Space Weaponization and US-China Relations

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Introduction

The issues surrounding the weaponization of outer space present difficult security and diplomatic challenges to the United States in its relationship with foreign states. Several features of space weaponization account for these difficulties. First, many space technologies have dual-use capacity, making it difficult for states to distinguish between defensive and offensive preparations or conventional and space weapons.[1] Second, some defense analysts argue that space weapons are inherently better suited to offensive than defensive warfare since they are able to launch powerful attacks quickly but are vulnerable to attack.[2] Third, due to insufficient situational awareness in space and poor "forensic" ability, the causes of satellite failures can be unclear, creating the potential for both anonymous attacks and groundless accusations of antisatellite (ASAT) attacks.[3] Finally, as in many areas of foreign policy, states often send mixed signals regarding their true intentions in space.

In considering the costs and benefits of space weaponization, the United States must consider the effects it will have on its security relationship with foreign states. The United States should pay particular attention to the effect on relations with China, a potential future superpower with nuclear, intercontinental ballistic missile (ICBM), and ASAT capability, along with growing space programs.

This article explores the range of possible interpretations of US policy and Chinese policy on space weaponization. I argue that although the United States cannot have full certainty about China's space weapons program, it should proceed against the background of certain basic facts about China's position. First, I argue that if the United States proceeds

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with space weaponization, China will respond with some form of its own military buildup. The extent of such a response is not certain, but a new arms race revolving around space warfare is not unthinkable. Second, China has already developed the means to attack some US satellites, and there is no guarantee that China does not seek to develop the means to launch a more robust space weapons or ASAT program.

Members of Congress and the Department of Defense have responded to China's increased space capacity and its January 2007 ASAT test by calling for renewed focus on US space policy and defense. Last fall, Cong. Terry Everett, the Ranking Republican member of the Strategic Forces Subcommittee of the House Armed Services Committee, in an article previously published in this journal entitled "Arguing for a Comprehensive Space Protection Strategy," referred to China's ASAT test as a "clear wake-up call for the Administration, Congress, and the American people."[4] I agree with the congressman that China's actions require a clear response from the United States. This response must include some of the unilateral defensive actions that the congressman calls for, including the development of a comprehensive space protection strategy and improvement of space situational awareness. However, unilateral defensive actions must not come at the cost of multilateral diplomatic progress.

I argue that the United States should take a proactive role in developing international rules for the military use of outer space. The United States can use its significant international influence to shape rules that preserve its national interests, such as deploying a limited ballistic missile defense (BMD) system but placing a ban on the testing of ASAT weapons. To maximize US long-term security, however, I would argue that the United States not deploy space weapons as part of a multilayered BMD shield or otherwise. Space weapons would not contribute to US security in the way that many proponents suggest. Ultimately, space weapons deployment is likely to expose US satellites to greater threat by encouraging foreign states to develop more advanced ASAT technology and expedite nuclear proliferation. Even when considered in isolation, the decision to forgo space weaponization is a wise one; when considered within the larger context of arms control negotiations, it clearly presents an opportunity to advance US long-term security. The United States should concede to negotiate on space weaponization with China in return for Chinese cooperation in other more critical areas of counterproliferation, such as the Fissile Material Cut-Off Treaty (FMCT) and the Proliferation Security

Initiative (PSI). Finally, the United States should continue to push for increased transparency in China's military and space programs.

The US Position on Space Weaponization

US policy on space weaponization is contradictory and unclear. The United States formally disclaims any intention to weaponize outer space in discussions with foreign states, yet multiple US policy defense documents call for just such a policy. Any analyst of US foreign policy would likely conclude that the United States seeks, at least, to keep its options open on the weaponization of outer space. A prudent military adversary, analyzing that same information, would be wise to prepare for eventual US weaponization of outer space.

One important source of insight into the US position on space weaponization comes from US official statements at the UN Conference on Disarmament (CD), the official international body for the negotiation of disarmament agreements. Most members of the CD have long supported the commencement of negotiations on a treaty on the prevention of an arms race in outer space (PAROS). Although the United States has consistently opposed a PAROS agreement, it actively assures other states that it does not intend to weaponize space. The United States justifies its opposition to a PAROS agreement with two arguments. First, the United States contends that negotiating an agreement on PAROS would be superfluous and wasteful since there is currently no space-weapon problem. The ambassador to the CD has explained, "There is no arms race in outer space. Thus, there is no—repeat, no—problem in outer space for arms control to solve."[5] Second, the United States argues that an inability to define *space weapon* precludes the negotiation of an agreement on PAROS.[6] Specifically, the United States argues that any definition of space weapon is likely to extend to "practical and important uses of space-related systems" such as satellites or the space shuttle.[7] Despite its opposition to an agreement governing PAROS, the US representative at the CD has consistently argued that current US policy "does not advocate, nor direct the development or deployment of weapons in space."[8]

A prudent reading of these statements suggests that the United States is keeping its options open in space. By refusing to support a binding international agreement on PAROS, the United States rejects any limit on its future ability to deploy space weapons. Statements of assurances suggest

that if the United States ultimately has plans for space weaponization, those plans are unlikely to be executed in the near future.

Recent US actions and other internal statements, however, paint a much more aggressive picture of US plans for the weaponization of outer space. In 2001, a high-level commission headed by Donald Rumsfeld and charged with examining the future of US space security concluded that to avoid a "Space Pearl Harbor" the "U.S. government should vigorously pursue the capabilities called for in the National Space Policy to ensure that the President will have the option to deploy weapons in space to deter threats to, and, if necessary, defend against attacks on U.S. interests."[9] In addition, the commission stated that since space warfare is a "virtual certainty," the "U.S. must develop the means both to deter and to defend against hostile acts in and from space."[10] The commission called for improvements in "defense in space" and "power projection in, from and through space."[11] Before the commission concluded its work, Donald Rumsfeld assumed the post of secretary of defense. In 2006, President Bush issued a new US National Space Policy that emphasized the US determination to remain free of restraint in outer space. "The United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to or use of space. Proposed arms control agreements or restrictions must not impair the rights of the United States to conduct research, development, testing, and operations or other activities in space for U.S. national interests."[12] In 2004, the Air Force published a paper called *Counterspace Operations* that begins with the assertion that "counterspace operations are critical to success in modern warfare."[13] The document goes on to explore the sorts of actions that would be included in a US offensive counterspace operation, including possible preemptive attacks on satellites, communication links, and surveillance and reconnaissance systems.

