Saving Space: Threat Proliferation and Mitigation

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Executive Summary

On May 29, 2009, the Geneva-based Conference on Disarmament (CD)—for the first time in more than a decade—agreed to a formal program of work centered on the launch of negotiations on a treaty to, at a minimum, cap the production of fissile material for nuclear weapons/explosive devices. Also included was an agreement to set up a working group on the "Prevention of an arms race in outer space (PAROS) to discuss substantively, without limitation, all issues… ."[1] The language used in the drafting of the agreement was precisely crafted to allow compromise between those countries wanting to start immediate negotiations on a treaty to ban weapons in outer space (namely China and Russia) and those nations concerned that negotiations of a legally binding treaty are premature, in that the parameters of a such a treaty have yet to be fully defined (namely the United States, but perhaps also France and India.)

The movement in the CD on the space issue could not have come at a more critical time. In the wake of China's 2007 test of an anti-satellite (ASAT) weapon—the first such dedicated test in a quarter of a century—the threats to future security in outer space are arguably at an all time high. The test revitalized those in the United States who support an aggressive U.S. policy of space control and spurred other nations (most ominously, India) to consider the possible need to pursue similar weapons either as a counter force or a deterrent. In addition, the test significantly added to the population of space debris in an already heavily polluted, and heavily used, orbital band.

The horizontal and vertical spread of space-related technology has made it easier for many nations to become "space players," as well as to obtain military capabilities in space. Today, at least 47 nations own and/or operate spacecraft, with approximately 900 working satellites in orbit. Further, new technologies such as micro-satellites (weighing less than 100 kg) are emerging that could lower costs and thus enable more space players. Unfortunately, the dual-use nature this technology also would allow significantly more opportunities for weaponization.

While concerns about space debris, orbital crowding and the increased likelihood of satellite collisions have led to a number of efforts to mitigate or stave off these problems, most of these efforts are in early stages. For example, the United Nations

[1] "Draft Decision for the establishment of a Programme of Work for the 2009 session," CD/1863, May 19, 2009, Conference on Disarmament, http://www.reachingcriticalwill.org/political/cd/papers09/2session/CD1863.pdf

General Assembly in January 2008 agreed to support a set of voluntary debris mitigation guidelines developed by the Committee for the Peaceful Uses of Outer Space. However, it remains to be seen whether this political accord will be translated into meaningful actions by states. In December 2008, the European Union agreed to a "Code of Conduct" on space activities, but the EU has yet to formally table the agreement in any international forum. Nor has any non-EU state endorsed the code—despite the fact that it represents the lowest common denominator with regard to responsible behaviour by space actors.

Meanwhile, it remains unclear whether multilateral legal instruments to avoid the outbreak of a space arms race can be found. Although the CD has now broken out of its 13-year stalemate, largely due to the change of U.S. administration following the 2008 elections, there is no guarantee that real movement toward a PAROS-related treaty will be forthcoming. There remain serious differences within the CD over the viability of the "Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects" (PPWT) tabled at the CD by Russia and China in 2008. The most important and widespread concerns hinge on the failure of that language to capture the most immediate military threat to satellites—the potential for the proliferation of ground-based destructive ASATs based on readily available missile technology. There also remain questions about the ability to verify a ban on weapons placed in space due to the inherently dual-use nature of space technology. At the same time, it is questionable whether those nations backing a space weapons ban treaty would agree to anything less—or even to a step-wise approach that attempted to address near-term threats first (whether through non-binding confidence building measures, politically or legally binding codes of conduct, or a ban on ASAT testing and use.) The critical trade off to be made will involve U.S. willingness to give up its 20-year, on-again/off-again pursuit of space-based missile defenses—which many nations, particularly China which is worried about maintaining its nuclear deterrent, see as threatening—for some sort of agreement to stop destructive ASAT proliferation. Despite the fact that U.S. President Barak Obama's campaign expressed interest in a treaty to prevent space weaponization, it is too early to judge whether the new administration will be interested enough in that goal to counter strong forces in the United States supporting missile defense and former U.S. policy of "freedom of action" for future offensive space operations. And even if the United States decided to support treaty negotiations, other nations such as India, Israel and France may be reluctant to move forward before ensuring that they have developed the same level of technology development applicable to offensive space capabilities as the United States, Russia and China.

Nonetheless, the recent decision by the CD to move forward on the space portfolio is cause for hope. It signifies that nation-states have not only recognized the looming threats to the safe and secure use of space, but also that preventing and mitigating these threats will require multilateral action. As these discussions kick off, it will be important that the international community constantly be reminded that space is truly a global domain, and that there will be no security in space in the absence of collective action.

Introduction

China's destruction of its aging Fengyun-1C weather satellite in January 2007 broke the 25-year-old taboo on testing of anti-satellite (ASAT) weapons, thus resurrecting the specter of space weaponization in the mind's eye of the international public for the first time since U.S. President Ronald Reagan's 1983 "Star Wars" speech.[2] With good reason: the Chinese test was a "game-changer" for the decades-long international debate about securing outer space for peaceful uses, in more ways than one.

