Security without weapons in space: challenges and options

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From H.G. Wells's futuristic fiction to Arthur C. Clarke's *2001: A Space Odyssey*, and from Solaris to Star Trek, space has captured our imagination as a place of exploration, challenge and mystery. The first Sputnik could have led to a Cold War Battlespace, but grew instead into the International Space Station. In the intervening decades, outer space has become much more than a realm of imaginary quests. It has become a site for commercial development, global communication, conflicting ambitions, and an important military resource and domain for power projection.

Outer space surrounds our planet, the 'heavens' above us, wherever we happen to be on Earth. It is visible to all but, at present, accessible to only a few. We will have to decide early in the twenty-first century whether to cooperate internationally to protect outer space as a sanctuary and shared resource for the benefit of billions, or whether to allow the 'ultimate high ground' of space control to be captured on behalf of the military of one nation.[2] This is not a decision that can be avoided. Already the structures for space weaponization are being embedded by a small, but influential coterie of US military officials, politicians and arms contractors. Delayed international action or a failure to decide will result in the weaponization of space as surely as a deliberate decision to deploy weapons for use in and from space.

The 11 September attacks on the World Trade Center and the Pentagon ratcheted up the perceived threats from terrorism and nuclear, chemical and biological weapons. For many, the idea of dangers and insecurities from the future weaponization of space seem too remote to be considered a priority for political action now. Yet history teaches us that by the time a particular weapon or military doctrine becomes an obvious political priority, it is usually too late to intervene and halt its development. Moreover**,** proliferation to other states or to non-state actors will follow from the possession by a few, though economic, technical or counter-proliferation hurdles may slow it down for a while.

As it is responsible for some 95% of military satellites and more than two-thirds of the world's expenditure on the commercial uses of space, it is hardly surprising that Washington desires to protect US space assets from being disabled or destroyed. The US military and political leaders need urgently to examine the implications of testing and deploying weapons for use in or from space, and whether they would actually increase or decrease the security of space assets. More fundamentally, would such weapons be likely to diminish or enhance the security of life here on Earth? With these questions in mind, this article considers initiatives for addressing space vulnerabilities and long-term security objectives.

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The politics of space weaponization

At a time when much political and military attention is focused on terrorism, why should the international community be concerned about some future possibility of weapons in space? The 'Desert Storm' Gulf War of 1991, the strikes on Yugoslavia in 1999, and the 2001 war in Afghanistan have demonstrated the enhanced power and precision of weaponry that depends on US military satellites. This space-reliant 'revolution in military affairs' (RMA), funded by a US defence budget that in 2002 exceeded the combined total of the next nineteen largest national defence expenditures, has placed the United States far ahead of any other country in the technology and hardware of warfare. Such levels of dominance are not necessarily good for the United States or its allies. Potentially destabilizing, they may also be self-defeating in security terms, provoking adversaries to direct attacks at the 'soft belly' (i.e. undefended civilians), as happened on 11 September.

The drive towards weapons for use in or from space has two principal justifications: firstly, that space weaponization is essential to protect space assets from a pre-emptive attack, dramatically called a 'Space Pearl Harbor' by the Commission to Assess United States National Security Space Management and Organization (known as the 2001 Space Commission, chaired by Donald H. Rumsfeld);[3] and secondly, that who controls space will control the Earth and obtain an unassailable military and commercial dominance. In addition to the assumptions of vulnerability and space power, some also argue from historical analogy that space weaponization is inevitable, and that whoever gets there first will enjoy an overwhelming advantage. The weaponization of space has to be seen in the context of missile defence, increasingly accepted by US allies in the post 11 September political environment. Advocates of US weapons in space have difficulty comprehending the degree to which their plans are viewed as a security threat by others because they assume that US superiority is beneficial for international stability.

From the mid-1990s on, all three types of argument could be found in US policy documents, most notably: the 1996 *National Space Policy*;[4] the 1999 *Department of Defense Space Policy*;[5] US Space Command's *Vision for 2020* (1997)[6] and *Long Range Plan* (1998);[7] The US Air Force *Strategic Master Plan for FY02 and Beyond*;[8] the January 2001 *Report of the Commission to Assess United States National Security Space Management and Organization*;[9] the Defense Department's 2001 *Transformation Study Report*;[10] and the 2001 *Quadrennial Defense Review*.[11] After *Vision for 2020* declared that 'the medium of space is the fourth medium of warfare—along with land, sea and air',[12] the 2001 Space Commission argued that the US government should pursue the relevant capabilities '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 US interests'.[13] United States Space Command foresaw its role in 'dominating the space dimension of military operations to protect US national interests and investment … [and] integrating space forces into warfighting capabilities across the full spectrum of conflict.'[14] The Space Commission concluded that space interests be regarded as a top national security priority and that the United States must ensure continuing superiority in space capabilities in order 'both to deter and to defend against hostile acts in and from space', including 'uses of space hostile to US interests'.[15]