In addition to these policy recommendations and government statements, the June 2002 unilateral decision by the Bush administration to pull out of the 1972 Antiballistic Missile (ABM) Treaty suggests that the United States is taking the first steps to achieve the goals laid out by the Rumsfeld Commission. The ABM Treaty banned the placement of missile defense components and weapons in space. ABM abrogation is consistent with a desire to remove restrictions on developing a BMD system as well as placing weapons in space for BMD or other purposes. The Bush administration's wholesale rejection of the treaty, rather than a more dip-

lomatic and limited renegotiation of its bilateral obligations, suggests that it is not interested in using legal constraints to assure its foreign partners that it does not plan to deploy space weapons. This position is in keeping with the Bush administration's aversion to arms control treaties, but it also reflects a preference for unfettered use of outer space.

These statements and actions do not, of course, establish that the United States is planning to launch weapons into outer space. Foreign policy making is an unsightly process with many competing interests at stake. The fact that one federal department, such as the Air Force, argues for the weaponization of space, does not mean that such weaponization will occur. But this is beside the point. Regardless of the ultimate effect of these statements on US policy in space, their impact on foreign audiences can be stronger. Foreign countries seeking to decipher US behavior can only be further persuaded that the United States plans to weaponize outer space.[14] Chinese officials, for instance, have taken note of each of the statements described above and confidently concluded that the United States seeks to control space.[15]

The View from Beijing

No state is more keenly interested in US policy towards outer space than China. To avoid unnecessary conflict, the United States should pay close attention to the implications of space weaponization for US-China relations. Unfortunately, much like the United States, China's behavior and stated policy do not produce a clear picture of its true intentions in outer space.

Officially, China adamantly opposes the weaponization of outer space. At the CD, China spearheads the quest for an agreement on PAROS. Partnering with Russia, China calls for confidence-building measures in outer space, dialogue on appropriate actions in outer space, and, ultimately, the negotiation of an international treaty designed to prevent an arms race in outer space. However, China's recent ASAT test creates doubts about its sincerity in seeking to limit the weaponization of space. On 11 January 2007, China launched a mid-range ballistic missile and destroyed an outdated Chinese weather satellite in low Earth orbit (LEO). If combined with a larger booster, such a weapon could reach satellites in higher orbits.[16] Many states at the CD noted the obvious tension between China's official position on PAROS and its ASAT test. China stated simply that it continued to support an agreement on PAROS.

China's contradictory actions and statements provide some support for many interpretations and yet are wholly consistent with none. I offer four possible interpretations of China's behavior towards the weaponization of space.

One interpretation is that China seeks only to maintain its defensive military position vis-à-vis the United States. Although long a member of the nuclear club, China has never sought to match the United States or Russia in nuclear military might. The best estimates of China's nuclear arsenal are that China has roughly 80 operationally deployed nuclear warheads[17] and less than 40 liquid-fueled, silo-based ICBMs.[18] According to this view, China's "minimalist" nuclear program reflects the Chinese conception of nuclear deterrence as insensitive to variations in the relative number of nuclear weapons.[19] China is more interested in directing state resources towards economic development, industrial growth, and conventional military modernization than in competing with the United States in nuclear or space weapon systems, and China's nuclear policy focuses on maintaining its deterrent capability.

On this account, China's primary concern with US space weaponization is its contribution to a US multilayered missile defense shield. Indeed, China's campaign for PAROS negotiation at the CD seems to intensify after each new development in United States BMD plans.[20] Although China could respond to a BMD shield with effective countermeasures,[21] future technological developments may permit the BMD system to vitiate China's nuclear deterrent.[22] In the case of a conflict over Taiwan, for example, a US space-based BMD system could prove very valuable to the United States. According to this view, if the United States decides to advance with such a BMD program, China will respond so as to maintain its nuclear deterrence. It will modernize its ICBM fleet (a program it has already initiated), develop further countermeasures to circumvent the BMD shield, and develop the means to launch multiple ASAT attacks. Ultimately, an arms race could ensue. This, however, would not be China's chosen outcome. Its development of space weapons is merely a counterstrategy to what it views as likely US space weaponization.[23] China would much prefer that the United States negotiate a PAROS agreement not to build the BMD shield.[24] If this were the case, China's January ASAT test would appear to be an attempt to get the United States to the negotiating table. By launching the ASAT, China sought to put the United States on notice that any attempt to weaponize outer space would lead to this mutually undesirable path.

A second interpretation, not wholly inconsistent with the first, is that China is concerned that the United States seeks to deny Chinese use of outer space. As China continues down the path of economic development and technological advancement, it seeks to grow its outer space programs. China seeks to launch new satellites for commercial and military purposes.[25] For instance, China has plans to launch a GPS-like satellite system called Beidou-2. From 2006 to 2010, China plans to launch up to 100 satellites.[26] It also has an interest in developing a space science program much like NASA. Although the United States has officially stated that it supports the peaceful use of outer space by all space-faring nations, so-called US "space controllers" or "space hegemonists"[27] argue the United States should carefully police the use of space to assure that no country uses it in a manner inconsistent with its interests. In response to such a US policy, China seeks to deny the US denial of outer space.[28] One means of doing so would be through the ratification of an international treaty that precluded the United States from putting in place the instruments or means to control outer space. Since the diplomatic approach does not seem likely to produce any concrete results, China is moving forward with its ASAT program in order to hedge the risk of US space domination.

