysts cite U.S. doctrine, technology development efforts, space war games, and the proposal to establish a U.S. military space force to portray the United States as a malevolent force bent on dominating space and restricting China's access to space. At the same time, Chinese sources minimize the military role of their country's space program.

Military China's space program plays an important role in the Chinese military's area denial/antiaccess (A2/AD) efforts. China's space-based C4ISR architecture enable long-range precision strikes that target U.S. military bases and ships. China's counterspace architecture threatens U.S. leadership in space by targeting space systems from the ground to geosynchronous orbit. In addition, as China expands its space cooperative activities, access to Chinese space capabilities will become more ubiquitous and could be used by potential adversaries to thwart U.S. interests, placing the U.S. military at risk.

In addition, China also has a vibrant counterspace program. China is developing a wide range of counterspace technologies that are intended to threaten adversary space

systems from ground to geosynchronous orbit (GEO).²³ These include direct-ascent kinetic-kill vehicles, co-orbital satellites, directed-energy weapons and jammers, and cyber capabilities.²⁴ In 2007, China destroyed one of its weather satellites with a direct ascent kinetic kill vehicle (KKV). According to the Director of National Intelligence, “the PLA has an operational ground-based antisatellite (ASAT) missile intended to target low-Earth-orbit satellites, and China probably intends to pursue additional ASAT weapons capable of destroying satellites up to geosynchronous orbit.”²⁵ The PLA is also expected to deploy a ground-based laser system for use against satellites in LEO by 2020.²⁶

Economic China promotes the commercial space sector for economic development. Chinese sources on commercial

²³ Dan R. Coats, 2019 Worldwide Threat Assessment of the U.S. Intelligence Community, 2019., p. 17.

²⁴ Office of the Secretary of Defense, Military and Security Developments Involving the People's Republic of China 2016, 2016., 37.

²⁵ Coats, 2019 Worldwide Threat Assessment of the U.S. Intelligence Community., 17.

²⁶ Patrick M. Shanahan, “Remarks by Acting Secretary Shanahan at the 35th Space Symposium, Colorado Springs, Colorado,” (April 9, 2019), <https://dod.defense.gov/News/Transcripts/Transcript-View/Article/1809882/remarks-byacting-secretary-shanahan-at-the-35th-space-symposium-colorado-sprin/>.

space seek to emulate the success of the U.S. commercial space sector in achieving technological innovation while reducing costs. Unlike the U.S. commercial space sector, China's commercial space sector appears to be a mix of private companies, state-owned enterprises (SOEs), and public-private partnerships. Although China's private commercial sector could at some point challenge U.S. leadership in space, it faces many challenges, including a supportive policy environment and central government support of the state-owned sector.

China's growing commercial space sector could pose challenges to the U.S. space sector. As with other industrial sectors such as steel and solar panels, China's commercial space sector may be over crowded, forcing the Chinese government to resort to mercantilist practices to support the sector through subsidies and flood the market with cheap Chinese products and services. China's ambitions to extract natural resources from space could have profound consequences for the world – if they are approved and successful. Mining asteroids and the Moon could drive down the price of natural resources by flooding the market with an overabundance of metals and minerals. Natural resource extraction in space, including space-based solar power, however, would limit the environmental impact of the Chinese government's efforts to improve the living standards of its 1.4 billion-plus population by lessening the need for terrestrial resources.

Separating ambition from economic and technological feasibility is difficult, and it is unknown to what extent the writings of Chinese space advocates reflect official policy.

Chinese writings on the U.S. commercial space sector are overwhelmingly positive. Chinese articles regard the U.S. commercial space sector as an innovative force able to deliver more effective and less expensive solutions than traditional space launch providers. Although China's commercial space sector appears to be a response to the dynamic commercial space sector in the United States, evidence suggests that the move to exploit the benefits of commercial space most likely resulted from a Chinese government mandate to spur all SOEs to become more commercial.

Diplomatic China uses space to advance its policy of building a "shared future for mankind". China's space policy is one element of China's foreign policy goal of reshaping the international system to better serve Chinese national interests. Much like China's foreign policy of building "a community of shared future for mankind", China's space policy is intended to build "a shared future vision for humanity in space." China's space activities are intended to build its reputation as a reliable and attractive space partner to help it achieve its goal of establishing a multi-polar world. China states that, unlike the United States, it takes an open and inclusive approach to international space cooperation. It conducts numerous international cooperative activities to improve its international

position and bolster its influence among less developed countries. China's "shared future vision for humanity in space" narrative is intended to increase its influence in space-related diplomacy and build relationships with foreign partners. China's narrative of using space for peaceful purposes and working to bring the benefits of space to all countries is one element of its larger initiative to reduce U.S. power and influence. China uses its international space cooperative activities to demonstrate that it is an enlightened, benevolent hegemon able and willing to fulfill other countries' security and economic needs through the application of space-based capabilities. These efforts may have a more salient effect in promoting Chinese influence in the developing world, an area that the U.S. space program has traditionally undervalued.

As in other domains, as Chinese capabilities and interests increase, China will likely try to shape the international governance of space by courting developing countries and proactive interaction with the United Nations. China could use its influence to promote its own agenda in space in regards to space arms control, space sustainability, the commercial uses of space, and natural resource extraction. It could also be used to stymie U.S. or Western approaches to space governance, such as its opposition to the European Union's proposed International Code of Conduct for Outer Space Activities.

The United States and China are in a long-term competition in space in which China is attempting to become a

global power, in part, through the use of space. China's primary motivation for developing space technologies is national security. However, as China's space program advances, its commercial and scientific activities will become more prominent and will extend the competition to encompass economics and diplomacy, challenging U.S. leadership in space just as China challenges the United States across the full range of diplomatic, military and economic power. In this respect, China's space program is one element of its efforts to transition the current U.S.-dominated international system to a multipolar world.

The United States remains the leading space power. Although China's space program is rapidly advancing, the United States remains the leading space power and will retain that position for decades. Yet, the United States can lose its position as the leading space power if it does not invest in its space program sufficiently and effectively. Although much attention has been placed on the role of intellectual property theft and forced technology transfer in advancing China's technology ambitions, taking steps to promote innovation within the U.S. space program will be the best guarantee of maintaining U.S. technological leadership in space.

China's explicit use of space as an instrument of national power poses military, economic, and diplomatic challenges for the United States much as China's increasing capabilities and expanding global presence challenge the United States in other

domains. Coordinated actions that emphasize U.S.-led diplomatic, scientific, military, and economic approaches to space and their role in helping other states achieve their space objectives will be the best guarantee of maintaining U.S. influence in space affairs.