In particular, the test further spooked already jittery U.S. Air Force and Pentagon officials about threats to U.S. space assets—which have become vital to modern U.S. force projection. "Space is no longer a sanctuary," said Secretary of the Air Force Michael Wynne, following the Chinese test. "This change is seismic in nature."[3]

U.S. Air Force doctrinal and future planning documents have been calling for defensive and offensive space operations and the weapons to undertake those missions more or less consistently since the late 1990s, and the 2006 National Space Policy issued by the administration of President George W. Bush, for the first time, seemed to publicly endorse such a path.[4] In reality, budget constraints, the limits of technology and congressional (not to mention domestic public) squeamishness continue to mire fulfillment of that vision. The Chinese test, however, bolstered the case of the so-called "space hawks" supporting more concerted efforts and rapid U.S. implementation of an aggressive national security space strategy, including missile defenses based in space. For example, Jeff Kueter, president of the conservative George C. Marshall Institute, said on Jan. 22, 2007: "If the international community is truly worried about the debris-generating affects of ASAT weapons, then it ought to embrace, indeed demand, development and deployment of boost-phase missile defenses capable of intercepting ASAT missiles long before they reach their satellite targets."[5] The chilly Sino-American space climate grew even colder with the February 2008 U.S. "shoot down" of a crippled U.S. spy satellite using developing sea-based missile defense technology.[6] While the U.S. government insisted that the move was to avoid a public safety hazard from the satellite crashing to Earth, most outside observers (especially in China) saw the destruction of USA 193 as a tit-for-tat display of ASAT capability vis-à-vis China. At the end of 2008, Washington and Beijing seemed to be heading toward a new Cold War in space.[7]

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[2] For a complete text of the speech proposing the Strategic Defense Initiative, see: http://www.pierretristam.com/Bobst/library/wf-241.htm

[3] Michael Sirak, "Air Force Leadership: Chinese ASAT Test Marked Turning Point; Space No Longer Sanctuary," Defense Daily, Feb. 12, 2007

[4] For a text of the unclassified version of the 2006 U.S. National Space Policy see: http://www.fas.org/irp/offdocs/nspd/space.pdf

[5] "Chinese Antisatellite Test Should Spur U.S. To Deploy Space-Based Missile Defenses, Expert Says," NTI Global News Wire, http://www.nti.org/d_newswire/issues/2007_1_23.html#003F8AA5; Jeff Kueter, "Crossing the Rubicon in Space Again: Iacta Alea Est," George C. Marshall Institute, January 2007, http://www.marshall.org/pdf/materials/492.pdf

[6] Victoria Samson, "CDI Analysis: Shooting Down USA 193," Feb. 27, 2008, World Security Institute website, http://www.worldsecurityinstitute.org/showarticle.cfm?id=265

[7] For background on U.S.-China tensions in space, see: Theresa Hitchens, "U.S.-Sino Relations in Space: From a 'War of Words' to Cold War in Space?" *China Security*, Winter 2007, pp. 12-30, World Security Institute, Washington, DC

While it remains to be seen what direction the new administration of President Barak Obama—who spoke out against space weapons during the presidential campaign[8]—will take regarding national security in space (as well as regarding overall relations with China), it cannot be denied that the issue of how best to approach protection of space assets remains in mid-2009 a major issue in the domestic U.S. debate over national security.

But although the negative reaction was strongest in the U.S. military, which sees China as a potential adversary, the Chinese ASAT test also stirred new discussions among military officials in other nations, including (predictably) India and France, about the potential need for not only satellite defenses but even development of ASAT weapons as a "deterrent" to use of such weapons by others. Indeed, U.S. trade journal *Defense News* on April 9, 2007 reported that India had reinstated plans to establish an Aerospace Command to oversee a new military space program and that development of ASATs had already commenced. "Sources in the ministry said space-based options must be used to protect national security, and that space programs should shift from support missions . . . to space control efforts," the report stated.[9] French Ret. Gen. Bernard Molard, at a Jan. 24, 2008 conference in Washington, laid out the "logic of space deterrence"—a concept that is increasingly gaining attention in both France and the United States.[10]

In addition to concerns about the looming potential for a space arms race, the Chinese test—which created a huge debris field in a heavily populated orbital band[11]—raised fears about the increasing risks to civil, commercial and military spacecraft alike due to the proliferation of space junk. Perhaps in the only silver lining to be had, the aftermath of the test renewed discussions among experts—including at the Committee for the Peaceful Uses of Outer Space (COPUOS) in Vienna—about further measures to curb the production of space junk, and even search for ways to remove debris from orbit.[12]

Finally, the test also reverberated in the diplomatic arena, calling into question the credibility of China's longstanding efforts to push forward a treaty on the Prevention of an Arms Race in Outer Space (PAROS), and threatening to further weaken already shaky chances for negotiations on such a treaty to commence at the Conference on Disarmament (CD) in Geneva. Disagreement on starting PAROS negotiations had been at the center of the CD's 12-year standstill, blocking the acceptance of a formal program of work and, most specifically, preventing negotiations on a Fissile Material

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[8] "Obama's Plan for American Leadership in Space," Jan. 10, 2008, *SpaceRef.com*, http://www.spaceref.com/news/viewsr.html?pid=26647

[9] Vivek Raghuvanshi, "China's ASAT Galvanizes Indian Efforts," *Defense News*, 9 April 2007, p. 20

[10] Gen. (ret.) Bernard Molard, "From Space Deterrence to Space Sustainability," conference on *The State of Space Security,* Jan. 24, 2008, George Washington University Space Policy Institute, Washington, DC, http://www.gwu.edu/~spi/Molard_Space%20Security_2008.pdf

