

Background

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China's Space Program: A Growing Factor in U.S. Security Planning

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Abstract: *In recent years, China has made great strides in its space program. Growing Chinese counterspace capabilities are beginning to threaten U.S. space superiority and therefore the ability of the U.S. to support its friends and allies and to deter aggression. To deal with the challenge, the U.S. should maintain and expand robust space capabilities, develop alternatives to space-based systems to reduce American vulnerability, and increase U.S. knowledge and understanding of Chinese space capabilities.*

In the past several years, China's space efforts have become increasingly prominent. Recent Chinese achievements have included the third manned *Shenzhou* mission and a space walk, expansion of the indigenous Chinese Compass satellite navigation system, and deployment of a range of new remote sensing satellites, such as the *Yaogan* series.

At the same time, there has been growing concern that China may be pursuing a policy of space dominance, including programs specifically oriented toward counterspace operations. The best known example is the 2007 anti-satellite (ASAT) test, which generated an enormous orbital debris field. Since then, the Chinese have conducted further tests with potential anti-satellite implications. In January 2010, they undertook a test that involved "two geographically separated missile launch events with an exo-atmospheric collision."¹ Between June and August 2010, two Chinese satellites, SJ-06F and SJ-12, engaged in orbital rendezvous maneuvers that appeared to include "bumping" into

Talking Points

- The Chinese People's Liberation Army (PLA) has been steadily modernizing for the past several decades, including its expanding military space capability.
- The PLA has concluded that the high ground of space is essential to the information gathering, transmission, and exploitation necessary to fight and win future wars.
- Chinese efforts to secure space dominance will entail hard-kill and soft-kill measures aimed at satellites, ground facilities, and data links and will incorporate active and passive defenses for its own space facilities.
- It remains unclear how the Chinese look at military space operations during a crisis, particularly given the poor Chinese track record in crisis management. The potential for inadvertent escalation is real.
- The United States needs to increase its understanding of China's space capabilities and space decision-making system, while maintaining a robust military space capability. The U.S. should also minimize its vulnerabilities by developing alternatives to and redundancies in space systems.

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each other.² Such activities, undertaken deliberately, would be useful for practicing docking maneuvers or anti-satellite operations. In addition, contrary to international custom, China gave no prior notice of any of these tests, which has heightened concerns and underscored the opaque nature of China's space program.

The growing Chinese counterspace capabilities threaten American space superiority, the ability of the United States to support friends and allies in the western Pacific, and American deterrence of potential aggression. The U.S. government needs to take steps to ensure that it maintains the ability to secure space superiority. Such a position of strength is necessary for the Sino-American space relationship to develop along the oft-touted lines of mutual respect and mutual benefit.

The Strategic and Military Context

China's space efforts are not simply the actions of the People's Liberation Army (PLA) or efforts at political signaling to obtain a space arms control treaty, as some have posited. Rather, these actions occur within a particular strategic and military context.

The first contextual element is the broadening view of the PLA's responsibilities. One of the PLA's foremost tasks is to preserve the rule of the Chinese Communist Party (CCP). As the PRC's economic and national interests have expanded beyond its borders, what is deemed essential for preserving the party's power has also expanded. To this end, Hu Jintao and his predecessor, Jiang Zemin, set forth the new "historic missions" of the PLA. Not only do these new historic missions sustain the longstanding duty of providing support to the CCP, but now the PLA is responsible for helping to safeguard China's national development, its expanding national interests, and furthering the objective of maintaining global stability and peace.

Hence, the PLA is expanding China's space capabilities in this strategic, national light, especially

given the PLA's roles in safeguarding national development and interests. To fulfill these historic missions, the PLA must be able to exploit space at times and places of its own choosing and, equally important, be able to deny an opponent the same freedom of action.

PLA writings increasingly mention the need for a deterrence capacity in space and elsewhere. To these historic missions must be added the additional task of constraining conflicts, both by preventing their outbreak and by limiting their extent if they occur nonetheless. Both of these tasks fall under the rubric of deterrence.

As the PRC's economic and national interests have expanded beyond its borders, what is deemed essential for preserving the party's power has also expanded.