A third interpretation is that China's statements at the CD are nothing more than empty rhetoric and that its real intention is to develop the means to launch its own space weapons. China only seeks to pursue PAROS as a means of buying time to catch up to the United States in research and development of its space program. The Department of Defense views China's advances for negotiation with skepticism, noting "the traditional roles that stratagem and deception have played in Chinese statecraft."[29] The Rumsfeld Commission noted that "the Xinhua news agency reported that China's military is developing methods and strategies for defeating the U.S. military in a high-tech and space-based future war."[30] Many China experts outside the Pentagon share the Department of Defense's skepticism about China's willingness to negotiate arms control agreements.[31] In a report to the US-China Economic and Security Review Commission, Michael Pillsbury, a former defense official with expertise in Asian affairs, reported that no less than three Chinese colonels have advocated covert development and deployment of ASAT weapons to be used against the United States in a surprise attack.[32] In his Fall 2007 article, Congressman Everett seems to adopt this interpretation of China's ASAT test. "Apparently, this single test is part of a broader effort to mature their direct-ascent ASAT capability and to

develop a spectrum of counterspace capabilities."[33] Fueling these fears is the belief among some US defense experts that if China deploys space weapons before the United States, China will have gained a large, perhaps insurmountable advantage.[34]

Finally, a fourth interpretation is that China's seemingly contradictory actions are not the product of a single coherent policy but the result of "stovepiped bureaucracies" that do not sufficiently coordinate their actions and policies.[35] The appeal of this explanation is that it does not require a reconciliation of China's two positions. The negotiation of PAROS is the objective of the Ministry of Foreign Affairs, and the development of ASAT weapons is the objective of the People's Liberation Army (PLA), which conducted the January ASAT test.[36] Insufficient policy integration, information sharing, and leadership have allowed these two objectives to develop simultaneously. If true, this interpretation would raise serious questions about China's ability to develop a coherent foreign policy necessary to building a working relationship with the United States.

Although each of these four interpretations of China's policy on space weaponization diverges from the others, each is largely consistent with China's foreign policy behavior. Each has been adopted and vigorously argued by its own camp of China watchers. Despite the uncertainty, however, two conclusions emerge from the above interpretations. The United States must adopt a foreign policy that is consistent with both of these conclusions.

First, if the United States proceeds with space weaponization China will respond by bolstering its own military capabilities.[37] China's response will seek to preserve the asymmetric threat it poses to US space assets and maintain its nuclear deterrent. Under each of the interpretations considered, China is not willing to allow the United States to build up its space weapons program unchallenged. In the least, China would develop additional ASAT weapons to which the United States would seek to develop effective countermeasures.[38] Alternatively or in addition, China could invest in more ICBMs and nuclear warheads,[39] acquiring the capacity to overwhelm a BMD shield. An option less likely in the near future, China could counter US space weaponization by deploying its own space weapons. Other potential Chinese responses include adopting a "launch on warning" policy or abandoning its no-first-use pledge.[40] Each of these strategies would seek to counter the effectiveness of US space weapons. The United States, of course, could always respond to China's response, but such tit-for-tat policy making risks devolving into an arms race. Chinese officials claim

that an arms race would "likely emerge" unless a negotiated solution can be reached on PAROS.[41] It is noteworthy, however, that under at least two interpretations, this is not China's preferred outcome. Under the first and second interpretations, China will only proceed with further developing ASAT technology and acquiring additional weapons if it cannot be assured that the United States does not plan to weaponize outer space.

Second, China has developed the means to attack some US satellites, and there is no guarantee that China does not ultimately seek to develop a robust space weapons program. China's ASAT test demonstrates that the Chinese have been working assiduously at developing their space weapons program. Although China made a decision in the early 1990s to focus its space resources on civilian programs, an annual official budget of $2.5 billion for space programs and a growing number of dual-use technology programs suggest that China's military space capacity is growing.[42] For instance, China has long conducted research on the development of beam weapons that can be incorporated into ASAT weapons systems.[43] China is known to have tested high-power microwave weapons for jamming satellite communication.[44] If China is indeed pursuing a full-blown space weapons program, a space arms race may be inevitable despite a US decision not to launch the first space weapons program.

How Should the United States Proceed?

The United States must design a foreign policy response that pursues US interests and is able to respond to each of the four possible Chinese positions on space weaponization. As described in its foreign policy statements and studies, the United States has three potential interests regarding space weaponization: protecting US space assets, ballistic missile defense, and, finally, space control and force projection.

First, as the world's most technologically advanced country, the United States owns a highly disproportionate share of the world's space assets and satellites. These satellites play a vital role in US economic activity and military operations.[45] Foreign states have certainly taken note. "The political, economic, and military value of space systems makes them attractive targets for state and non-state actors hostile to the United States and its interests."[46] Unfortunately, satellites also make relatively easy targets for foreign antagonists. Satellites move in predictable patterns, cannot remain over friendly territory, and are easily located by other states.[47] While most

commercial satellites are in geosynchronous Earth orbit, beyond the reach of existing Chinese ASAT weapons, China could reach US satellites in LEO with its current basic ballistic missile technology. In the case of a limited US-China conflict, perhaps over Taiwan, US military satellites, most of which orbit in LEO, would make for a tempting target. Strategic elimination of US military satellites could effectively blind US forces. China might consider such a limited attack especially attractive since it would be unlikely to incite a full-scale nuclear response.

Second, US weaponization of outer space cannot be fully analyzed without considering the space requirements of a ballistic missile defense system. Of the many possible future BMD systems, most envision some amount of space components. A more robust BMD system would require space interceptors,[48] such as space-based lasers (SBL). Although boost-phase interception may be possible from ground-based BMD systems, most boost-phase models rely on space-based weapons.

Just as with the larger discussion of space weaponization, US policy on BMD is not entirely clear. In seeking to assuage the concerns of Russia and China, the United States has stated that it only plans to deploy a limited BMD shield directed at so-called rogue states. Yet some officials in the Bush administration have clearly demonstrated an interest in developing a more robust, multilayered BMD shield that can protect against attacks from stronger military powers.[49] US withdrawal from the ABM Treaty suggests that these views are influential in shaping its policy.

The final argument for the placement of weapons in space is the US ability to secure control of outer space, which many military planners consider to be the inevitable future theater of military conflict and the ultimate military high ground.[50] Control of outer space would both permit the United States to project power from space (either offensive or defensive) and deny adversaries the ability to do the same. Space-based weapons could provide some clear advantages in case of military conflict. For instance, SBLs could greatly reduce the response time of the US military to certain kinds of terrestrial threats. While a ballistic missile in the United States can take up to 45 minutes to reach its target, SBLs can destroy targets moments after the decision is made to attack.

