



CARNEGIE
ENDOWMENT FOR
INTERNATIONAL PEACE

Congressional Testimony

CHINA'S COUNTERSPACE PROGRAMS—ONLY MORE BAD NEWS

Testimony by **Dr. Ashley J. Tellis**
Senior Associate, South Asia Program
Carnegie Endowment for International Peace

House Armed Services Subcommittee on
Strategic Forces and the Subcommittee on
Seapower and Projection Forces
January 28, 2014

Good afternoon, Chairman Rogers, Chairman Forbes, distinguished Ranking Members, and Members of the Subcommittees. Thank you for your kind invitation to testify on China's counterspace programs and their impact on the United States. I respectfully request that my statement be entered into the record.

In my view, the current and evolving Chinese counterspace threat to U.S. military operations in the Asia-Pacific theater ranks on par with the dangers posed by Chinese offensive cyber operations to the United States. The dangers emanating from China's counterspace investments are real and growing. And the diversity of Chinese counterspace activities ensures that almost every U.S. space component—the space systems in orbit, the links that control them and channel their data, and their associated ground facilities—will face grave perils as current Chinese counterspace programs mature and their technologies are integrated into the People's Liberation Army's (PLA) warfighting arsenal. The need for compensating U.S. investments to defeat these emerging threats is, therefore, vital if the extant U.S. military superiority that is essential to protecting the United States, its allies, and its interests is to be safeguarded.

The international community still vividly remembers the events of January 11, 2007, when a Chinese SC-19 direct-ascent anti-satellite (ASAT) weapon destroyed an aging Chinese weather satellite in low Earth orbit (LEO) through a successful hit-to-kill intercept. That test evoked considerable revulsion because the near doubling of space debris it produced threatens all space platforms, including China's own. A little over six years later, on May 13, 2013, China conducted yet another test—after several other experiments in the intervening years—of what is almost certainly a new direct-ascent ASAT system. This test, which the U.S. Department of Defense laconically described as a missile launch “on a ballistic trajectory to nearly geosynchronous Earth orbit” (GEO), however, did not receive the international attention that followed the January 2007 event.

Yet it should nevertheless be disconcerting to U.S. defense planners because it further corroborates China's continuing intention to develop and maintain the capacity to kinetically target U.S. space systems that are positioned even in high Earth orbits. If the January 2007 test proved that China can range critical U.S. space systems in low Earth orbit, such as meteorological and electro-optical surveillance satellites, the May 2013 test indicates that vital U.S. space systems even in higher orbits, such as precision navigation and timing, infrared surveillance, and advanced communications satellites, are now vulnerable to the threat of direct-ascent kinetic attacks by China.

In the aftermath of the January 2007 ASAT test, I had argued that China's counterspace program—of which the direct-ascent ASAT weapon was only one component among many—was “part of a considered strategy designed to counter the overall military capability

of the United States” (Ashley J. Tellis, “China’s Military Space Strategy,” *Survival*, Vol. 49, No. 3/Autumn 2007). Nothing has occurred in the Chinese counterspace program since that time to compel a revision of that judgment. In fact, the evolving developments in the program since that 2007 event only suggest that many of the alternative explanations that were adduced then for China’s counterspace activities have proven unsustainable.

The idea that the Chinese direct-ascent ASAT weapon program is evidence more of “technological determinism” or bureaucratic politics than part of a studied menu of counterspace options is hard to fathom given the immensity, diversity, and focus of the myriad efforts involved. This contention was unreal in 2007 and it is even more so today, when Chinese counterspace activities have expanded both in their range and scale. Thus, for example, in recent years, China has steadily expanded its:

- space-object surveillance and identification systems (SOSI) through new advanced optical and radar systems
- direct-ascent and co-orbital ASAT programs to include new kinetic systems as well as exotic devices such as robotic arms that can be used to disturb or disrupt satellite orbits
- activities involving high- and low-energy lasers and high-powered microwave weapon systems
- electronic warfare acquisitions involving a diverse set of jammers intended to paralyze U.S. satellite communications systems in both military and civilian bands
- computer network attack capabilities which are increasingly intended to target, among other things, both space systems and their ground networks
- capability to mount discrete physical attacks on installations integral to the space ground segment

Moreover, all these programs only complement China’s longstanding ability to execute a “Samson option” involving the detonation of nuclear weapons in space.