What is striking, however, is that, while Western writings on deterrence generally focus on *dissuading* an opponent from performing actions that the deterring power would prefer it not undertake, Chinese writings also talk about *compellence*. That is, to deter an opponent successfully, the PLA must not only dissuade, but also be able to coerce an opponent into undertaking actions that the deterred power would prefer not to do. In this regard, Chinese discussions about deterrence not only note roles for conventional and nuclear forces, but also highlight the importance of space deterrence.

Finally, by way of context, the PLA continues to improve its ability to undertake joint operations. This interest in joint operations was already evident a decade ago, when the PLA promulgated a variety of *gangyao* that would help to guide future military planning, training, and operations.³ The capstone of these *gangyao* was devoted to joint military operations.

The ability to conduct joint operations is portrayed as a hallmark of Local Wars Under High-Tech

1. Agence France-Presse, "China Did Not Notify US Before Anti-Missile Test," Google News, January 12, 2010, at <http://www.google.com/hostednews/afp/article/ALeqM5gIyJwTWQjzwLtHke9NhVHNS7qiHQ> (July 15, 2011).

2. Brian Weeden, "Dancing in the Dark: The Orbital Rendezvous of SJ-12 and SJ-06E," *The Space Review*, August 30, 2010, at <http://www.thespacereview.com/article/1689/1> (July 15, 2011).

Conditions, because such operations allow synergies among services, pit one's strengths against its opponent's strengths, and shield one's weaknesses. As the 2010 edition of *China's National Defense*, China's biennial defense white paper, notes, "The PLA takes the building of joint operation systems as the focal point of its modernization and preparations for military struggle."⁴

According to various PLA analyses, the key to successful joint operations is the ability to gather, transmit, and exploit information. Indeed, the very description of future wars has shifted from Local Wars Under High-Tech Conditions to Local Wars Under Informationalized Conditions—the most important high technologies are those related to information technology. Similarly, the 2010 Chinese defense white paper notes that the PLA "strives to enhance its fighting capabilities based on information systems."⁵

Only the high ground of space can provide the opportunity to gather information; transmit it rapidly, securely, and reliably; and exploit it promptly.

To create synergistic effects, widely dispersed units must be able to establish a common situational awareness framework and to coordinate their activities, timing their operations to maximize mutual support. If future wars will be marked by the "three nons" of non-contact, nonlinear, and nonsymmetrical operations, then information will be the keystone of success in future wars.

In order to effect joint operations, according to PLA analyses, a military must be able to exploit space. Only the high ground of space can provide the opportunity to gather information; trans-

mit it rapidly, securely, and reliably; and exploit it promptly. PLA writings describe space as essential for reconnaissance and surveillance, communications, navigation, weather forecasting, and battle damage assessment. A military that is capable of effective joint operations can also deter an opponent. Thus, space capabilities strengthen conventional deterrence as well as deterring in their own right.

The PLA has an interest in achieving space dominance to fulfill its historic tasks, to deter future conflicts if possible, and to fight and win Local Wars Under Informationalized Conditions if necessary.

This context suggests that China is following a particular method in developing an expanding array of space capabilities, including a growing range of satellites, a new heavy-lift space launcher, and a fourth launch site on Hainan Island, which is much nearer the equator. This underlying interest is reflected in certain space missions, which PLA writings suggest are particularly important.

Most obviously, the PLA expects improved space information support. With each passing year, China's satellite constellations will provide better information to military users. Today, Chinese systems provide not only basic earth observation capabilities, but also:

- An autonomous navigation system, which is already operational, unlike the European Galileo system;
- Data relay capacity;
- Weather forecasting; and
- Earth observation, including growing maritime surveillance capability.

In addition, China's improving space capabilities, coupled with its steadily advancing conventional capabilities, will provide the increased ability to

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3. *Gangyao* refers to Chinese documents that might variously be thought of as "guidelines," "essentials," or "compendium." Military *gangyao* are comparable, in many ways, to field manuals or to U.S. Joint Publications. For further discussion of *gangyao*, see David M. Finkelstein, "Thinking About the PLA's 'Revolution in Doctrinal Affairs,'" in James Mulvenon and David M. Finkelstein, eds., *China's Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of the Chinese People's Liberation Army* (Alexandria, Va.: CNA, 2005), pp. 10–11, at <http://www.defensegroupinc.com/cira/pdf/doctrinebook.pdf> (July 27, 2011).
 4. State Council Information Office, "National Defence Policy," in *China's National Defence in 2010* (Beijing: Information Office of the State Council, 2011), at <http://in.china-embassy.org/eng/xwfw/xxfb/t811491.htm> (July 18, 2011).

seek space superiority or space dominance (*zhitian quan*) through a combination of space offensive and defensive operations.