Recommendations for US Policy

To determine the optimal policy, the United States must decide which of these three potential justifications for space weaponization provides

benefits in excess of costs. In making this determination, the United States should consider not only the immediate consequences of its actions but also the way in which its behavior will influence Chinese interests and shape Chinese policies. It must eschew myopic policy recommendations and consider the long-term reactions and realignments that US policy is likely to incite. We do little service to the long-term security of the United States by considering our defensive and offensive space options in the context of simplified hypotheticals presented by some advocates of space weaponization. Would we hesitate to use space-based defensive weapons to intercept an incoming ballistic missile armed with a nuclear payload? The answer is as obvious as it is unhelpful. The more difficult question is, what risks do we run in deploying such a space-based interceptor in the first place? How would such a deployment affect the larger strategic context in which the United States operates? In considering these questions, the United States must be wary of policies that provide short-term military advantages at the cost of long-term national security.

In light of the uncertainty surrounding Chinese policy on space weaponization, I would recommend that the United States focus on what I consider the two core observations of Chinese space weapons policy. One, China will likely react to space weaponization with its own military buildup. Two, China may ultimately plan to pursue an aggressive space weaponization or ASAT program. Against this background, I offer some recommendations for US policy.

The US refusal to engage in discussions on the weaponization of outer space imposes two significant costs. First, it increases Chinese uncertainty and suspicion, leading China to assume its worst-case scenario about US space weaponization. Second, it prevents the international community from developing new rules and norms in areas such as advancing situational awareness, coordinating launches, and deterring the further development and proliferation of ASAT weapons that could benefit US space assets. There is broad consensus that the United States can no longer afford to remain silent in the international debate on the weaponization of outer space. The Rumsfeld Commission, the US-China Commission,[51] and many space-arms-control advocates all recommend greater US participation in setting rules for the use of outer space beyond the existing legal framework.

For years China has pressured the United States to negotiate a new international agreement on space and space weaponization. If the United States now accepts this invitation, it may find that it has substantial leverage in

determining the parameters of the discussion. The United States should use this leverage to assure that the final agreement reflects its interests in space. One issue for the United States to consider is whether the CD is the best forum to negotiate rules on space. Admittedly, most member states recognize the CD as "the single multilateral disarmament negotiating forum" and as such the appropriate forum for the discussion of space weaponization. But agreeing to PAROS discussions at the CD may place the United States in a defensive position. For years, China and other states have used the CD as a forum to lambaste the US position on space weaponization. At the CD, the United States risks appearing like a reluctant defendant facing a hung jury. More importantly, the current formulation of the discussion at the CD as "prevention of an arms race in outer space"—such as through the advancement of a limited BMD system—may subtly shape discussions against US interests. Preventing an arms race does not fully encompass the interests at stake in space. International discussions on space should consider not only preventing destabilizing actions in space but encouraging stabilizing actions in space as well. Moreover, a new agreement on space might address a wider array of issues than just the "space arms race," including civilian space use and space debris.

The United States might limit the discussion at the CD to simply supporting the negotiation of an agreement on space weaponization in another forum. One obvious alternative forum is the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), a UN representative body with a mandate to consider space law issues. Alternatively, the United States might consider whether to forgo the universal consensus of the UN for a closed multilateral agreement with China and Russia and perhaps a select group of states with active space programs, potentially including Canada, India, Israel, Japan, Saudi Arabia, or the states of the European Space Agency. The scope of the negotiation will affect the substance. For instance, space weaponization may be effectively addressed in an agreement between the United States, China, and Russia, but an agreement that sought to include new rules curbing the creation of space debris would be best addressed within a larger group of states.

In the following discussion, I describe what I view as the optimal US position on the most pressing space weaponization issues. The discussion is divided into three categories: space-based weapons, ballistic missile defense, and ground-based ASAT weapons.

Space-Based Weapons

I recommend that the United States accept a commitment to forgo placement of weapons in outer space. The costs of space weaponization simply outweigh the benefits. Above, I argue that China would respond to US space weaponization with some level of military buildup. In the least, this response would include the deployment of a more robust ASAT system capable of attacking and potentially eliminating space weapons.[52] After all, space weapons, like military satellites, make for vulnerable military targets.[53] The use of space-based weapons in a conflict must be discounted by the likelihood that they would be eliminated by Chinese ASAT attack. More importantly, increased ASAT deployment would have the counterproductive effect of exposing US satellites to greater threat. Aside from ASAT issues, Chinese response to US space weaponization would include an increase in China's ICBM fleet and nuclear arsenal. Vertical proliferation cannot be in the interests of the United States, if only for the increased peacetime risks of accidental launch or the terrorist risk associated with increased availability of weapons technology and components. Finally, the United States should not discount the possibility, often cited by opponents of space weaponization, that the deployment of US space weapons would instigate a space arms race.

These costs must be weighed against the benefits of space weapons championed by advocates of space weaponization. Despite their relatively open exposure to ASAT attack, some space weapons do provide significant military capability. One question, however, is whether the military benefit of space weapons, for example a long rod penetrator, is much greater than the benefit provided by terrestrial or Air Force weapons.