[11] For comprehensive analysis of the debris field created by the Chinese ASAT test, see "Chinese ASAT Test," *Celestrak*, http://celestrak.com/events/asat.asp; and, "Fengyun-1C Debris: Two Years Later," Orbital Debris Quarterly News, Volume 13, Issue 1, January 2009, National Aeronautics and Space Administration, http://orbitaldebris.jsc.nasa.gov/newsletter/pdfs/ODQNv13i1.pdf

[12] Theresa Hitchens, "COPUOS wades into the next great space debate," *The Bulletin of the Atomic Scientists*, June 26, 2008, http://www.thebulletin.org/web-edition/features/copuos-wades-the-next-great-space-debate

Cutoff Treaty (FMCT)—due to the standoff between the U.S. and China on whether one set of talks should go forward without the other. Although Russia and China dropped the demand for simultaneous negotiations in 2003 (instead calling for "discussions" of PAROS), at the time the Bush administration was not interested in a deal on either FMCT or PAROS. With the May 29 agreement by the CD on a new program of work that includes both FMCT negotiations and PAROS discussions, progress toward nuclear disarmament and nonproliferation looking more achievable than it has in many years. Certainly, this momentous shift is largely due to the dramatic change in U.S. policy emerging from the Obama administration. Nonetheless, there remain major obstacles to a PAROS treaty (elaborated below.)

Given the above reverberations emanating from the Chinese test, the threats to safety and security in outer space today are arguably greater than even at the height of the Cold War. Therefore, it behooves the international community to find ways to mitigate those threats through multilateral action. Saving space for the benefit of all mankind is a critical link in ensuring future international security, both in and of itself but because of its intrinsic relationship to reducing the threat of nuclear weapons. This paper will look at the three key factors currently most salient in determining space security, for better or for worse: military-related technology dissemination and evolution; debris growth and efforts at mitigation; and international efforts to constrain space activities in order to ensure future sustainability of human exploitation.

Technology Proliferation, Horizontal and Vertical

Cold War Beginnings

During the Cold War, the Soviet Union and the United States developed and deployed robust military space programs that remain in operation today, including: hardened communications satellites; missile early warning satellites; electro-optic and radar imaging satellites; global positioning and navigation satellites; signals intelligence satellites for eavesdropping on communications; and weather satellites for mapping and planning purposes. Both sides also pursued research, development and testing of ASATs, including laser and conventionally based, and actively explored space-based weapons and war fighting concepts based on the notion that space would become the new 'high ground' of battle. The Soviets last tested an ASAT—the Co-orbital ASAT consisting of a missile interceptor that would explode its conventional payload into shrapnel-sized bits once it had rendezvoused with the target—in 1982.[13] The last U.S. declared ASAT test (as noted above, many consider the "shoot-down" of USA 193 to have been a *de facto* ASAT test) was in 1985. The test involved the launch of a small kinetic energy (non-explosive) missile, the Air Launched Miniature Vehicle, from a U.S. Air Force F-15 fighter jet flying at high altitude, destroying an aging research satellite called Solwind. While the Army was the U.S. military service to most recently pursue dedicated ASAT research, under the KE-ASAT program—which would have involved ground-based launch of a kinetic energy warhead in a manner nearly identical to China's 2007 test—the system was never flight tested. The KE-ASAT program was formally killed by the Department of Defense in 1993, although

[13] Laura Grego, "A History of Anti-satellite (ASAT) Programs," Union of Concerned Scientists website, last revised Oct. 20, 2003, http://www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/technical_issues/a-history-of-anti-satellite.html

congressionally mandated funding kept it in suspended animation through to 2002.[14] Russia and the United States have since the mid-80s stuck to an informal mutual moratorium on ASAT testing (although research on potentially ASAT-related technology has since occurred), largely due to worries about the destabilizing effects of ASAT use on crisis escalation and the nuclear balance, as well as concerns in more recent years about space debris.[15]

Horizontal: Space Tech Spreads Far and Wide

During the Cold War, the United States and the Soviet Union were the only real space powers. The situation today is dramatically different. Currently, some 47 nations own and/or operate satellites, with nearly 900 working satellites in orbit—mostly for civil/commercial purposes.[16] The bulk of today's satellites are in Geostationary orbit (GEO, 36,000 kilometers in altitude) for civil and military communications purposes: telephony, internet services and broadcast television. However, an increasing number of satellites are being built in Low Earth Orbit (LEO, up to 2,000 kilometers) for Earth imaging, with ever greater resolutions that can provide traditional data such as crop and ocean monitoring, as well as data for tracking (and perhaps targeting) of military infrastructure. There are approximately 389 working satellites in LEO, including Earth observation (both civil and military/intelligence gathering), weather and mobile communications satellites.[17] Of that number, about 130 are Earth observation sats, owned and/or operated by 33 countries plus the European Space Agency.[18] Vietnam was the most recent nation to orbit an Earth observation satellite, launching it in April 2008.[19] In the military arena, India most recently (in April 2009) launched a high-resolution (down to 1 meter), all-weather radar imaging satellite with the explicit purpose of monitoring military activities and terrorist movements primarily in rival Pakistan.[20] Indeed, some "real estate" in space is getting crowded: particularly the GEO belt and the area over the poles where many satellites cross over each other's path. This fact has created emerging concerns about simple "highway safety" in space and the need to avoid accidental interference or collisions (see below.)