In discussing Chinese space offensive and defensive operations, it is important to note that, while many of the tasks associated with these efforts align with what American military planners consider “counterspace” activities, the Chinese themselves do not employ such a term. Moreover, Chinese writings on offensive and defensive space operations are not limited to, or even primarily focused on, attacking systems in orbit. Indeed, establishing space dominance entails sustaining the entire structure of terrestrial and space systems, including orbiting satellites, space-related terrestrial facilities, and the data, communications, and telemetry links that tie all of these systems together.⁶ Thus, the improvements in the PLA’s broader conventional portfolio are also important because they might be used to debilitate portions of the overall American space infrastructure.

For example, Chinese descriptions of space offensive operations include not only applying hard-kill capabilities against satellites, but also attacking launch bases and tracking, telemetry, and control facilities.⁷ They also discuss soft-kill techniques, such as jamming and dazzling satellites to minimize the generation of debris and the attendant physical and diplomatic consequences. Offensive operations will also likely involve cyber attacks against the various data and communications links that transfer information and commands used to control satellites in orbit.

Similarly, Chinese writings on space defensive operations incorporate a range of information denial measures. These include passive steps, such as camouflage and deception, to prevent an opponent from using space-based systems to gather accurate information. Information denial also includes preventing an opponent from attacking Chinese space-related systems, which would mean efforts

to neutralize and suppress the enemy’s space infrastructure. These include both kinetic and electronic means directed at space-based systems, terrestrial facilities, and the data and communications links among them.

Chinese descriptions of space offensive operations include not only applying hard-kill capabilities against satellites, but also attacking launch bases and tracking, telemetry, and control facilities.

This is all consistent with what may be a guiding concept for China’s space operations, “unified operations, key point is space dominance.” Unified operations refer to applying all types of capabilities, terrestrial and space-based, active and passive measures, hard-kill and soft-kill. These operations would focus on ensuring that the PLA can exploit space at key, decisive times and places of its choosing, while preventing an opponent from doing so.

Chinese Views on Space Deterrent Forces

Finally, the PLA also views space capabilities as essential for deterring an opponent. According to PLA authors, the information that enables local wars under modern, informationalized conditions flows through space assets. Space systems are essential for gathering, transmitting, and exploiting information, which makes non-contact, nonlinear, non-symmetrical warfare possible and allows disparate forces operating across a vast expanse to coordinate their movements and their activities. In this context, space systems are essential for deterrence.

Several characteristics of space systems make their deterrent capacity especially powerful.⁸ First, space systems are seen as more credible than nuclear systems. They are more usable and have been employed in many recent wars. Consequently, in the context of the three prerequisites for deterrence,

5. *Ibid.*

6. Chang Xianqi, *Military Astronautics*, 2nd ed. (Beijing, PRC: Military Industries Press, 2004), pp. 278–279.

7. Hong Bin and Liang Xiaoqiu, “The Basics of Space Strategic Theory,” *China Military Science*, No. 1 (2002).

8. This section is drawn from Xu Wei and Chang Xianqi, “Space Deterrence and Its Strategic Application,” *Journal of the Academy of Command Equipment and Technology*, Vol. 13, No. 1 (February 2002).

they are not only real combat capabilities, but leaders are likely to have the will to employ them, unlike nuclear weapons.

At the same time, PLA space writers suggest that space systems offer the potential to neutralize an opponent's nuclear deterrent, while expanding one's own integrated deterrent capability. Space-based missile defenses can intercept an opponent's nuclear forces while en route to their targets, minimizing damage to oneself. One PLA article suggests that pairing space defense with nuclear forces enables one to attack or defend at will, retaining the initiative while confronting an opponent with an unpalatable set of choices.⁹

Space systems are very expensive and fairly fragile, and satellites travel in predictable orbits.