A second reason for US commitment not to place weapons in space is the negotiating leverage such a concession would provide. Of course, such leverage cannot be taken for granted. Rather, agreement not to weaponize outer space could be loosely conditional on making progress in other areas of US security. There are at least three areas where the United States could expect to gain concessions from China in return for a commitment not to weaponize space. First, China's participation at the CD strongly suggests that it might be willing to begin negotiations on an FMCT, a top security priority of successive US governments, if the United States agrees to negotiate on space weapons.[54] Since China's commitment to the FMCT can facilitate the FMCT commitments of India and Pakistan, its participation is critical.[55] Second, the United States can demand greater support from China on the Proliferation Security Initiative. The PSI, which seeks to

prevent illicit sea and air transport of fissile material, has been identified by the Bush administration as a key program in reducing the possibility of acquisition of nuclear weapons by a terrorist organization. To date, China's muted opposition to the PSI stands as one of the greatest impediments to a fuller development of the initiative.[56] Chinese cooperation could be vital to this program's success. Third, the United States should demand greater transparency in Chinese military planning, especially with regard to ASAT and space-focused programs. Such transparency, long sought by US defense officials, would reduce the likelihood of potential conflicts over speculative intelligence and give the United States greater insight into how military decisions are made (and whether China indeed suffers from a stovepiped bureaucracy). I argue that progress in each of these three areas would represent a greater security gain than proceeding with the weaponization of space. If the United States is able to negotiate a quid pro quo in one or all of these areas in return for a commitment not to weaponize outer space, the agreement would represent a clear US net security gain.

A third reason for the United States to agree not to launch weapons into outer space is that such an agreement need not threaten two stated US interests—protection of satellites and the development of a limited BMD system. Before turning to each of these issues, it is necessary to note two potential problems with a decision to forgo space weaponization. First, as stated above, there is no guarantee that China does not plan to develop its own robust ASAT and space weapons programs regardless of US activity in this area. "Space racers" doubt that a US commitment not to place weapons in space will influence China's policy on space weaponization. Ultimately, cheating is a risk that countries run whenever they agree to be bound by a shared international agreement. However, certain factors significantly reduce this risk. First, while the secret development of space weapons technology might be possible, any effort to deploy or test space weapons will be clearly visible to the international community.[57] Without the capacity to test, any space weapons program will be stifled at an early stage of development. Second, there is little reason to think that in the foreseeable future the technological capacity of the United States would fall far behind that of any state planning to launch space weapons. A commitment not to deploy weapons does not mean that all research and development must cease immediately. Once it becomes clear that a state is preparing to launch space weapons, the United States could respond by executing its own space weapons contingency plan. Third, as stated above, space weapons are relatively easy targets for ASAT attack, a feature that can work in the interests of the United States if others deploy first.

Fourth, a universal ban on space weapons would engender a normative framework that would justify a swift reaction by the United States, such as the deployment of its own space weapons or ASAT attack if another country violated the ban first. Finally, if the United States is able to negotiate for greater transparency in Chinese military planning, as suggested above, it would reduce the possibility of a surprise Chinese launch.

A second potential criticism of the recommendation to forgo space weapons is the common assertion that such a commitment requires a workable definition of *space weapons*. Admittedly, defining space weapons without encompassing other space assets, such as satellites capable of inflicting physical damage on other satellites, presents a challenge. However, the impossibility of agreeing on a definition is likely inversely proportional to the political will to reach such a definition. Once the United States and China have determined to reach a space weapons ban, they should be able to design reasonable criteria to distinguish between space weapons and ordinary space assets. One possible approach would be to abandon the idea of a general definition altogether and agree on a definitive positive or negative list of space objects that would or would not fall within a space weapons ban. A positive list would describe the space systems that are specifically included within a prohibition. Alternatively, a negative list would include those that are specifically not affected by the prohibition. Each approach presents its own challenges. A positive list would require that the United States have sufficient information to describe the sorts of weapons China seeks to launch. A negative list would have the opposite effect: it would require the United States to reveal potentially sensitive details of its space assets to qualify for launch. Yet if the effect of each of these two approaches is to increase transparency about the sorts of assets that China and the United States have in space, it may only bolster stability between the two states.

Ballistic Missile Defense

I argue that an agreement on space weapons need not categorically prohibit United States deployment of a BMD system. A discussion of space weaponization should address BMD only to the extent that it is relevant to "space weaponization"; certain types of BMD are clearly not pertinent. For instance, the US Patriot Advanced Capability-3 (PAC-3) short-range missiles form a central component of US missile defense. But PAC-3, which lacks the ability to execute long-range interceptions, seems clearly beyond the scope of a discussion on space weaponization. On the other

hand, some BMD systems—such as those directed at weapons that enter orbit—do have space implications. In setting the limits of the discussion on space weaponization, the United States should suggest a clear distinction between BMD systems based on the location of the interceptor versus the location of the object being intercepted.[58] BMD systems with space-based interceptors would fall within the scope of the agreement. All other BMD systems would not be covered. Substantively, the United States could commit to not deploying space-based interceptors. Given the dual nature of many space weapons, such a commitment would increase the credibility of an international prohibition on space weapons.

As described above, China's opposition to a US ballistic missile defense shield emerges from its desire to maintain its nuclear deterrent capability vis-à-vis the United States. A US commitment not to launch space-based interceptors as part of a BMD shield would contribute to assuring China that the United States' BMD system is not directed at limiting its nuclear deterrence. "If the [BMD] system [the United States] decides on includes weapons in space . . . a cascade of negative repercussions will follow. . . . If, however, U.S. missile defenses are designed to counter proliferation only and do not include weapons in space, Chinese and Russian fears could be assuaged."[59] Hui Zhang, a prominent Chinese expert on nuclear weapons policy, states: "A space-based, boost-phase defense would be particularly threatening."[60] Admittedly, even a terrestrial BMD, combined with possible US nuclear primacy and first-strike capacity,[61] could pose a significant threat to China's capacity for nuclear retaliation—even accounting for failings in US intelligence on Chinese missile locations.[62] To deploy even a limited BMD shield, the United States may need to provide China (and Russia) with additional assurances to ease their concerns on BMD.[63] However, a ban on space weapons would only contribute to this effort.

Finally, I should emphasize that the US ability to remove the discussion of terrestrial BMD from the discussion on space weaponization does not mean that there are not other good reasons to question the value of even this limited form of BMD. Aside from foreign misgivings about a US ballistic missile defense shield, effective countermeasures and the increased reliance on cruise missiles[64] raise important questions about the advantages that the United States gains from BMD. Moreover, as I argue below, if the United States seeks to prohibit the testing of ASAT weapons, it may have to accept a prohibition on the testing of mid-course BMD systems as well.