Further, many other nations have recently been putting more emphasis on obtaining military advantages from space—although China is the only other nation that has tested an ASAT, and just two other nations, India and Israel, are currently suspected of pursuing such capabilities. China, France, Germany, Italy, Israel, Spain and the

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[14] *Ibid*

[15] For an insightful look at Cold War space competition, see Michael Krepon and Christopher Clary, *Space Assurance or Space Dominance? The Case Against Weaponizing Space*, 2003, The Henry L. Stimson Center, Washington, DC

[16] See Union of Concerned Scientists Satellite Database, Union of Concerned Scientists web site, http://www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/technical_issues/ucs-satellite-database.html

[17] Theresa Hitchens, "Code Red? Chinese ASAT Test Raises Debris Threat to EO Sats," *Imaging Notes*, Volume 22, Number 2, Summer 2007, http://www.imagingnotes.com/go/article_free.php?mp_id=99

[18] UCS Satellite Database, op cite.

[19] Thai Thanhvan, "Vietnam's First Satellite Launched After 13-Year Preparation," *XNA*, April 28, 2008, http://www.spacemart.com/reports/Vietnam_First_Satellite_Launched_After_13_Year_Preparation_999.html

[20] Steve Herman, "India Launches High-Tech Imaging Satellite," *VOANews.com*, April 20, 2009, http://www.voanews.com/english/2009-04-20-voa13.cfm

United Kingdom all have dedicated military space assets for communications and/or imaging. A number of other nations have or are building dual-use satellites that can provide both civil and military functions, including India and Japan. Iran and North Korea are pursuing space launch and satellite capabilities that also would be assumed to have dual-use functions. The increasing interest in military uses of space has been fostered by two major factors. The first is the easier access to space capabilities over the past 20 years, and improvements in capabilities provided by the information revolution of the 1990s. The second is the 1990s "revolution in military affairs," led by the United States, which has resulted in the shift of national security space applications from strategic missions, such as spying and early warning of missile launches, to tactical applications, which include, perhaps most importantly, weapons targeting using global navigation and positioning satellites. The United States and Russia have long maintained navigation and positioning satellites for multiple purposes (besides targeting, these satellites are important for logistics management and own-force tracking), their respective Global Positioning System (GPS) network and the GLONASS constellation. Meanwhile, the European Union hopes to deploy its Galileo system by 2013, and China intends to deploy a similar world-wide navigation satellite network, dubbed COMPASS, by 2015—although both systems are claimed to have primarily civilian functions. The new emphasis on tactical applications of space power, while greatly increasing military effectiveness on the ground, also has spurred military thinking in many nations about how to negate enemy space assets—thus the renewed interest in ASAT capabilities.

Vertical: Emerging Technologies

The proliferation of satellite technology has not only been horizontal—that is, spreading to more and more operators—but also vertical, in that new capabilities (sometimes providing lower cost options for achieving certain functions) have rapidly emerged since the mid-1990s. This vertical proliferation includes, for example, the development of micro-satellites (weighing less than 100 kilograms) that could be used for a spectrum of missions from the benign to the lethal: inspection of damaged satellites; re-fueling of satellites; deployment of internet-linked satellite "swarms" to reduce the vulnerability of today's large communications and imaging satellites which come in ones, twos and threes; radio frequency jamming of nearby satellites; and ASATs using kinetic energy (ramming a target satellite), high-powered microwaves or explosives. Micro-sats (and their even smaller cousins nano-sats and cube-sats) further raise the promise of cheaper access to space, especially as the ability to miniaturize components such as cameras continues to improve. This could mean another boom in satellite acquisition. Approximately 400 micro-sats have been orbited over the last 20 years, although mostly for civil research purposes. However, the U.S. and Chinese militaries have been particularly active in micro-sat experimentation over the last five years—although largely in secret.[21] One of the complicating factors for space security of an increased number of smaller satellites is the difficulty of tracking them, which could cause even more problems for preventing interference and collisions—as well as raise suspicions about their purposes given the myriad possibilities for weapons applications.

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[21] Laura Margottini, "Microsats pose global threat," BBC News, July 19, 2007, http://news.bbc.co.uk/1/hi/technology/6902800.stm; Noah Shactman, "Secret Micro-Sat Mission Feeds Space War Worries," *Danger Room*, Jan. 15, 2009, Wired.com, http://www.wired.com/dangerroom/2009/01/secret-inspecti/