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Though this steady stream of US policy documents extolling 'combat theories and concepts related to space warfare'[16] has provoked increasing anxiety among other nations, the United States has persisted in dismissing diplomatic initiatives to address 'prevention of an arms race in outer space' (PAROS), arguing that there is 'no need for new outer space arms control agreements'.[17] While the 'space hawks' and 'inevitable weaponizers' in the United States Department of Defense would endorse the Bush Administration's opposition to arms control, there

are 'militarization realists' and 'space doves' in the US armed forces and political arena who believe that some kind of arms control or international legislation to prevent the weaponization of space is an urgent necessity.[18] Although the Democratic Party's opposition to Republican plans for space-based missile defences was largely silenced in the aftermath of the 11 September attacks, the former Democratic Leader in the Senate, Tom Daschle, has called the weaponization of space 'the single dumbest thing I have heard so far from this administration. ... It would be a disaster for us to put weapons in space of any kind under any circumstances. It only invites other countries to do the same thing.'[19]

Addressing the vulnerability of space assets

To garner support for space weaponization, the Space Commission evoked the spectre of a space Pearl Harbor, focusing on the vulnerability of space assets and the increasing dependence of US military forces on satellite-based technology. Emphasis is placed on the risks of a pre-emptive attack from anti-satellite weapons (ASATs) or the detonation of a nuclear device at high altitude. Any international approach to address space security needs to take into account both US concerns about the vulnerability of its military and space assets and also the concerns of other governments regarding their vulnerability to US military superiority.

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One characteristic of asymmetric conflict is that the push for military invulnerability will tend to increase civilian vulnerability. The major driver behind space weaponization may be missile defence, but concepts such as full spectrum dominance and space control are mirrored in the Bush Administration's approach to combating terrorism. Notions of full spectrum dominance, as outlined in United States Space Command documents, are perceived as a security threat by countries that have no political desire or intention to threaten the United States, but which would be expected by their own citizens and militaries to develop countermeasures to deter the United States nevertheless. This is a version of the classical security dilemma, whereby the attempts of some states to look after their security needs by strengthening their military resources lead to rising insecurity for others. Regardless of its intentions, overwhelming military security and the current US mission to police the world feed other nations' threat perceptions. In space, as with other issues, the United States needs to be more aware that its actions could be self-fulfilling, and may well provoke asymmetric security responses in others that create greater international threats and vulnerabilities.

Undoubtedly, one or more nuclear detonations at very high altitude would disable satellites in Low Earth Orbit (LEO)[20] that had not been previously hardened against the effect of a nuclear weapon's electro-magnetic pulse (EMP). Although the United States has hardened many of its key military satellites, many commercial assets and several other countries' satellites would be jeopardized. Though the technology to prevent a high altitude nuclear detonation does not exist, it would be extremely difficult for the perpetrator to evade detection. Such a detonation would indiscriminately damage the space assets and communications and navigational systems of friends as well as foes, and there would be high political costs to crossing the nuclear threshold.

The Space Commission's answer appears to be more weapons, but weaponizing space would be likely to accelerate the threats to US assets rather than deterring or preventing them.[21] A more sensible approach would combine the physical and technical hardening of satellites, which would contribute to deterring such an attack, and arms control—with particular emphasis on nuclear disarmament, strengthening the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and efforts to restrict missile proliferation, such as the Missile Technology Control Regime (MTCR) and the recently concluded International Code of Conduct Against Ballistic Missile Proliferation (ICoC).

For many technological and political reasons, a high altitude nuclear detonation is unlikely, though in an age of asymmetric warfare, it cannot be completely ruled out. A much more immediate danger to commercial and military assets in space, already arising from careless human actions in the first forty-five years of space activities, comes from space-crowding and orbital debris.

LEO is teeming with human generated debris, defined by NASA as 'any man-made object in orbit about the Earth which no longer serves a useful purpose'. There are some 9,000 objects larger than 10cm and over 100,000 smaller objects. As orbiting debris may be travelling at very high velocities, even tiny fragments can pose a significant risk to satellites or spacecraft, as experienced by US astronaut Sally Ride, when an orbiting fleck of paint gouged the window of the Space Shuttle during her first flight.[22] If instead of paint, the projectile had been harder or larger, it could have put the lives of the crew at risk.

As noted by Joel Primack, one of the premier experts on the problems of space debris, 'the weaponization of space would make the debris problem much worse, and even one war in space could encase the entire planet in a shell of whizzing debris that would thereafter make space near the Earth highly hazardous for peaceful as well as military purposes'.[23] Such a scenario would cause the Earth to be effectively entombed, jeopardizing the possibility of further space exploration and greatly complicating civilian uses. In addition, Primack speculates that even a small number of 'hits' in space could create sufficient debris to cause a cascade of further fragmentation (a kind of chain reaction). This, in turn, could potentially damage the Earth's environment and, as the Sun's rays reflect off the dust, cause permanent light pollution, condemning us to a 'lingering twilight'.[24]

States with the capabilities to launch intercontinental ballistic missiles (ICBMs) or to put satellites in space will also be capable of launching an ASAT attack. A few may develop ASAT laser weapons suitable for an attack against anything in LEO. As such states are likely to have their own space assets in orbit, however, the destruction or fragmentation of satellites would exacerbate the problem of space debris and so be counter-productive for their own security interests. Military and commercial systems in space depend on ground facilities (telemetry, tracking and control, communications, data reception, etc.) and radio links (carrying commands, communications, telemetry and data), both of which provide much more accessible opportunities for interference, disablement or destruction. It is unlikely that adversaries would risk a direct, physical attack when electronic hacking, jamming or 'spoofing' provide a low tech, low cost means of disrupting space assets. The weaponization of space as a proposed response to potential vulnerabilities needs to be placed in a much wider context than United States Space Command literature suggests.