Whether assessed individually or in their totality, these endeavors remain initiatives of strategic significance that are authorized ultimately by the Central Military Commission (CMC). There is no evidence which suggests that these programs are the products of “freelancing” by the various research institutions and industrial conglomerates involved in the development and production of counterspace systems. To the contrary, China’s counterspace activities are principally directed by the PLA’s General Armaments Department and to a lesser degree by the General Staff Department, although the latter remains the nodal body that directs the subordinate services that have physical custody of the various counterspace components in wartime. This system of centralized control suggests that a high degree of deliberation drives the entire chain of Chinese counterspace activities to include the programmatic definition of requirements, research and development,

acquisition of the various systems and their subsequent integration into the combat arms, all the way to operational deployment in the field in preparation for final employment when directed.

The idea that Chinese counterspace activities would diminish in intensity as Beijing slowly became a space power of significance has also proven to be illusory. Without a doubt, China is a major spacefaring nation today. The number of annual Chinese space launches currently exceeds that of the United States and it is believed that China presently operates some 105 satellites in space, just six short of the number required to surpass the Russian satellite inventory in orbit right now. Chinese satellites today span the gamut from weather and navigation platforms to communications and remote sensing, from electro-optical surveillance and synthetic aperture radar systems to electronic intelligence collection platforms. The Chinese space program more generally is attempting to push the boundaries of innovation with its manned spaceflight and lunar exploration components as well as through other development activities such as its spaceplane and hypersonic glide vehicle programs.

Even as China has expanded these investments in space, however, its commitment to developing a wide range of counterspace capabilities—targeted principally at the United States but also applicable to other spacefaring powers—has not diminished. This antinomous dynamic is driven by two realities. First, even as China seeks to use space for its own national goals, it is determined to develop and employ counterspace technologies whenever necessary to neutralize the combat advantages enjoyed by its opponents in the event of a conflict, while at the same time utilizing these burgeoning capabilities to deter any adversary attacks on its own space systems. Second, although the goals of Chinese counterspace employment vis-à-vis a superior adversary, such as the United States, may subsist in tension with China's own professed desire for a peaceful space environment, Beijing appears to have concluded that the “delta” between its own and Washington's dependence on space for the fulfillment of their respective national aims favors China rather than the United States. In other words, although competing counterspace actions by both nations would be hazardous to their common interests, the United States would stand to lose more than China does, given the relatively greater American dependence on space for both civilian and military purposes. Based on such an assessment, prosecuting counterspace operations in a crisis may be rational for China in any significant Sino-U.S. conflict along its periphery, even though Beijing itself stands to lose considerably as a result of the expected American riposte.

Finally, the idea that China is deeply invested in its counterspace programs because the United States has proven resistant to space arms control is also fallacious. The Chinese interest in counterspace solutions has little to do with Washington's attitude to space arms

control, although numerous Chinese commentators continue to advance this argument. Beijing's investments in counterspace capabilities, rather, are deeply rooted in the political predicaments it faces—none of which can be remedied by any arms control solutions. To begin with, China believes that it is engaged in a major geopolitical competition with the United States, a struggle wherein war, however remote, is still possible. Such a war could arise either because of extant disagreements, for example over Taiwan, which get out of hand; or because regional crises involving American protectees, such as Japan, explode to bring Chinese and American military power into confrontation; or because intensifying Sino-American competition in the Indo-Pacific spins out of control at some point during the next few decades when a power transition appears to be underway in Asia and possibly at the core of the international system.

Irrespective of what specific provocation may spark a wider conflict, Chinese defense planners are deeply consumed by the necessity of preparing for an armed confrontation with the United States, which they clearly recognize as a superior military power. Given their assessment that American superiority derives fundamentally from its ability to leverage its space systems to produce the information dominance necessary to deliver decisive warfighting advantages, Chinese strategists are by necessity drawn to the idea of attempting to neutralize American space capabilities. This lure becomes all the more tantalizing because not only is U.S. space superiority critical for the success of American military operations but its space architecture is as a rule remarkably vulnerable to offensive actions undertaken by an adversary.