Furthermore, there have been developments toward the potential use of lasers as ASAT weapons over the past two decades, with the emergence of "adaptive optics" that allow better focusing of the beam by compensating for atmospheric distortion via the use of deformable mirrors—pioneered for astronomical purposes in ranging stars. Adaptive optics work has been ongoing for a number of years at the U.S. Air Force's Starfire Optical Range at Kirtland Air Force Base in New Mexico. Air Force officials have denied that the experiments are aimed at ASAT operations, although Pentagon budget documents from 2004 through 2007 specifically listed ASAT applications among the program's goals. That reference was deleted beginning in 2008 after congressional inquiries about the nature of the Starfire work.[22] The concept of laser ASATs is not new, however. The Soviets and Americans began experiments with laser-based ASATs in the 1970s. In the late 1980s, Washington was abuzz with rumors that the Soviets had successfully developed a laser ASAT at the Sary Shagan Laser Ranging Facility in Kazakhstan—although this allegation was later dismissed.[23] At the same time, the U.S. Army and Air Force developed the MIRACL (mid-infrared advanced chemical laser) at White Sands Missile Range in New Mexico. MIRACL was finally tested in 1997, proving that optical imaging satellites could be disrupted by even low-power laser bursts.[24] In September 2006, U.S. press reports emerged that China had illuminated a U.S. spy satellite with a low-powered ground-based radar, although the reports conflicted as to whether the action was meant as an ASAT test—and the incident apparently caused no lasting damage to the U.S. satellite involved.[25] The U.S. Missile Defense Agency continues work on the Air-borne Laser (ABL) for intercepting incoming missiles in their boost phase—a system that could also have ASAT application. But progress on that system has been glacially slow during its 12-year development program due to issues with weight and beam stability, and subsequent cost overruns and schedule delays.[26] Indeed, at an April 6, 2009, press conference, U.S. Secretary of Defense Robert Gates announced that he was recommending to the Obama administration that the 2010 defense budget downgrade the ABL back to a research and development program rather than a procurement program, and that purchase of the second Boeing 747 planned for adaptation to the ABL configuration be canceled.[27]

While laser-based ASATs are theoretically possible, there remain many technical challenges. Low-power systems for use in "dazzling" optical satellites may not reliably function—especially on imaging satellites using multiple wavelengths—and given their effects, provide the side whose satellite was hit relatively good information about not only where the attack originated but also about the location of the facility or ground position that the dazzling is trying to protect from view. High-

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[22] Theresa Hitchens, "Space Wars: Coming To The Sky Near You?" *Scientific American*, March 2008, pp. 81-82

[23] Grego, op cite

[24] Hitchens, "Space Wars: Coming To The Sky Near You?" op cite

[25] Vago Muradian, "China Attempted To Blind U.S. Satellites," Sept. 21, 2006, *DefenseNews.com*, found at http://sci.tech-archive.net/Archive/sci.space.policy/2006-09/msg00666.html; Warren Ferster and Colin Clark, "NRO Confirms Chinese Laser Test Illuminated U.S. Spacecraft," Space News, Oct. 3, 2006, http://www.space.com/spacenews/archive06/chinalaser_1002.html

[26] Noah Shactman, " 'Flying Lightsaber' Faces Disintegration," *Danger Room*, *Wired.com,* March 24, 2009, http://www.wired.com/dangerroom/2009/03/budget-latest/

[27] "Gates Lays Out Key FY 2010 Budget Recommendations," Defense Industry Daily, April 6, 2009, http://www.defenseindustrydaily.com/Gates-Lays-Out-Key-FY-2010-Budget-Recommendations-05367/

power ground-based lasers—that might be set from "stun to kill"—today use vast quantities of noxious chemical fuel, thus requiring very large facilities that are potentially very large targets themselves. The enormous amounts of fuel required for chemical laser operations also contributed to the ABL problems. And despite successes in development of adaptive optics and experiments in bouncing lasers from mirrors to their targets, atmospheric distortion of the light beam continues to be an issue.

From Debris Mitigation to a Weapons Ban Treaty: Multilateral Efforts to Curb Threats to Space

While emerging technologies could someday enable more sophisticated ASATs, the most immediate concerns continue to center on so-called direct ascent ASATs launched by ground-based missiles—as tested by the Soviet Union and China, and developed by the U.S. KE-ASAT program and demonstrated by the use of an Aegis-cruiser based medium-range missile to shoot down USA 193. Aside from radio frequency jamming, computer system hacking or bombing of ground facilities, the functioning of satellites in LEO can be most simply negated by such ASATs based on medium-range ballistic missiles. At least 12 nations possess such missiles: China, Egypt, France, Libya, India, Iran, Iraq, Israel, North Korea, Pakistan, Russia and the United States. Reaching GEO sats from the ground is a much more difficult business because of the distance involved, and no nation has shown that GEO can be reached, much less a satellite attacked, using a long-range ballistic missile. In fact, only a handful of nations and commercial entities can place a satellite in GEO today (including China, the European Space Agency, France, Japan, Israel, India, Russia and the United States.) It is also true that missile launch capability is not the long pole in the tent for ASAT development—instead it is the mastery of satellite tracking, precision maneuverability and end-game guidance systems—but the fact that China, Russia and the United States have successfully demonstrated the feasibility of missile-based ASATs makes clear that conversion of ballistic missiles into workable ASATs can be achieved. Unfortunately, this type of ASAT is the most dangerous to the safety of the space environment for all satellite operators because satellite destruction results in the creation of space debris. Thus, the potential for a space arms race centered on destructive ASATs should be a primary concern of the international community.

Debris Threats and Mitigation Efforts

Space debris, which is impossible to control, cannot discriminate among civil, commercial and military satellites, nor does it recognize any nationality. Worse yet, even tiny pieces of debris, no bigger than the size of a marble, can serious damage or destroy a working satellite due to the high speeds of objects on orbit. And the threat from space junk is, even in the absence of any further ASAT testing or use, already significant and growing.