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Furthermore, there are a number of technical approaches that could increase the security of space-based assets without resorting to the deployment of weapons. These include: hardening and shielding power sources and vulnerable equipment both to protect against EMP and certain levels of kinetic impact; building in redundancy, ensuring that there are back-up facilities and replacements to avoid a whole system being crippled if one or a few parts of it are disabled; and increasing situational awareness, manoeuvrability, and stealth/concealment capabilities.

International approaches

Placing weapons in space is not the inevitable outcome of the use of space for commercial purposes. Many of the perceived vulnerabilities of space assets can be addressed in other ways. At present, no one but the United States has the capability, intention and resources to pose a significant

risk to space-based assets. In addition, no state with the technological potential to pose a future threat to US (or other) space assets (for example, the Russian Federation, China, France/European Union, India) is prioritizing financial or technical resources to developing weapons capable of threatening space assets, and all of these are more interested in building or maintaining cooperative (if sometimes uneasy) alliances with the hyperpower. If US military developments in space continue their drive towards weaponization, however, other governments may feel under pressure to devote political, financial and technological resources to counter or offset US space-based superiority. Before such expensive and dangerous military responses become necessary, a number of governments and NGOs are exploring legal, political and diplomatic ways to address space security and weapons.

When considering what is desirable and feasible, three considerations are important: the current legal situation and what is already being addressed; realistic political possibilities in the near future; and what would need to be done to create the political conditions for addressing space security more effectively. Possible approaches fall into five broad categories: confidence-building measures; utilizing existing legal instruments; partial measures; national and regional approaches; and comprehensive approaches, including treaty negotiations. In examining these options below, I make the argument for the international community to undertake a comprehensive approach that would incorporate most of these elements. Comprehensively addressing space weaponization and security issues would not preclude partial, interim steps or agreements reached without full multilateral negotiations, but there needs to be the clear, overarching goal of creating a legally binding space security regime and embedding an unequivocal taboo on the deployment or use of weapons in and from space.

Confidence-building measures

Space security has been the subject of United Nations resolutions for more than forty years. General Assembly resolution 1721[25] of 20 December 1961 established many of the foundational principles of space arms control that were later to be enshrined in the 1967 Outer Space Treaty (OST). It stressed that exploration and peaceful uses should be open to all, and that international law should apply to space and celestial bodies. It advocated the registration of space launches and international cooperation on issues such as communication and meteorology.[26] The United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), attached to the General Assembly's Fourth Committee, has long been able to discuss the problems associated with space traffic control and debris, but is hampered by an interpretation of its mandate that precludes any addressing of arms control or disarmament questions. Employing the well-known 'ping-pong' tactic, the United States and others insisted that any disarmament-related issues were the purview of the Conference on Disarmament (CD), where they could then be blocked.

Transparency measures under consideration, in conjunction with wider efforts to control ballistic missile proliferation, include notification of launches, providing pre- and post-launch information, and the licensing of activities. The idea of starting the process of addressing space security by looking at transparency, confidence-building measures and international cooperation to track and mitigate debris and overcrowding in space appears attractive because it is thought possible to bypass the space hawks' objections and draw the United States into such discussions. If the United States were prepared to engage and if (a bigger if, this) the talks could be effectively managed, they would be intrinsically valuable. However, as long as the CD and COPUOS maintain a rigid division of labour, it will be difficult—if not impossible—to move from such confidence-building measures into the kind of cooperative arms control that is urgently required. There would be a danger

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that under such circumstances substantive talks on space debris and traffic control would be time-consuming and could be manipulated to divert attention from measures to prevent the first testing and deployment of space weapons.

Strengthening existing legislation

There are already a number of international instruments with jurisdiction over space activities. The most important is the OST, which provides a basic framework for space activities. Enshrining the principles of peaceful use and exploration, and that outer space should be available for the benefit of all (not subject to national appropriation by sovereignty claims), the OST has 102 parties, including the United States, the Russian Federation, China, France, the United Kingdom, India, Israel and Pakistan.[27] It prohibits the stationing of WMD, including nuclear weapons, in space orbit or on celestial bodies. It does not cover the transit of nuclear weapons (on ballistic missiles) through space or prohibit nuclear weapons launched from Earth into space for the purposes of destroying incoming missiles.[28] It also says nothing about ASATs or the placement of conventionally armed weapons in space. Other relevant treaties include the 1963 Partial Test-Ban Treaty (PTBT), which banned nuclear testing in outer space and the Moon Agreement of 1979, which confirmed many of the provisions of the OST, with specific reference to the Moon. Though prohibiting the threat or use of force on the Moon or the use of the Moon to commit hostile acts in relation to the Earth or space assets, the Moon Agreement does not address placing conventional weapons in orbit around the Moon.[29]