Space systems are also seen as a vital partner for conventional deterrence. Space systems can detect and locate enemy forces. This alone may be sufficient to deter because it can remove the prospect of surprise. Moreover, as noted previously, space systems are essential for coordinating terrestrial forces, allowing them to communicate with each other and to synchronize their activities. This enables conventional forces to operate jointly, making them much more powerful than when operating only in single service, combined arms fashion.

Finally, by enhancing lethality and range, space systems enable conventional forces to engage in "non-contact warfare," striking the enemy with great accuracy while expending fewer weapons. This combination will make an opponent less willing to engage in conventional warfare at all.

In addition to complementing nuclear and conventional deterrence, PLA writings suggest that space systems may deter an opponent on their own. Supported by strong space information systems, a

nation can hold an opponent's space systems at risk, whether through the threat of attacks or through limited use of space information systems and other means, thereby influencing an opponent's activities in at least two possible ways.¹⁰

First, space systems are very expensive and fairly fragile, and satellites travel in predictable orbits. This makes them extremely vulnerable. In essence, this combination of expense, fragility, and vulnerability makes the space infrastructure vulnerable to hostage taking. Much like nuclear deterrence, space deterrence becomes a question of cost-benefit analysis: Is the focus of deterrence, such as Taiwan, worth the likely cost of repairing or replacing a badly damaged or even destroyed space infrastructure?¹¹

Second, damage to space systems will have wide-ranging second-order repercussions because space systems affect not only the military sphere, but also the economic, political, and diplomatic spheres.¹² Damaging an opponent's space infrastructure will impose economic and diplomatic costs beyond those of simply replacing satellite systems. For example, damage to an opponent's command and control networks may affect military operations not only in the Asia-Pacific region, but also in the Middle East and Central Asia and in South America and southern Africa. Similarly, damage to an opponent's communications satellite network will also affect financial transactions. Would a local contingency be worth such global risks and effects?

From the Chinese perspective, the combination of first-order and second-order effects may be sufficient to persuade an opponent that they cannot attain victory at an acceptable price. "Then, they may not be willing to undertake hostile activities."¹³

Implementing Space Deterrence

In light of the potential import of space deterrence, how do PLA authors envision the actual implementation of space deterrence? Apparently, there is a concept that the PLA could employ: an

9. Hong and Liang, "The Basics of Space Strategic Theory."

10. Lu Yu, *Space Information Conflict* (Beijing: National Defense Industry Press, 2009), pp. 55–56.

11. Xu and Chang, "Space Deterrence and Its Strategic Application."

12. Li Jingjun and Dan Yuquan, "The Strategy of Space Deterrence," *China Military Science*, No. 1 (2002).

13. Xu and Chang, "Space Deterrence and Its Strategic Application."

“escalation ladder” of measures to effect space deterrence. These measures involve testing space weapons, exercising space forces, reinforcing space capabilities, and actually employing space forces.

Testing Space Weapons. Several Chinese articles suggest that testing space weapons, especially in peacetime, can influence an opponent’s psychological perceptions. Even if the tests fail, they reflect a certain level of capability and interest.¹⁴ An opponent must assume that the deterring nation is researching and developing space weapons and that their own assets are likely vulnerable or at least in jeopardy.

To this end, maximum publicity is seen as enhancing the deterrent effect of such tests. Publicity effectively notifies any potential opponent that their space assets will likely be in jeopardy during crisis. This might not only dissuade an opponent from pursuing aggression, but also undercut the opponent’s political and diplomatic standing. More directly, conducting such tests demonstrates the nation’s overall level of science and technology, reinforcing concepts of comprehensive national power and feeding political and technological deterrent capacities.¹⁵