Indeed, the Feb.10, 2009 collision of an Iridium communications satellite (Iridium 33) with a defunct Russian Cosmos (Cosmos 2251) at approximately 790 kilometers in altitude—the first known collision between two intact satellites—was the latest incident to highlight the dangers of space junk. According to Celestrak, a private

satellite monitoring web site, the U.S. Air Force's Space Surveillance Network[28] has catalogued more than 1,000 large (bigger than 10 cm in diameter) pieces of debris from the incident.[29] Estimates of how much smaller debris might have been created vary wildly, from tens of thousands to hundreds of thousands of pieces—all NASA would say is "substantially more" than that of the number tracked. The U.S. space agency further noted that the crash took place in one of the most active LEO orbits, not far below the Chinese ASAT test which took place at 850 kilometers, and is likely to remain a danger to spacecraft for decades.[30]

As of April 2009, the Space Surveillance Network's catalogue of space objects, which contains active satellites as well as debris larger than 10cm in diameter (and a small amount of debris in the 5cm range) that can be reliably traced back to its source, now numbers 19,000 objects.[31] There are millions of estimated debris pieces down to the size of paint flecks, however—most of which cannot be detected.

In fact, the dangers of space debris have been widely understood since the mid-1990s. During the 1990s, two seminal technical studies emerged: the 1995 study by the U.S. National Research Council, "Orbital Debris: A Technical Assessment,"[32] and the 1999 "Technical Report on Space Debris" by the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS).[33] Orbital debris is the inevitable consequence of the use of space: every launch creates some amount of debris. A 2006 study by NASA scientists concluded that even if there is not a single new space launch, the amount of space debris would continue to grow to the point where collisions become the rule rather than the exception[34], since "the environment is unstable and collisions will become the most dominant debris generating mechanism."[35]

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[28] The Space Surveillance Network consists of more than 30 ground-based optical and radar sensors at 16 locations around the world, and as of 2007 is managed by the U.S. Air Force's Space Control Squadron 1 out of Vandenberg Air Force Base, California. See: Theresa Hitchens, *Future Security in Space: Charting a Cooperative Course*, September 2004, Center for Defense Information, Washington, DC; and Brian Weeden, "Billiards in space," *The Space Review*, Feb. 23, 2009, http://www.thespacereview.com/article/1314/1

[29] T.S. Kelso, "Iridium 33/Cosmos 2251 Collision," *Celestrak.com*, updated May 13, 2009, http://celestrak.com/events/collision.asp

[30] "Satellite Collision Leaves Significant Debris Cloud," *Orbital Debris Quarterly News*, Volume 13, Issue 2, April 2009, National Aeronautics and Space Administration, http://orbitaldebris.jsc.nasa.gov/newsletter/pdfs/ODQNv13i2.pdf

[31] Michael Hoffman, "It's getting crowded up there: The ShowScout National Space Symposium 2009," April 3, 2009, DefenseNews.com, http://defensenews.com/blogs/space-symposium/2009/04/03/its-getting-crowded-up-there/

[32] "Orbital Debris: A Technical Assessment," National Research Council (National Academy Press: Washington, DC, 1995)

[33] UN Committee for Peaceful Uses of Outer Space Scientific and Technical Committee, *Technical Report on Space Debris*, A/AC.105/720 (New York: United Nations), http://www.unoosa.org/pdf/reports/ac105/AC105_720E.pdf

[34] J.C. Liou and N.L. Johnson, "Risks in Space from Orbiting Debris," *Science* 311, no. 5759 (2006): 340–341

[35] William J. Broad, "Orbiting Junk, Once a Nuisance, Is Now a Threat," *New York Times*, 6 February 2007, http://www.nytimes.com/2007/02/06/science/space/06orbi.html?ei=5090&en=16f9c6b2615d4e62&ex=1328418000&pagewanted=print

In 2001, the 67-member COPUOS charged the Inter-Agency Debris Coordinating Committee[36] to develop a set of voluntary debris mitigation guidelines for possible adoption by the United Nations. The guidelines, submitted to COPUOS in 2002, included technical recommendations for nations to limit debris released during normal space operations, to minimize the potential for on-orbit breakups, and to undertake post-mission spacecraft disposal and prevent collisions.[37] After three years of negotiations, the COPUOS Science and Technical Subcommittee finally adopted a revised (and less technically specific) set of guidelines in February 2007,[38] the full Committee adopted them in June 2007,[39] and the UN General Assembly endorsed the voluntary guidelines in January 2008.[40] The accord is a landmark achievement, especially regarding Article 4, which pledges nations not to deliberately create long-lived debris.[41] Nonetheless, the guidelines are voluntary and lack specification about how they are to be implemented, leading to questions of whether nations will adopt them and how strictly they might be applied.