Important prohibitions on deploying and testing anti-ballistic missile (ABM) systems in space and on interfering with national technical means (NTM) operated for verification purposes were enshrined in the 1972 ABM Treaty, deemed void following US withdrawal in June 2002.[30] The principle of non-interference with NTM was also enshrined in the 1987 Intermediate Nuclear Forces (INF) Treaty and the 1991 Strategic Arms Reduction Treaty (START I).[31] START I also prohibited the production, testing and deployment of 'systems, including missiles, for placing nuclear weapons or any other kinds of weapons of mass destruction into Earth orbit or a fraction of an Earth orbit' and contained transparency and confidence-building provisions. It reinforced the provisions of the 1988 Ballistic Missile Launch Notification Agreement, providing for advance launch notification of ballistic missiles used as boosters to put objects into the upper atmosphere or space.[32]

George Bunn and John Rhinelander, legal advisers to earlier US administrations, have argued that the OST created an 'overall rule [that] space shall be preserved for peaceful purposes for all countries'.[33] They argue that OST parties would have the right under the treaty to request consultations if another party planned to test or deploy in space a laser or kinetic kill vehicle capable of being used as an ASAT, a description that would cover the space-based component of the Bush Administration's multi-layered missile defence architecture. Endorsing that OST parties should make use of this provision and request formal consultations with the United States, Jonathan Dean also proposed that nations could pass a resolution in the General Assembly to request the International Court of Justice to give an advisory opinion on whether testing or orbiting space weapons of any kind would be contrary to the core rule and objective of the OST that space be maintained for peaceful purposes. On the grounds that the testing or use of space weapons would jeopardize national technical means of verification, enshrined in several treaties and agreements, and the commercial uses of space, Dean also suggests that legal action could be taken to prevent such threats, utilizing international and US courts, as appropriate.[34]

Partial measures

Assessing that the current situation is equally detrimental to the interests of commercial and military space users, advocates of space weapons for missile defence and arms controllers, and that the alternative to compromising around some middle ground would be no agreement at all (and a victory for the space hawks), some arms controllers are exploring partial measures.

The Eisenhower Institute has suggested that certain space assets like the Global Positioning System (GPS) and other navigation satellites, telecommunication and weather satellites could be declared 'global utilities' and given special legal status.[35] Recalling earlier discussions, particularly during the 1980s debates over Ronald Reagan's Strategic Defence Initiative (SDI), a number of governmental and non-governmental representatives have pushed for reconsideration of a multilateral ban on ASAT weapons, at least as a first step.

Another proposal builds on an earlier Bunn proposal to distinguish between weapons in low and high orbit. With the aim of getting the support of key actors among the inevitable weaponizers and militarization realists, Clay Moltz argued the case for prohibiting the use, testing or deployment of weapons or interceptors of any sort above 500 miles and prohibiting the stationing of weapons in LEO. His proposal would permit the testing (and presumably use) of ground-based, sea-based and air-based interceptors in LEO against ballistic missiles but not against satellites or other space-based objects (while recognizing that implementation of this would have to rely on taboo-building and confidence, since verification techniques would be unable to distinguish between permitted ABM interceptors and banned ASAT purposes).[36] While such a compromise would be unlikely to satisfy the space hawks, it allows key elements of the Bush Administration's missile defence plans, while clear barriers would prevent space-based lasers or kinetic kill weapons, and might therefore head off the escalation to higher levels of space weaponization that many fear as the most threatening and destabilizing facet of the missile defence project.

The Stimson Center's 'space assurance' concept takes another approach, starting from the premise that cooperative international measures are necessary to ensure the continuation of space commerce and exploration and would be highly advantageous to US military operations. Accordingly, the Stimson Center favours licensing and controlling particular kinds of space-related activities through consultation, negotiation, or by means of unilateral national action.[37]

These are interesting initiatives to gain attention from moderates in the Bush Administration, but there is a risk that partial approaches may buy off public concern, making it more difficult to build the necessary political momentum to ensure that negotiations actually go ahead.[38] It is also important to note that though there are indications that some in the Bush Administration might be willing to consider a ban on ASAT weapons and uses, this is no longer a viable option for other key states, notably China. US use of force-support assets in space means that such a ban would be dismissed as a mechanism to protect US military capabilities while denying others the right to defend themselves against space-supported attacks. If pursued on its own, an ASAT ban would be regarded as discriminatory and unenforceable. To be viable, it would need to be coupled with a ban on space weapons testing and deployment.

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National and regional approaches

Although few parliaments have yet begun to pay attention to space security as an issue, it is beginning to be linked with rising international concern about missile defence. The European Parliament

has issued periodic reports on Europe and space. By contrast with the US emphasis on the military uses of space, the most recent European Parliament report emphasized that space activities should be only for peaceful purposes, including scientific knowledge, with 'benefits for research, industry and society as a whole', including the European Space Agency (ESA) and a future satellite system for global environment monitoring.[39] The report also identified 'protection and management of the space environment' as a major policy goal and warned that the European Union could be taking its first step towards the militarization of space with the GALILEO navigation/location system, intelligence-gathering and the Global Monitoring for Environment and Security (GMES) initiative. The European Union's emphasis on social and economic benefits and on managing the environment is reinforced by France, Europe's leading space-faring nation and a prime mover behind the ESA.[40] Among US allies in Europe, France has been more keen than most to challenge Washington over missile defence and space policy, and has in the past advocated greater action on PAROS in the CD than the United States is willing to contemplate.