Exercising Space Forces. The next level of deterrence involves exercising space forces. These exercises could include space offense and defense operations, anti-missile exercises, space strategic strike rehearsals, and displays of joint military operations involving both space and non-space forces. Each type of exercise has its own intended meaning. For example, space offense and defense operations indicate the ability to seize space dominance, while anti-missile exercises demonstrate strategic defensive capacity, even in the face of nuclear weapons. Space strike exercises implicitly threaten the entire strategic depth of an opponent, and joint exercises with other forces serve as a reminder that a full

range of capabilities are potentially at play, not simply space capabilities.¹⁶

While tests of space weapons might be part of a peacetime routine, PLA authors suggest that exercises should be undertaken in the context of an ongoing crisis. According to one analysis, holding such exercises can help to mold the other nation’s perceptions. Exercises may be seen as an expression of will or commitment, signaling to an opponent the nation’s readiness for war.¹⁷ Similarly, some PLA analysts suggest that such exercises should be held in sensitive space areas to underscore the seriousness of one’s resolve.¹⁸

As an added benefit, such exercises not only display the space deterrent capabilities of the forces involved, but also provide valuable unit training. This additional training can enhance deterrent effects. Well-trained forces are better able to implement operational plans. Thus, in the opinion of some PLA officers, U.S. military space exercises have improved America’s space deterrent capacity.

Deploying Additional Space Forces. In the event of an ongoing, escalating crisis in which space exercises have not constrained the crisis, the next step would be to reinforce available space forces. This includes both deploying additional systems and maneuvering those already in orbit toward “sensitive areas of space” (*mingan de kongjian quyu*) to create a local advantage over an opponent.¹⁹

Not only does reinforcement of available space forces signal to an opponent one’s resolve, but increased reconnaissance and surveillance assets will complicate an opponent’s efforts at maintaining secrecy. The likelihood of discovery, in turn, may dissuade an opponent from commencing hostilities because it jeopardizes the element of surprise. Moreover, if an opponent chooses not to de-escalate, increased deployments will provide greater redundancy in the event of war.²⁰

14. *Ibid.*

15. Li and Dan, “The Strategy of Space Deterrence.”

16. Xu and Chang, “Space Deterrence and Its Strategic Application.”

17. *Ibid.*

18. Chang, *Military Astronautics*, p. 303.

19. The Chinese do not define what might constitute a “sensitive area of space,” but one might postulate it to include areas near high-value targets, such as missile warning satellites. Xu and Chang, “Discussing Space Deterrence.”

Actually Using Space Forces. Actual use of space forces is seen as the ultimate form of deterrence. However, PLA analyses seem to have different definitions of what this means. For example, one article seems to suggest that prior use of space forces lends credibility for subsequent deterrent efforts. Thus, using space forces in previous local wars provides an unmistakable statement of one's own capabilities and a willingness to take losses and inflict punishment. According to this view, the foundation of space deterrence rests upon actual capabilities that are displayed in real wars.

The track record of Chinese crisis management—including the Belgrade embassy bombing, the EP-3 incident, and the more recent Senkakus/Diaoyutai fishing boat incident—hardly inspires confidence.

Other analyses suggest that the deterrence involved in actual attacks is based not on prior experience, but on effective actual attacks during an ongoing crisis. For example, one Chinese publication notes that if tests and launches fail to deter, then one can engage in space information attacks or limited space strikes (*kongjian daji*).²¹ Another author describes such operations as reprimand or punishment strikes (*chengjie daji*). In this view, actually employing space forces constitutes the strongest kind of deterrent (*zuigao qiangdu de weishe*).²² The aim is to undertake point strikes to “cow the enemy with small battles” (*yixiaozhan er quren zhibing*).²³

One type of punishment strike would be to interfere, suppress, or otherwise disrupt enemy space systems, such as jamming the enemy's communications and data links or damaging his command system through computer network attacks.²⁴ Inflicting

confusion and disruption on an opponent's space systems may convince it to cease hostilities. If not, then the strikes will enable one's own military to operate from a more advantageous position.