Rules of the Road, Codes of Conduct, and Space Traffic Management

While continuing efforts by the COPUOS Scientific and Technical and Legal Subcommittees to bolster debris mitigation efforts and possibly transform the volunteer guidelines into a legally binding accord are expected, those efforts are equally expected to gain little traction in the near-term. Meanwhile, a quiet effort to build support for COPUOS articulation and adoption of a broader set of 'rules of the road' for space, including recommended action on debris, has been on-going since mid-2007. In a June 2007 working paper, then COPUOS chairman, French space scientist Gerard Brachet, suggested that the committee's Science and Technical Subcommittee take up an analysis of potential rules of the road for space as a part of a package of future committee activities, according to experts following the effort. Brachet called a first meeting of an informal working group to draft proposed rules of the road—including representatives of several COPUOS member states, intergovernmental organizations and the commercial telecommunications industry—on Feb. 7–8, 2007. There were discussions among some of the group members in the margins of the June 11–20, 2008, COPUOS meeting in Vienna in hopes of speeding the process; and a second meeting was held in the margins of the 59th International Astronautical Congress in Scotland on Sept. 29 to Oct. 3, 2008, at which a set of draft papers was reviewed, said participants in both meetings.[42] The COPUOS Scientific and Technical Subcommittee revisited the issue of rules of the road, or "space traffic management," at its Feb. 9–20, 2009, meeting in Vienna, but

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[36] The Inter-Agency Space Debris Coordination Committee (IADC)—made up of the space agencies of China, France, Germany, India, Italy, Japan, Russia, Ukraine, and the United States, plus the European Space Agency—was established in 1993 as a mechanism for space agencies to exchange information.

[37] "IADC Space Debris Mitigation Guidelines," IADC-02-01, Inter-Agency Space Debris Coordination Committee, 15 October 2002, http://www.iadc-online.org/docs_pub/IADC-101502.Mit.Guidelines.pdf

[38] UN Office for Outer Space Affairs, "Report of the Scientific and Technical Subcommittee on its Forty-Fourth Session, Held in Vienna from 12 to 23 February 2007," A/AC.105/890, 6 March 2007, http://www.unoosa.org/pdf/reports/ac105/AC105_890E.pdf

[39] United Nations General Assembly, Report of the Committee on the Peaceful Uses of Outer Space, A/62/20, supplement no. 20, June 26, 2007, http://www.oosa.unvienna.org/pdf/gadocs/A_61_20E.pdf

[40] United Nations General Assembly, Resolution A/Res/62/217, January 10, 2008, http://www.oosa.unvienna.org/pdf/gares/ARES_62_217E.pdf

[41] Gerard Brachet, "Long-term Sustainability of Space Activities," Annex, p. 131, *Security in Space: The Next Generation—Conference Report, 31 March–1 April 2008*, United Nations Institute for Disarmament Research (UNIDIR), 2008.

[42] Hitchens, "COPUOS wades into the next great space debate," op cite

apparently made little headway on the issue—with some nations (including Venezuela) rejecting the concept as being driven by Western space powers, according to a number of sources involved with the meeting. The report from that meeting did not mention the Brachet working group. Instead, it only referenced the February 2008 French proposal that COPUOS take up the issue of "long-term sustainability of space activities," which Paris subsequently put on hold in June 2008 to await the outcome of the Brachet initiative. It said, "some delegations expressed the view that the proposal by France for an agenda item entitled 'Long-term sustainability of space activities' would provide an important opportunity for the Scientific and Technical Subcommittee to consider the safety of future space traffic, which included the issue of space debris mitigation."[43] The next opportunity for COPUOS consideration of the effort will be the full Committee meeting slated for June 3–13, 2009.

The Brachet initiative is linked to, although distinct from, a telecommunications industry effort to develop a set of best practices to share data about potential satellite collisions (including with debris.) The informal industry group, which includes most major telecommunications companies, has been meeting since late 2007 to discuss ways to improve data sharing among operators and governments. The group held a workshop in February 2008 and agreed that Intelsat, Inmarsat, EchoStar and the independent Center for Space Standards and Innovation would continue working on a prototype data center for collision avoidance.[44] The data center concept was further explained by Richard Dalbello, vice president for legal and governmental affairs at Intelsat General in April 28, 2009 testimony to the U.S. House of Representative's Science and Technology Subcommittee.[45] In April 2009, representatives from telecommunications firms Intelsat, Inmarsat, SES-Global, Telesat and Echostar updated progress on the effort made following a second operator's workshop in December 2008 in Ottawa, Canada.[46]

A number of academic and scientific organizations have also made proposals for wider space traffic management regimes. The issue of space traffic control was a key subject at a series of workshops organized by the American Institute of Aeronautics and Astronautics (AIAA) in 1999 and 2001. The 2001 workshop report, "Addressing the Challenges of the New Millennium," highlighted the fact that current international treaties fail to provide "clear legal guidance;" that "rules of the road for traffic management between satellite operators are not well specified;" and that "maneuvers of spacecraft are also unregulated."[47] The International Academy of Astronautics (IAA) "Cosmic Study on Space Traffic Management," published in early 2006, lays

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[43] United Nations General Assembly, A/AC/105/933, "Report of the Scientific and Technical Subcommittee on its forty-sixth session, held in Vienna from 9 to 20 February 2009," issued March 6, 2009, http://www.oosa.unvienna.org/pdf/reports/ac105/AC105_933E.pdf

[44] Richard Dalbello and Joseph Chan, "Industry Efforts to Increase Space Situational Awareness," Improving Our Vision Workshop, co-sponsored by the World Security Institute's Center for Defense Information, the Secure World Foundation, and the U.S. Air Force Academy's Eisenhower Center for Space and Defense, April 15-18, Washington, DC, http://www.aiaa.org/tc/sos/ws2008/NOAAWorkshop.ppt#257,1,

[45] See: http://gop.science.house.gov/Media/hearings/space09/april28/dalbello.pdf