This reality has driven Chinese counterspace programs ever since the United States was able to demonstrate the importance of information dominance during Operation Desert Storm and it continues to animate Chinese counterspace ambitions to this day. Because Chinese planners judge that their best chance to neutralize American information dominance hinges on undermining its space superiority, they are unlikely to restrain their counterspace programs, either unilaterally or through an arms control regime, until such time as they can satisfy their ambition to defeat American military power through means other than counterspace operations. Even as they continue to pursue such goals, however, China will continue to blame the United States for, as one Chinese military officer, Senior Colonel Zhao Dexi, put it, “maintain[ing] its absolute advantage in space even at the expense of other nations’ security...[and]... promoting its policy on space control while vigorously developing its military force in space, including space weapons...[while]... oppos[ing] holding talks on [the] non-weaponization of outer space.”

The Chinese critique about the supposed U.S. weaponization of outer space is indeed specious and is intended largely to deflect attention from the fact that China's principal counterspace capabilities are not routinely in space and will not traverse it until actually

employed in wartime. It is in fact ironic that, thanks to China's diverse counterspace investments, Beijing is more likely to be the first to actually weaponize space—that is to introduce systems that serve as weapons in space—despite its insistent and avowed claims that “China is not engaged in any space arms race at present, nor will it be in the future” (Senior Colonel Zhao Dexi, “Challenges to Space Interests and Our Strategic Choices,” *China Military Science*, March 2010, Open Source Center, CPP20100921563002, September 21, 2010).

Despite the wide variety of counterspace investments that China currently is pursuing, it is unclear whether Beijing seeks—as a matter of pre-established doctrine—to wrest space superiority through widespread kinetic attacks on U.S. space systems right from the very start of a conflict. Part of this uncertainty derives from the lack of information about whether the CMC has promulgated a formal counterspace doctrine, though it has been clear for some time now that the PLA has, utilizing U.S. and Russian approaches, already developed different components of such a doctrine which emphasize different dimensions of space control to include what in the United States is termed space situational awareness as well as defensive and offensive counterspace. Moreover, many of the constituent elements of these mission areas, as manifested in the Chinese counterspace repertoire, are already integrated into campaign planning at the operational level. Since the last decade, in any case, a large literature involving Chinese theorizing about space warfare operations has emerged and if the 2007 ASAT test appears to have taught Chinese space thinkers anything at all, it is that kinetic attacks on space systems produce dangerous amounts of debris that could be perilous to China's own space systems and space operations.

A significant number of Chinese space warfare theorists seem to have accordingly converged on the position that the capabilities to execute kinetic attacks on an adversary's space systems, along with the willingness to undertake such attacks, must be ever present for the success of deterrence—understood as preventing attacks on one's own space systems or preventing an escalation that involves attacks on one's own space systems. But the actual prosecution of such kinetic attacks should be utilized only when peacetime and crisis signaling fails or when dictated by the invincible operational necessities of war. Irrespective of when or how kinetic attacks are employed, however, most Chinese space warfare theorists conceive of their counterspace operations as contributing to the acquisition of space superiority. Because of China's current technological and space order-of-battle limitations, however, such superiority is understood not as encompassing dominance over all of outer space but rather as limited control that constrains the operations of an adversary's space and conventional warfighting capabilities sufficiently to enable the PLA's own units to achieve their specific operational objectives.

Given this conception of the role of counterspace instruments in military operations, Chinese theorists appear to be laying the foundations for justifying increased investments in capabilities aimed at the disruption of space operations—or, in other words, securing episodic effects—and the denial of space-derived information necessary for exercising conventional superiority in a given battlespace—or, in other words, securing persistent effects—over and above the preexisting investments made in developing kinetic kill systems, which can only contribute to the war effort by the destruction of an adversary’s space assets either in orbit or on the ground. This quest for new counterspace capabilities that provide transient and reversible effects rather than simply permanent and irreversible destruction seems to have acquired renewed emphasis in Chinese theorizing after the 2007 ASAT test, and it appears driven by the need to avert unintended escalation and compel the adversary to terminate his aggression while simultaneously enabling Chinese conventional forces to secure their operational aims.