Britain, like France, has an active space programme, with significant investment in space-based telecommunications, remote sensing, surveillance and intelligence gathering. Reflecting its close military collaboration with the United States, however, the United Kingdom has been reluctant for PAROS to be made a CD priority, although it traditionally votes in favour of the annual United Nations General Assembly resolutions on prevention of an arms race in outer space.[41] The British Ministry of Defence (MoD) has expressed concerns about space debris, and has noted—but without expressing explicit concern—that space could become part of a potential 'future battlespace' in which the use of directed energy weapons 'seems likely to increase'.[42] Britain is more dependent on US military space programmes than other European Union countries. Although officials privately express concern about the implications of the Bush Administration's ambitious and apparently open-ended plans for missile defence and the weaponization of space, Britain already hosts two US facilities that are crucial for missile defence and the US National Security Agency, at Fylingdales and Menwith Hill in Yorkshire, and the current government would be unlikely to take an independent or critical stance unless the issue became domestically politicized at a much higher level than at present.

Within the United States itself, a Democrat Representative, Dennis Kucinich of Ohio, put forward a Space Preservation Bill in the House of Representatives in January 2002. In essence, the bill calls on the United States to ban all research, development, testing and deployment of space-based weapons. If passed, it would also require the United States to enter into negotiations toward an international treaty to ban weapons in space.[43] This initiative, which has also given rise to an NGO-sponsored Space Preservation Treaty, can be a useful tool to stimulate public and political debate, but it is unlikely to become a viable basis for negotiations or real legislative action. Nevertheless, there may be some political merit in other parliaments introducing similar initiatives to stimulate national debate and public and political mobilization around space security issues.

Comprehensive approaches

The most effective comprehensive approach for addressing both US and international security concerns would require three interrelated components:[44]

- a ban on the testing, deployment and use of all kinds of intentional weapons in space. This is needed to extend and strengthen the 1967 Outer Space Treaty's prohibitions on weapons of mass destruction in space so that directed energy (laser) and kinetic kill weapons are also banned, as well as any other potential offensive innovations that military researchers or planners might dream up;
- a ban on the testing, deployment and use of terrestrially based anti-satellite weapons, adding land, air and sea-based ASAT to the ban on space-based ASAT covered in the previous point; and

- a code of conduct for the peace-supporting, non-offensive and non-aggressive uses of space. The code of conduct/rules of the road could include regulations relating to space debris and space traffic control, missile launch notification, and other transparency and confidence-building measures, with mechanisms for reviewing and updating provisions as and when appropriate.

An obvious and fundamental problem for treaty negotiations is how a 'weapon in space' can be defined or distinguished from the military components in space of terrestrially based weapons. Suggestions for basing the ban on 'purpose' rather than 'technology' need to be explored further. Verification questions abound. Such objections do not undermine or invalidate the concept of either a space security treaty or a set of interconnecting agreements covering these three essential and inter-related components, but they do point to the need for legal and technical experts to get together with diplomats and government officials to work out the needs and parameters of a space security architecture.

With the advent of America's most recent push to develop missile defences, there has been renewed pressure from many states for the CD to address issues relating to the potential weaponization of space under its PAROS agenda item. Some states, notably China and the Russian Federation, have intensified their demands for the CD to undertake negotiations to prevent the weaponization of space. In June 2002, the Russian Federation and China, together with Indonesia, Belarus, Viet Nam, Zimbabwe and Syria, co-sponsored a working paper on 'Possible Elements for a Future International Legal Agreement on the Prevention of the Deployment of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects'.[45] Consisting of thirteen articles, the working paper was laid out as a draft treaty with the object of stimulating the early start of substantive discussions in the CD on the issue of PAROS.[46]

The preamble stated that 'only a treaty-based prohibition of the deployment of weapons in outer space and the prevention of the threat or use of force against outer space objects can eliminate the emerging threat of an arms race in outer space and ensure the security for outer space assets of all countries which is an essential condition for the maintenance of world peace'.

The draft treaty's scope comprises three elements: 'Not to place in orbit around the Earth any objects carrying any kinds of weapons, not to install such weapons on celestial bodies, or not to station such weapons in outer space in any other manner. Not to resort to the threat or use of force against outer space objects. Not to assist or encourage other States, groups of States, international organizations to participate in activities prohibited by this Treaty.'