Ground-Based Antisatellite Weapons

Proponents argue that space weapons could provide reliable protection for US satellites. Yet, as described above, to the extent that China responds to US space weapons deployment with the deployment of a more robust ASAT system, the security of US satellites actually decreases. When considered from this perspective, it would be wise for the United States to protect its space assets through a less antagonistic policy.

In addition, it is not clear that space weapons could provide effective defense for US satellites. Space weapons would be useless against a wide variety of assaults on satellites that may be within China's reach.[65] For instance, China could cut off communication between US military forces and US satellites by means of electronic jamming, blinding satellites through the use of laser technology, or hacking into a satellite signal. Most obviously, space weapons would also fail to deter conventional attacks on satellite ground communication stations. Such attacks on ground stations are easier to execute than a ground-to-space ASAT assault.[66]

The challenge for the United States is to defend its own satellites against a wide variety of potential threats without encouraging China to significantly step up its ASAT program. Various techniques and policies are capable of achieving this objective.[67] First, the United States could engage in the hardening and shielding of its satellites. Making satellites more resistant to laser attack, nuclear radiation, or hacking would contribute greatly to the defense of its satellite system. Similarly, the United States could equip satellites with the means to protect themselves from high-intensity laser beams or other harmful agents. Additionally, cheap decoy satellites could be deployed. The United States could also work to decrease dependence on individual satellites: creating redundancy by placing additional satellites in space can effectively limit the damage that any single attack can inflict.[68] Admittedly, many of these techniques are not without their drawbacks. For example, it might be difficult to hide satellites inside radar-reflecting balloons without impairing their own sensors and communications. Yet, increasing the research and resources directed towards this area might provide added passive satellite defenses.

Finally, even once the United States has implemented the strategies described above, it may seek to limit the further development of land-based ASAT weapons. Some opponents of space weapons have suggested that the United States propose a ban on the mere *development* of ASAT weapons.[69] Such a prohibition seems nearly impossible to verify. In addition, the bene-

fits of cheating would be unacceptably high: if the United States stops the development of ASAT weapons but China maintains a secret program, the advantage to China would be too great. Alternatively, however, a ban on *testing* ASAT kinetic-kill weapons, including near-miss trials, would be easier to verify. Verifying the testing of ASAT beam weapons presents more of a challenge,[70] and the United States may have to accept this aspect of the agreement as nonverifiable. However, ASAT beam weapons present other limitations (such as an inability to blind satellites beyond their direct line of sight) that may increase the potential benefits of other forms of passive defense (such as redundancy to assure that some minimum percentage of satellites is always out of sight of Chinese ASAT beam weapons).

The challenge of a ban on ASAT testing will be to distinguish ASAT systems from the terrestrial BMD systems that I have argued should not fall within the scope of an agreement on space weaponization. Hui Zhang is correct to note that BMD weapons generally have an inherent ASAT capability.[71] Zhang also notes that the Chinese would consider any system proscribing ASAT testing but permitting BMD testing as "discriminatory."[72] Yet, the United States will have to test BMD systems if it seeks to deploy a missile defense shield. One possible resolution would be to distinguish between mid-course BMD systems designed to intercept missiles in orbit, which are largely indistinguishable from ASAT systems, and BMD systems that intercept missiles in either boost or terminal phase, which target missiles closer to the Earth's surface. Such a distinction may be justified by the additional benefits that would result. For instance, mid-course missile interception—like ASAT assaults—creates space debris. However, boost-phase interception—which the United States may be able to conduct through ground-based BMD systems—and terminal-phase interception do not.[73] Given this trade-off, the United States faces two options. On the one hand, if the United States determines that a ban on ASAT weapons testing is worth forgoing the testing and deployment of mid-course missile defense systems, it can propose a flat ban on any weapons test that intercepts its target in orbit and creates space debris. On the other hand, if the United States determines that mid-course missile defense systems testing is too valuable, it may have to live with the continued testing of ASAT weapons and the further accumulation of space debris. Given the questionable utility of a BMD system, the unrestrained right to test boost-phase and terminal-phase BMD systems, and the negative consequence of space debris, I recommend that the United States accept a flat ban on weapons tests that target objects in orbit, including ASAT and mid-course BMD systems.

Finally, any agreement that limits the United States' ballistic missile defense options must account for the possibility that the missile technology of the true target states of its BMD, such as Iran and North Korea, might one day improve to the point of outstripping the negotiated limits on BMD. To avoid a future US abandonment of the agreement, as in the case of the US withdrawal from the ABM Treaty, any agreement on space weapons should incorporate some flexibility by recognizing the potential need for future negotiations and requiring ongoing dialogue on missile threats. If it becomes necessary for the United States to deploy a more robust BMD system, it might seek to defuse Chinese concerns by pursuing BMD as a more open and transparent initiative with discrete and limited opportunities for Chinese participation. Such an initiative may lay the groundwork for deeper forms of collaboration in the future. SSQ

Notes

1. For example, Mueller points out that "nuclear-tipped anti-ballistic missiles (and even short-range ballistic missiles) can potentially be employed as powerful ASAT weapons." Karl P. Mueller, "Totem and Taboo: Depolarizing the Space Weaponization Debate," *Astropolitics* 1, no. 1 (Summer 2003): 3–4.

2. Ibid., 7. They explain that space weapons are vulnerable "because they move predictably, cannot remain over friendly territory, and are difficult to conceal."

3. Michael P. Pillsbury, *An Assessment of China's Anti-Satellite and Space Warfare Programs, Policies and Doctrines* (Washington, DC: US-China Economic and Security Review Commission, 19 January 2007) [hereinafter "Pillsbury Report"], 4.

4. Terry Everett, "Arguing for a Comprehensive Space Protection Strategy," *Strategic Studies Quarterly* 1, no. 1 (Fall 2007): 21.

5. Statement by John Mohanco, deputy director, Office of Multilateral Nuclear and Security Affairs, US Department of State (UN Conference on Disarmament, Geneva, 13 June 2006), press release, US Mission to the United Nations in Geneva, http://www.usmission.ch/Press2006/0613USstatementattheCD.htm.