The prevalence of such theorizing suggests that China is moving towards a space campaign posture that emphasizes a variety of counterspace activities ranging from measured actions that produce transient and reversible effects (“soft-kills”) to the extreme violence of kinetic attacks, which are best reserved only for the apex of escalation or when dictated by dire operational necessity. Such a concept of operations is obviously “better” than simply a kinetic war of all against all in space and on the ground, but at the end of the day it cannot be consoling to U.S. defense planners in any significant way. For starters, it is not clear whether these visions purveyed by Chinese space warfare theorists, no matter how thoughtful or well situated, represent the actual operational preferences of the planners or the warfighters in the Chinese military. Notions of graduated escalation have long been alien to Chinese military culture and its style of combat operations. But even if this represents the new inclinations of the PLA, the emphasis on counterspace operations that emphasize securing transient and reversible effects only imply that space will no longer be a protected sanctuary in the context of any future U.S.-China confrontation. Rather, it will be a heavily contested environment, where the U.S. military will have to struggle to secure the information dominance that it simply presumed in the past would automatically obtain, when all it had to do then was to employ that freely found dominance to produce conventional victories on the ground, at sea, and in the air.

The immensity of the burdens associated with securing this information dominance in an era when all U.S. intelligence, surveillance, and reconnaissance (ISR), communications, and other combat support systems will be under persistent attack—even if they are not physically destroyed—cannot be underestimated. Even if Beijing eschews kinetic attacks on U.S. space systems and their ground segments in the early phases of a Chinese counterspace campaign, U.S. military forces will have to apply enormous effort toward: defeating Chinese deception and denial operations; mitigating the Chinese jamming of all critical U.S. space systems to

include the Global Positioning System constellation and its terrestrial receivers, space-based synthetic aperture radars, major satellite communication systems, and the links that ensure the effectiveness of the electro-optical and infrared surveillance systems; protecting all satellites from laser dazzling and damage; and, warding off cyber attacks on the space control networks and eventually against the space systems themselves. Thus, even if kinetic attacks against satellites and their ground segments by direct-ascent, co-orbital, nuclear and missile weapons, and special forces are excluded from consideration, the challenges confronting the U.S. military in regard to sustaining the information dominance it has traditionally enjoyed—in the face of current and prospective Chinese counterspace capabilities—will be enormous. Furthermore, given that kinetic counterspace attacks cannot be ruled out at any point in the event of a conflict, the U.S. military will have to simply prepare for all eventualities, irrespective of what Chinese space warfare theorists contend is either plausible or desirable.

The United States is eminently capable of dealing with the threats posed by Chinese counterspace investments through both defensive and offensive counterspace responses of its own, but these will necessarily require significant financial resources if they are to be successfully brought to fruition. Since I have outlined broadly the technical measures required in these areas in my article cited earlier—“China’s Military Space Strategy”—I will not repeat them here. Suffice it to say that because protecting U.S. information dominance is vital not only to securing success in war but also to procuring that victory at the lowest cost in terms of lives and effort expended, both the administration and the Congress should not stint in funding all the mitigation efforts required to defeat China’s counterspace initiatives—the term “defeat” in this context understood as enabling the U.S. military to successfully complete its missions despite opposition.

Let me end by offering a few concluding thoughts on the policy responses the United States should pursue in regards to responding to China’s counterspace programs. Unfortunately for both the United States and the international community, there is no arms control solution available to limit the dangers posed by China’s counterspace activities. There are already deep and abiding disagreements universally about what constitutes weaponization in space, which instruments ought to be considered space weapons, and whether and how U.S. space policies have contributed to space competition. All these controversies ensure that a useful space arms control regime capable of restraining counterspace activities by any state, including China, is very far away, if it is at all possible.

Given this fact, the United States must prepare to cope with China’s counterspace programs principally through unilateral investments in developing the appropriate antidotes. It should initiate a discussion with all spacefaring powers about the nature of emerging threats to security in space and it should certainly engage in consultation with its friends and allies, especially in Asia—including Japan, South Korea, India, and Australia, among others—about

the challenges posed by China's counterspace program. A conversation with China about space security too would be worthwhile, but it should not be assumed that such discussions, no matter how intense, will produce a convergence in perceptions. The United States should also continue to monitor the on-going discussions about the International Code of Conduct for Outer Space Activities supported by the European Union. But even if these deliberations ultimately produce a document that the United States finds worthwhile to sign on to, it bears remembering that neither the Code nor for that matter the proposed Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT) actually address the problematic threats to space security posed by China's counterspace investments. Regrettably, therefore, the United States is condemned to manage this hazard mainly through its own resources because, given China's political objectives and strategic constraints, even good confidence-building measures are unlikely to constrain its evolving counterspace warfare programs in any meaningful way.