The Chinese-Russian initiative is partly a political tactic, and partly a genuine attempt to stimulate discussion about what a space security treaty might look like. Like the Kucinich Bill, it is important to recognize that such drafts are only sketched, intended to provoke discussion rather than be a technical or legal basis for negotiations. They can play a very valuable role, providing their supporters recognize their mobilizing function and do not become stuck on the minutiae of specific language formulations or become narrow-mindedly exclusive about their particular approach.[47]

Conclusion

As the Russian Federation's permanent representative in Geneva, Leonid Skotnikov, underlined when presenting the Chinese-Russian draft treaty to the CD, 'urgent measures should be taken today to prevent the deployment of weapons in outer space, so that we are not forced later on to waste a colossal amount of time and effort on its deweaponization.'[48] If we ignore the issue now, it is possible

that—as with the 'Star Wars' plans of earlier decades—it might go away or collapse under the weight of its own technological, military or financial contradictions. Or, alternatively, it could be quietly and efficiently embedded and promoted within the bureaucracies and military industries, as appears to be the strategy Rumsfeld has chosen, as he proceeds to implement the recommendations of the Space Commission.

As outer space grows in commercial and military importance, there are current threats and vulnerabilities that need to be addressed now, but coherent international approaches are hampered by weapons-driven approaches on defence and security and short-sighted attitudes towards arms control. Although the conditions have not yet developed for negotiations on a comprehensive treaty to be viable, it could be very useful to consider initial measures on launch notification, space debris and elements of a code of conduct for sustainable space activities. If addressed as confidence-building means related to the wider context of space security and non-weaponization, rather than treated as sufficient ends in themselves, such negotiations would be a way to engage the United States and other space-farers in a dialogue about ways of sharing outer space to enhance international security and reap greater long-term benefits for all.

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The levels of issue salience and civil-society engagement are still quite low. To raise consciousness there needs to be greater understanding of the foreseeable consequences. It is not sufficient to assert that the weaponization of space would create even more debris with unpredictable consequences for the Earth, human security or future space activities. More research needs to be undertaken on a range of technical, strategic, environmental, economic and security implications and to assess the likely architecture (numbers and types of weapons) if one or more countries were to deploy space-based directed energy or kinetic kill weapons or an ASAT array. The debate risks becoming bogged down, however, if it focuses too much on the arguments for or against certain types of weapons or technologies.

Advocates of a space weapons ban need to frame the issue in terms of future security and focus on the following strategies:

- *Forge alliances* within the military, political and industrial sectors, especially in the United States, using technical expertise and cognitive strategies aimed at diminishing support for space weaponization and shaping interests in the direction of identifying both US security needs and international security as best served through creating a space sanctuary or security regime.
- *Strengthen* the advocates of a space weapons ban both within and outside the United States by encouraging knowledge-sharing and the development of a coherent, objective and multi-layered approach. The objective of space security needs to be promoted in terms of a non-weaponized architecture, with a code of conduct regulating space activities to enhance the security of space assets and current and future non-offensive uses and activities.
- *Unify* as large a group of states as possible behind a coherent concept for a space security treaty, preferably through building a strong partnership of governments and civil society experts, advocates and activists.
- *Maximize* the effective engagement of global civil society around achievable goals and viable strategies.

There is nothing wrong with motivating public action through images that make people afraid, if the threats and risks underlying the fears are well founded. In the case of space weaponization or war, the dangers cannot be predicted and must not be underestimated. Future exploration and the peaceful uses of space could be irrevocably damaged. Life on Earth could be harmed in unpredictable and far

reaching ways. It is time to create new partnerships between governments, industry, space users and explorers, and informed, concerned citizens to get this message across to the wider public and their political representatives.