6. "For many years the U.S. engaged in [talks about banning space weapons] with the Soviet Union to no avail, largely because no one then, or now for that matter, could formulate an agreed definition of what is meant by 'space weapon.'" Statement by Amb. Christina Rocca, permanent representative of the United States of America to the UN Conference on Disarmament, "Prevention of an Arms Race in Outer Space" (UN Conference on Disarmament, Geneva, 13 February 2007), press release, US Mission to the United Nations in Geneva, http://geneva.usmission.gov/Press2007/0213PAROS.html.

7. "The United States [has] looked frequently at the possibility of banning anti-satellite weapons or other space-related weapons systems, but we always find that such a ban is impossible to define in a way that excludes practical and imported important uses of space-related systems. Many proponents . . . assume that it is easy to identify what is or is not a weapon in outer space. This certainly is not the case, as anything in outer space with the ability to alter its trajectory could be a weapon." Statement by Mr. John Mohanco, delegation of the United States of America, in *Final Record of the One Thousand and Twenty-fifth Plenary Meeting* (Geneva: Conference on

Disarmament, 13 June 2006), 21, http://disarmament.un.org/Library.nsf/a61ff5819c4381ee85256bc70068fa14/a911b376e1fda36b852571dc00579271/$FILE/cdpv1025.pdf.

8. Rocca, "Prevention of an Arms Race."

9. *Report of the Commission to Assess United States National Security Space Management and Organization*, *Executive Summary* (Washington, DC: Commission to Assess United States National Security Space Management and Organization, 11 January 2001) [hereinafter "Rumsfeld Commission Report"], 8 and 12.

10. Ibid., 10.

11. Ibid., 16.

12. Office of Science and Technology Policy, Executive Office of the President, The White House, National Security Presidential Directive (NSPD) 49, "U.S. National Space Policy," 31 August 2006, http://www.fas.org/irp/offdocs/nspd/space.html.

13. Air Force Doctrine Document 2-2.1, *Counterspace Operations*, 2 August 2004.

14. Michael Pillsbury argues that Chinese military analysts consistently misread the space weaponization debate in the United States, "fail[ing] to acknowledge the consistently successful struggle of the arms control-minded members of the US Congress to block funding for space weapons during the past decade or more." Pillsbury Report, 9.

15. Statement by Eric D. Hagt in "Chinese Military Modernization and Its Impact on the United States and the Asia-Pacific" (US-China Economic and Security Review Commission, Washington, DC, 30 March 2007), 5, http://www.cdi.org/PDFs/EricHagtCongressionalTestimony.pdf. Hui Zhang reports that the common perception among Chinese defense analysts is that the United States seeks to achieve space control. Hui Zhang, *Chinese Perspectives on Space Weapons*, Project on Reconsidering the Rules of Space (Cambridge, MA: American Academy of Arts and Sciences, January 2007), 32–33, http://www.amacad.org/hui3.pdf.

16. Hagt, "Chinese Military Modernization," 8.

17. Jeffrey G. Lewis, *The Minimum Means of Reprisal: China's Search for Security in the Nuclear Age* (Cambridge, MA: MIT Press: 2007), 25–29. Lewis presents what seems to be the consensus position on the number of Chinese nuclear warheads. However, some analysts believe that the number could be far higher and closer to 400 nuclear warheads. See, e.g., Robert A. Manning, Ronald N. Montaperto, and Brad Roberts, *China, Nuclear Weapons, and Arms Control: A Preliminary Assessment* (New York: Council on Foreign Relations, 2000), 64–66, http://www.taiwandocuments.org/cfr01.PDF.

18. China has two types of missiles that qualify as ICBMs. The DF-5 (CSS-4) has a range of 13,000 kilometers (km) and is China's only means of reaching the continental United States with a nuclear missile. Jeffrey Lewis, Hui Zhang, and the Department of Defense agree that China has roughly, and perhaps less than, 20 DF-5 missiles. Lewis, *Minimum Means of Reprisal,* 26–30; Office of the Secretary of Defense (OSD), Annual Report to Congress, *Military Power of the People's Republic of China 2007*, 18, http://www.defenselink.mil/pubs/pdfs/070523-China-Military-Power-final.pdf; Zhang, *Chinese Perspectives*, 49. The DF-4 (CSS-3) has a range of 5,500 km. Lewis and the Department of Defense report estimate that China has approximately 20 of these missiles as well. China is likely to soon deploy the DF-31, with a range of 7,250+ km and the DF-31A, with a range of 11,270+ km. OSD, *Military Power*, 42; and Lewis, *Minimum Means of Reprisal*, 30.

19. For a discussion of this view of China's nuclear policy, see generally Lewis, *Minimum Means of Reprisal*.

20. Ibid., 174–82.

21. The Ballistic Missile Defense Organization, the Department of Defense agency predecessor to the Missile Defense Agency, reported in 1995 that China had likely developed or acquired multiple forms of countermeasures. Ballistic Missile Defense Organization, BMDO

Countermeasure Integration Program, *Country Profiles*: China (Washington, DC: Pentagon, April 1995), http://www.fas.org/nuke/guide/china/bmdo1995.pdf.

22. Hui Zhang argues that Chinese concerns over BMD arise from concerns that future technological developments could deliver improvements that render the BMD system capable of circumventing countermeasures. Zhang, *Chinese Perspectives,* 35.

23. Pillsbury Report, 8.

24. Lewis argues that China is sincere in its effort to negotiate an arms control agreement to curb the development of space weapons and prevent a nuclear arms race. Lewis, *Minimum Means of Reprisal*, 139–40.

25. For a discussion of the connection between economic development and China's plans for civilian and military use of outer space, see Zhang, *Chinese Perspectives*, 44–45.

26. Hagt, "Chinese Military Modernization," 6.

27. Mueller, "Totem and Taboo," 11–13.

28. Hagt, "Chinese Military Modernization," 4.

29. OSD, *Military Power*, 14.

30. Rumsfeld Commission Report, 14.

31. See, e.g., Larry M. Wortzel, "China Waging War on Space-Based Weapons," The Heritage Foundation, 11 August 2003, http://www.heritage.org/Press/Commentary/ed081103b.cfm. See also Manning, Montaperto and Roberts, *China, Nuclear Weapons, and Arms Control*, n. 18.