The other option is to undertake sudden, short-duration strikes against enemy space systems. In light of the previous option, this would imply strikes that involve kinetic means, especially given the types of targets: space information systems, command and control centers, communications nodes, guided-missile launch bases, energy storage sites, and other strategic targets. Such strikes, some have suggested, will inflict a psychological impact upon the enemy and likely produce cascading effects throughout their space system, due to its linked nature.²⁵

This sort of deterrence logic seems to be rooted in the idea that the ability to inflict punishment is the greatest deterrent. As one Chinese author suggests, “the foundation of space deterrence must be preparation for real war” (*bixu yi shizhan zhunbei zuowei kongjian weishe de jichu*) or war-fighting.²⁶

Problematic Aspects of Chinese Views on Space Deterrence

The divergence of views on how to emplace a policy of space deterrence raises questions about the extent to which the PLA necessarily governs larger Chinese space policy. This is underscored by the discrepancy between how PLA authors describe the utility of testing space weapons and how the PRC behaved at the time of the January 2007 ASAT test. Not only was there no prior publicity, but the PRC Foreign Ministry seemed to handle the aftermath in a singularly hesitant fashion. Consequently, one must wonder whether the Chinese civilian leadership necessarily subscribes to the same view of deterrence that Chinese military space analysts have laid out.

20. Chang, *Military Astronautics*, pp. 303–304.

21. Lu Yu, *Space Information Conflict* (Beijing: National Defense Industry Press, 2009), p. 56.

22. Chang, *Military Astronautics*, p. 304.

23. *Ibid.*, p. 302.

24. *Ibid.*, p. 304.

25. Xu and Chang, “Space Deterrence and Its Strategic Application.”

26. Chang, *Military Astronautics*, p. 302.

On the other hand, some PLA writers, including the author of a PLA textbook on military space operations, suggest that such tests should not be announced, precisely to foster uncertainty in an opponent. Given that the other Chinese tests appear to have involved no real advance warning, this may be a matter of policy.

Similarly, the description of reinforcing available space forces would seem to imply a very slowly developing crisis. During a rapidly escalating situation, it is open to question whether such measured steps would be possible or be interpreted in the presented manner. The track record of Chinese crisis management—including the Belgrade embassy bombing, the EP-3 incident, and the more recent Senkakus/Diaoyutai fishing boat incident—hardly inspires confidence.

What the U.S. Should Do

For the United States, the ability to maintain space superiority is essential for the American approach to conflict. American forces rely on space assets for weather information, positioning and navigation assistance, communications, time synchronization, and tactical and strategic intelligence and warning. The growing Chinese ability to threaten American space superiority has direct implications for the ability of the United States to support friends and allies in the western Pacific and to deter aggression. It is therefore essential that the U.S. government take steps to ensure that the U.S. ability to secure space superiority is never called into question. Toward these ends, the U.S. government should:

- **Maintain a robust American military space capability.** Given the heavy ongoing reliance on space systems, the United States must be prepared to devote the resources necessary to maintain superiority across the spectrum of space capabilities. This includes modernizing not only military sensors and communications systems, but also positioning, navigational, timing, meteorological, and earth observation satellites. The terrestrial components of space capabilities—tracking and telemetry systems and the data links that connect them with orbital systems—are equally important. These systems must be made secure, not only in terms of physical infrastructure, but also

in terms of the information that passes through that infrastructure. Information security, in turn, requires maintaining proper security not only over the information that is gathered, but also the telemetry that controls satellites, so that the orbital systems can be effectively monitored and properly controlled (e.g., cannot be turned away from the sun or ordered to shut down when passing over vital targets).

Another essential element of a robust space capability involves space situational awareness (SSA). Much like in the cyber realm, attribution—knowing who is performing what kinds of action—is essential for successful deterrence. If the source of interference or physical attack cannot be identified, then effective retaliation is unlikely. Regrettably, this task is becoming increasingly complicated as the sheer amount of material in orbit expands and as the number of space actors increases. Air Force Space Command does yeoman service, providing both government and private users with SSA information, including conjunction warnings (i.e., collision alerts). Such capabilities do not come cheap, but successful space deterrence demands the ability to identify and track the myriad objects in Earth orbit, not only to prevent collisions, but also to differentiate attacks from accidents.

Ensuring the health of the American space industrial base is another key aspect. The Administration has emphasized the importance of American space industry to space security in both its National Space Policy and National Security Space Strategy. To this end, it is seeking to reform export controls and the International Trade in Arms Regulations (ITAR), which have harmed the international competitiveness of American satellite manufacturers. These efforts, as long as they continue to address specific security concerns and do not slight the continued need to protect key American technology advantages, deserve support from Congress and Secretary of Defense Leon Panetta. The U.S. needs to undertake additional efforts, such as streamlining acquisition of space systems, which regularly takes more than a decade from initial design to initial operational capability.