Notes

1. This paper has benefited greatly from my discussions in several countries with scholars, activists and military officials too numerous (or sensitive) to mention, but I would like to express particular appreciation to Theresa Hitchens, Bruce DeBlois, John Pike and Yu Xiaoling for challenging and stimulating my thinking on space security.
2. Paul Wolfowitz, US Deputy Secretary of Defense, in a speech to the Frontiers of Freedom organization, used this term in the following quotation: '... while we have demonstrated that hit-to-kill works, as we look ahead we need to think about areas that would provide higher leverage. Nowhere is that more true than in space. Space offers attractive options not only for missile defense but for a broad range of interrelated civil and military missions. It truly is the ultimate high ground. We are exploring concepts and technologies for space-based intercepts.' *Transcript – Wolfowitz Outlines Missile Defense Successes, Way Ahead*, US State Department (Washington File), 25 October 2002, available at <http://usembassy.state.gov/tokyo/wwwhsec20021028b3.html>.
3. *Report of the Commission to Assess United States National Security Space Management and Organization*, Washington DC (Public Law 106-65), 11 January 2001, available at <http://www.space.gov/docs/fullreport.pdf>, known as the 2001 Space Commission.
4. Available at <http://www.ostp.gov/NSTC/html/fs/fs-5.html>.
5. Available at <http://www.fas.org/spp/military/docops/defense/d310010p.htm>.
6. Available at <http://www.fas.org/spp/military/docops/usspac/visbook.pdf>.
7. Available at <http://www.fas.org/spp/military/docops/usspac/lrp/toc.htm>.
8. Available at <http://www.spacecom.af.mil/hqafspc/Library/AFSPCPAOffice/2000smp.html>.
9. Available at <http://www.space.gov/docs/fullreport.pdf>.
10. Available at <http://www.defenselink.mil/news/Jun2001/d20010621transrep.pdf>.
11. Available at <http://www.defenselink.mil/pubs/qdr2001.pdf>. In 2002, US Space Command (SpaceCom) was folded into US Strategic Command (StratCom), following Department of Defense reorganization. This integration of SpaceCom as part of the Pentagon's core military mission was one of the recommendations of the 2001 Space Commission (see note 3), now being implemented.
12. United States Space Command, *Vision for 2020*, February 1997, available at <http://www.fas.org/spp/military/docops/usspac/visbook.pdf>.
13. Report of the 2001 Space Commission, *op. cit.*, p. 12. This echoes US SpaceCom's *Long Range Plan*, which stated: 'At present, the notion of weapons in space is not consistent with US national policy. Planning for this possibility is the purpose of this plan should our civilian leadership later decide that the application of force from space is in our national interest.' United States Space Command, 1998, *Long Range Plan*, March, p. 8, available at <http://www.fas.org/spp/military/docops/usspac/lrp/toc.htm>.
14. *Ibid*., Executive Summary.
15. Report of the 2001 Space Commission, *op. cit*., pp. 7–10.
16. The quotation is from the statement of Hu Xiaodi, ambassador of China to the CD on 27 June 2002. See CD/PV.907 of 27 June 2002.
17. Eric Javits, ambassador of the United States of America to the CD on 27 June 2002. See CD/PV.907 of 27 June 2002.
18. This characterization is based on Lt. Col. Hays's typology of four approaches to space weaponization: 'space hawks', keen to pursue weaponization at all costs; 'inevitable weaponizers', who argue from historical analogy and are sceptical of arms control; 'militarization realists', who interpret history differently and believe that the US has little to gain and much to lose by weaponizing space; and 'space doves', who advocate comprehensive arms control on the grounds that concepts such as space sanctuary and space security are more consistent with US national security than initiating an arms race in outer space. Lt. Col. Peter L. Hays, 2002, *United States Military Space: Into the Twenty-First Century*, Colorado, Institute for National Security Studies, September (INSS Occasional Paper no. 42), especially pp. 116–21. See also Lt. Col. Bruce M. DeBlois, 1998, Space Sanctuary: A Viable National Strategy, *Airpower Journal*, vol. 12, no. 4 (Winter), pp. 41–57, available at <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj98/win98/deblois.pdf>.
19. Quoted in Peter Grier, 2001, The New Nuclear 'Theology', *Christian Science Monitor*, 8 May, available at <http://www.csmonitor.com/durable/2001/05/08/fp1s2-csm.shtml>.

20. Space abounds with disagreements about definitions. For example, LEO is defined by some as 60–500km above the Earth and by others as between 100–1,500km above Earth. Geostationary Earth Orbit (GEO) is around 35,000km above the Earth's equator, where satellites proceed on circular, twenty-four hour orbits. In between is the Medium Earth Orbit (MEO).
21. If an adversary able to carry out a high altitude nuclear detonation were reckless enough to defy such compelling technical and political deterrents and risk crossing the nuclear threshold in pursuit of its objectives, we might also reflect that perhaps it would be better if the demonstration target were commercial and military assets in space rather than a city full of people on Earth.
22. Sally Ride, Drell Lecture, Stanford Center for International Security and Cooperation, 10 April 2002, quoted in Joel Primack, 2002, Pelted by paint, downed by debris, *The Bulletin of the Atomic Scientists*, vol. 58, no. 5 (September/October), p. 25, available at <http://www.thebulletin.org/issues/2002/so02/so02primack.html>.
23. Primack, *ibid*., pp. 24–25.
24. *Ibid*., p. 71.
25. Full text available at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_16_1721.html>.
26. In 1963, a further United Nations General Assembly resolution called for a ban on the deployment of nuclear weapons or other weapons of mass destruction in space. See General Assembly resolution 1884 of 17 October 1963. This was followed by a further resolution that paved the way for negotiation of the Outer Space Treaty. See General Assembly resolution 1962 of 13 December 1963, available at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_18_1962.html>.
27. The Outer Space Treaty is formally named the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies. For a list of the states party to this treaty, as of 2002, see *SIPRI Yearbook 2002: Armaments, Disarmament and International Security*, Oxford, Oxford University Press and Stockholm International Peace Research Institute, p. 765–66. A further twenty-seven states have signed but not ratified. Treaty available at <http://www.oosa.unvienna.org/SpaceLaw/outersptxt.html>.
28. Early US missile defence interceptors in North Dakota carried nuclear warheads, permitted under the 1972 Anti-Ballistic Missile (ABM) Treaty. The still-deployed Russian system around Moscow (*Galosh*) is also equipped with nuclear interceptors.
29. The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the Moon Agreement) was signed in December 1979 and entered into force in 1984. Before this, there were a couple of agreements facilitating cooperation: The 1968 Astronauts Rescue Agreement; the 1972 Convention on International Liability for Damage Caused by Space Objects; and the 1975 Convention on Registration of Objects Launched into Outer Space (the Registration Convention). All available at <http://www.oosa.unvienna.org/SpaceLaw/treaties.html>.
30. It is important to note that Article V of the ABM Treaty prohibited space-based ABM systems, but has been interpreted as allowing space-based interceptors or lasers for theatre missile defence (TMD). This loophole was closed by the Helsinki agreements of 1997. The Helsinki agreements were not ratified by the Senate, and the demise of the ABM Treaty re-opens this option. See Hays, *op. cit.*, pp. 96–97.
31. This non-interference obligation was made multilateral in the Conventional Forces in Europe (CFE) Treaty, which has thirty NATO and East European participants and is of unlimited duration. These points were made by Jonathan Dean in his presentation to the Conference on Outer Space and Global Security, organized by UNIDIR and the Simons Foundation of Canada at United Nations Office Geneva, 26–27 November 2002.
32. These provisions have been augmented by a US-Russian memorandum of understanding establishing a Pre-and Post-Launch Notification System (PLNS) for most ballistic missile and space vehicle launches, signed 16 December 2000. This would be operated as part of the US-Russian Joint Data Exchange Centre. Text available at <http://www.state.gov/t/ac/trty/4954.htm>.
33. George Bunn and John B. Rhinelander, 2002, Outer Space Treaty May Ban Strike Weapons, *Arms Control Today*, vol. 32, no. 5 (June), p. 24 (Letter to the Editor), available at <http://www.armscontrol.org/act/2002_06/letterjune02.asp>.
34. Jonathan Dean, 2002, Defences in Space: Treaty Issues, in James Clay Moltz (ed.), *Future Security in Space: Commercial, Military and Arms Control Trade-Offs*, Monterey Institute of International Studies, Occasional Paper no. 10, pp. 3–7, available at <http://cns.miis.edu/pubs/opapers/op10/op10.pdf>.
35. As noted by Jonathan Dean in his presentation to the Conference on Outer Space and Global Security, *op. cit.*
36. James Clay Moltz, 2002, Breaking the Deadlock on Space Arms Control, *Arms Control Today*, April, pp. 3–9, available at <http://www.armscontrol.org/act/2002_04/moltzapril02.asp>.
37. Presentation by Michael Krepon, President of the Henry L. Stimson Centre, 8th ISODARCO Beijing Seminar on Arms Control, Beijing, 14–18 October 2002.
38. The 1963 PTBT, for example, put nuclear testing out of sight, underground, thereby defusing public concern despite the fact that nuclear testing continued to fuel the nuclear arms race for another three decades.
39. European Parliament, 2001, *Draft Report on Europe and Space: Turning a New Chapter, Committee on Industry, External Trade, Research and Energy*, 2001/2072(COS) (Rapporteur: Konstantinos Alyssandrakis), 3 October.