32. Pillsbury Report, 3 (citing the publications of Colonels Li Daguang, Jia Junming, and Yuan Zelu). But for a broad criticism of this interpretation of Chinese texts, see Eric D. Hagt, 11–13.

33. Everett, "Arguing for a Comprehensive Space Protection Strategy," 22.

34. Mueller, "Totem and Taboo," 20.

35. Bates Gill and Martin Kleiber, "China's Space Odyssey: What the Antisatellite Test Reveals about Decision-Making in Beijing," *Foreign Affairs* 86, no. 3 (May/June 2007): 2.

36. Ibid.

37. Brad Roberts, Robert A. Manning, and Ronald N. Montaperto, "China: The Forgotten Nuclear Power," *Foreign Affairs* 79, no. 4 (July/August 2000): 59, stating, in 2000, that if the United States were to withdraw from the ABM Treaty and pursue a BMD system, "China is likely to embark on a full-scale drive for a far more powerful nuclear force."

38. Krepon states that if the United States deploys space-based ASAT weapons, "Moscow and Beijing will no doubt respond with their own ASAT programs." Michael Krepon, "Lost in Space: the Misguided Drive Towards Antisatellite Weapons," *Foreign Affairs* 80, no. 3 (May/June 2001): 6.

39. Zhang, *Chinese Perspectives*, 49–53.

40. Ibid., 53.

41. "Military doctrines and [concepts] such as 'control of space' and 'ensuring space superiority' have been unveiled successively, and space operation [command] headquarters and combatant troops are in the making. If we should remain indifferent to the above-mentioned developments, an arms race would very likely emerge in outer space in the foreseeable future." H. E. Mr. Qiao Zonghuai, vice foreign minister of China, "An Effective Way to Prevent an Arms Race in Outer Space—The Early Negotiation and Conclusion of an International Legal Instrument" (speech, UN Disarmament Conference, Beijing, China, 3 April 2002), available through the Ministry of Foreign Affairs of the People's Republic of China, http://www.nti.org/db/china/engdocs/qiao0402.htm.

42. Hagt, "Chinese Military Modernization," 3.

43. Ibid., 45.

44. Ibid.

45. Everett, "Arguing for a Comprehensive Space Protection Strategy," 20–21.

46. Rumsfeld Commission Report, 12; see also Everett, "Arguing for a Comprehensive Space Protection Strategy," 21: "Those who wish to challenge America's role in the world increasingly recognize the strategic importance of space and are more willing to deny us freedom of action in space by employing a wide range of methods." Ibid., 24.

47. Mueller, "Totem and Taboo," 7.

48. "Some military missions, such as boost-phase intercontinental ballistic missile defense against large adversaries, can feasibly be conducted only from space." Ibid., 12.

49. Eric D. Hagt suggests that the " 'S[c]hriever' space war games conducted by the U.S. Air Force in 2001, 2003, and 2005 strongly reinforced the conclusion that U.S. space control sets China as a target." Hagt, "Chinese Military Modernization," 5.

50. Mueller, "Totem and Taboo," 11–12.

51. The China Commission recommended that "Congress direct the Administration to engage in strategic dialogue with China on the importance of space surveillance, the military use of space, and space weapons. Such a dialogue should include strategic warning and verification measures." Pillsbury Report, 8.

52. "[I]f there are weapons in space, then there will be extensive development and deployment of ASAT, in order to negate those weapons." Richard Garwin, "Space Weapons or Space Arms Control," *Proceedings of the American Philosophical Society*, September 2001, 243, 250.

53. "As many experts point out, space-based weapons cannot protect satellites, as these weapons are vulnerable to the same types of attack as the objects they are meant to protect." Zhang, *Chinese Perspectives*, 39.

54. For a discussion of China's role of the linkage between PAROS and FMCT negotiations, see Lewis, *Minimum Means of Reprisal*, 102–7.

55. Zhang, *Chinese Perspectives*, 63.

56. Jofi Joseph, "The Proliferation Security Initiative: Can Interdiction Stop Proliferation?" *Arms Control Today* 34, no. 5 (June 2004): 6–13, http://www.armscontrol.org/act/2004_06/Joseph.asp.

57. One possible exception to this rule is the launch of a microsatellite.

58. Hui Zhang states that "the scope of space weaponry, as generally defined in China, includes not only space-based weapons, but also any weapons that target objects in outer space." Zhang, *Chinese Perspectives,* 35. The position I propose is in direct conflict with this understanding of space weapons.

59. Krepon, "Lost in Space," 6.

60. Zhang, *Chinese Perspectives,* 41.

61. Keir A. Lieber and Daryl G. Press, "The Rise of U.S. Nuclear Primacy," *Foreign Affairs* 85, no. 2 (March/April 2006): 42.

62. See Li Bin, "Paper Tiger with Whitened Teeth," *China Security,* Autumn 2006, 78–89, http://www.wsichina.org/cs4_5.pdf.

63. Hui Zhang suggests, among other possible measures, the US adoption of a no-first-use policy, the exclusion of Taiwan in the missile defense plan, and the development of a cooperative early warning system between the United States and China. Zhang, *Chinese Perspectives*, 41.

64. Dennis M. Gormley, "Cruise Control," *Bulletin of the Atomic Scientists* 62, no. 2 (March/April 2006): 26.

65. For a discussion of the various threats to satellites and the relative efficacy of space weapons and other mechanisms in defending from these threats, see Bruce M. DeBlois et al., "Space Weapons: Crossing the U.S. Rubicon," *International Security* 29, no. 2 (Fall 2004): 50–84.

66. Mueller, "Totem and Taboo," 18.

67. See DeBlois et al., "Space Weapons," 78.
68. Redundancy is the chief recommendation by Mueller. Mueller, "Totem and Taboo," 18.
69. Krepon, "Lost in Space," 7.
70. One suggestion by Frank von Hippel would be to try to detect the laser beam by its scattering of particles in the atmosphere and the target.
71. Zhang, *Chinese Perspectives*, 35.
72. Ibid., 68.
73. Ibid., 47.