- **Increase alternatives to space systems.** Ironically, one way to reduce American vulnerability in space is to reduce reliance on space. Once space systems no longer constitute a clear “single point of failure,” they become less attractive targets. Some of the reliance can be reduced at the tactical level. For example, all of the services should undertake mission training without the benefit of space systems for navigation, intelligence collection, and communications. The idea is that the military should be able to operate, if necessary, without space-based information support. This will likely result in clumsier, less coordinated attacks—at least initially—and may result in higher casualties in wartime, but a demonstrated ability in peacetime exercises to perform missions in a degraded information environment will send a clear political and military message to potential adversaries that attacking space systems is not an “assassin’s mace” against the U.S.

Even more important would be the ability to deploy alternative systems in the event that space-based platforms are neutralized or destroyed. Fielding such systems in peacetime would send a clear message that degrading or even destroying space-based systems will only marginally affect the U.S. military’s ability to complete its missions and may not even impose significantly higher casualties. To this end, Congress should direct the services to investigate alternative platforms, such as high-altitude, long endurance unmanned aerial vehicles (UAVs), small satellites that might be placed in orbit in a stand-by mode, and ground-based systems that could replace lost space systems in the event of conflict.

Such systems will not be cheap, but the potential savings in lives and the advantages of maintaining information superiority are incalculable. The information derived from such systems may also be subject to fewer security restrictions than those obtained through space. This would allow the dissemination of information derived from them to allies, partners, and even the press without divulging the capabilities of the most advanced American systems.

- **Increase knowledge of Chinese space capabilities.** Like the foreign policy of the former

Soviet Union, China’s space policy is a puzzle in a riddle wrapped in an enigma. While some of the various Chinese organizations involved in military space efforts have been identified—e.g., the General Armaments Department, the China Aerospace Science and Technology Corporation (CASC) and the China Aerospace Science and Industry Corporation (CASIC), the Academy of Command Equipment and Technology, and the Ministry of Industry and Information Technology—how those entities interact with each other is poorly understood. Indeed, Beijing seems to view transparency in policy processes as even less desirable than transparency in capabilities. This may be due largely to a fear that foreign understanding of the policy decision-making process would allow outsiders to influence Chinese decision making. At the same time, Chinese understanding of how other nations make policy decisions gives them an asymmetric advantage in influencing foreign governments, both in peacetime and during a crisis or conflict.

The military, intelligence community, and Congress should make it a priority to expand the pool of experts capable of analyzing China’s space capabilities in the original language. Given the nuances in Chinese writings, reliance on external translators is a second-best solution at best.

To supplement such analyses, some amount of interaction between U.S. and Chinese space experts is probably both inevitable and necessary. However, such interactions should not be guided by the hope that American openness will be reciprocated. Instead, as with any bargaining between equals, it should be predicated on efforts at mutual, equitable interaction. Given the relatively advanced nature of American space capabilities, especially in the military arena, the PRC, especially the PLA, would undoubtedly welcome an opportunity to obtain information for free. Therefore, Congress should specify those areas in which the Defense Department, NASA, and the National Oceanic and Atmospheric Administration can and, just as important, cannot interact with the Chinese, much as the National Defense Authorization Act for Fiscal Year 2000 restricted what the U.S. military could discuss with the

Chinese military. This would have the added benefit of honoring the separation of powers between the executive and legislative branches, while clarifying what can and cannot be grounds for U.S.–PRC space interaction and cooperation.

Conclusion

An increasingly important part of national security, including deterrence, depends on space capabilities. For the United States, the ability to secure space superiority, which has not been an issue since the end of the Cold War, is integral to its ability to fight wars in the American way. For the PRC, the ability to secure space dominance and to deny it

to an opponent will likely become an increasingly important part of their national security planning.

As long as Beijing is under no illusion that it can deny the United States the ability to use space at the times and places of Washington's choosing, the Sino–American space relationship has the potential to develop along the lines of mutual respect and mutual benefit. However, such peaceful development will depend on U.S. willingness to plan forces and allocate resources to this end.

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