40. Centre National d'Etudes Spatiales (CNES), *2001–2005 Strategic Plan*, available at <http://www.cnes.fr/enjeux/1frame_index_enjeux.htm>.
41. After making a joint statement that they had voted in favour of the PAROS resolution but did not consider it a very high priority in 1998, Britain and Germany have since ensured a common European Union statement to this effect. In recent years, the PAROS resolution receives a very high vote in favour, with none against and a handful of abstentions, which include the United States and Israel and a satellite of the United States, such as the Marshall Islands or Micronesia. For example, General Assembly resolution 57/57 (22 November 2002) received 159 in favour, none against and 3 abstentions. Available at <http://disarmament.un.org/vote.nsf>.
42. UK Ministry of Defence, *The Future Strategic Context for Defence*, paragraph 81 in The Military Dimension, available at <http://www.mod.uk/issues/strategic_context>. For a wider discussion of UK space interests, see British National Space Centre (BNSC), *United Kingdom Space Strategy 1999–2000: New Frontiers*, available at <http://www.bnsc.gov.uk>.
43. *Space Preservation Act of 2002*, HR 3616 (January 2002), available at <http://www.pnnd.org/us_space_preservation_bill.htm >.
44. For an early discussion of these concepts, see Rebecca Johnson, 2001, Multilateral Approaches to Preventing the Weaponisation of Space, *Disarmament Diplomacy,* no. 56 (April), available at <http://www.acronym.org.uk/dd/dd56/56rej.htm>.
45. CD/1679 of 28 June 2002. This was a follow-on from China's earlier working papers on PAROS. In order to bring the Russian Federation on board as a co-sponsor, China's position underwent some important shifts. In particular, its 2001 working paper entitled *Possible Elements of the Future International Legal Agreement on the Prevention of the Weaponisation of Outer Space* (CD/1645) had proposed that the scope should cover 'weapons, weapon systems or their components that may be used for warfighting in outer space'. This provision was clearly intended to prohibit orbital attack weapons and anti-satellite weapons, but appeared to rule out some of the existing force-support roles, which could be construed as components of weapons, and was very ambiguous on interference with military space assets by electronic means rather than physical force (for example, hacking or jamming), covered for civilian satellites under the 1932 International Telecommunication Union (ITU) Convention, as amended in 1992 and 1994.
46. Leonid A. Skotnikov, Permanent Representative of the Russian Federation to the CD, 27 June 2002, CD/PV.907.
47. If pushed to the exclusion of other approaches, a premature treaty or legislative initiative risks becoming counter-productive, even serving to focus and strengthen the opposition, thereby 'inoculating' the issue against later, more pragmatically targeted campaigns to develop legislation that would enhance space security and prevent weaponization.
48. Skotnikov, *op. cit*.