[46] Chan, et al, "Data Sharing To Improve Close Approach Monitoring And Safety of Flight," presented at the March 30-April 2, 2009 Fifth European Conference on Space Debris, Darmstadt, Germany, http://lfvn.astronomer.ru/report/0000048/002/index.htm

[47] "International Space Cooperation: Addressing the Challenges of the New Millinnium," 6th International Space Cooperation Workshop Report, International Activities Committee, American Institute of Aeronautics and Astronautics, March 21, 2001, p. 9 (hereafter, AIAA report)

out a comprehensive framework that could be emplaced by 2020 by a international inter-government agreement.[48] The IAA framework would include: a process for provision of orbital data; a notification system including pre-launch and maneuver notifications; "zoning," "right of way" rules for maneuvering; safety provisions for launches, human spaceflight including tourism, and re-entries; debris mitigation and environmental pollution measures; and liability laws.[49] More recently, the International Association for the Advancement of Space Security (IAASS) has proposed setting up an international organization to develop and manage a space traffic regime modeled after the International Civil Aviation Organization (ICAO.) In a May 2007 study, the IAASS focuses on a potential international regulatory regime that includes launch safety as well as on-orbit operations.[50] None of these approaches, however, have yet been formally taken up by any national government, inter-governmental/regional body or the United Nations.

Meanwhile, the European Union by June 2008 had drafted its Code of Conduct on space activities, first promised in September 2007 at the 62nd Session of the U.N. General Assembly in New York.[51] The code, which focuses on voluntary confidence-building and space traffic management practices, was formally adopted by the EU in December 2008[52], and EU diplomats promptly began briefing other nations on the document. The Czech Presidency of the EU reviewed the code at the Feb. 12, 2009, plenary session of the CD in Geneva.[53] However, at the moment, it is highly unclear whether the EU will propose the code for formal consideration by either the CD or COPUOS, with European diplomats saying that the current plan is to treat the code as a free-standing proposal, along the lines of the 2004 Hague Code of Conduct Against Ballistic Missile Proliferation, that can be joined by nations as they see fit.

PAROS: Weapons Ban, Linkage to FMCT, Transparency and Confidence Building Measures

PAROS History

The prevention of an arms race in outer space has been on the agenda of the CD since 1985, when an ad hoc committee was formed to examine the issue. The committee was disbanded in 1994, and since that time, all discussions relating to PAROS have taken place on an informal basis.[54] Between 1990 and today, the primary obstacle to

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[48] "International Space Cooperation: Addressing Challenges of the New Millennium," 6th International Space Cooperation Workshop Report, International Activities Committee, American Institute of Aeronautics and Astronautics, March 2001 (hereafter, AIAA 2001 report); Corrine Contant-Jorgenson, Petr Lála, and Kai-Uwe Schrogel, eds., "Cosmic Study on Space Traffic Management," International Academy of Astronautics (hereafter, IAA Cosmic Study), 2006, http://iaaweb.org/iaa/Studies/spacetraffic.pdf.

[49] IAA Cosmic Study, 13-14.

[50] "An ICAO for Space?", May 29, 2007, International Association for the Advancement of Space Safety, http://www.iaass.org/pdf/ICAO%20for%20Space%20-%20White%20Paper%20-%20draft%2029%20May%202007.pdf

[51] Statement by Portugal, contained in "Transparency and confidence-building measures in outer space activities, Report of the Secretary-General, Addendum," A/62/114/Add.1, September 17, 2007, United Nations General Assembly, New York

[52] See: http://www.stimson.org/space/pdf/EU_Code_of_Conduct.pdf

[53] The full statement by Czech Ambassador to the CD Ivan Pinte is found here: http://www.unog.ch/80256EDD006B8954/(httpAssets)/EEA43906F2B69099C125755B003E11BA/$file/1123_EU_PAROS.pdf

[54] For a history of PAROS, see: "Outer Space Background and History," Reaching Critical Will web site, http://www.reachingcriticalwill.org/legal/paros/osbackground.html

the launch of any formal discussions or negotiations on the issue has been rejection by the United States of the need for new space arms control initiatives. As Karen House, U.S. delegate to the 63rd Session of the UN General Assembly, told the First Committee on Oct. 20, 2008: "There is much rhetoric about the prevention of an arms race in outer space. For nearly three decades, the United States has consistently pointed out that it is not possible to define the nature of a space-based 'weapon.' The United States also believes it is not possible to develop an effectively verifiable agreement for the banning of either space-based "weapons" or terrestrial-based anti-satellite (ASAT) systems."[55] Indeed, that position contributed to the impasse on all issues before the CD (the top four being FMCT, nuclear disarmament, negative security assurances and PAROS) as other nations, primarily China and Russia, have insisted that PAROS be included in any agreed CD program of work, for which consensus is required.

In particular, China began linking start of FMCT negotiations—for which there has been a CD mandate since 1995—in 1999, following the announcement by the administration of U.S. President Bill Clinton that the United States would continue research and development on national missile defense. Hui Zhang, a Fellow in the Science, Technology and Public Policy Program at Harvard University's Belfer Center for Science and International Affairs, in a 2002 paper, summed up China's concerns as such:

> "China is expressing a serious concern on US missile defense plans. China is concerned that it would be one target of US missile defense: even the limited system would neutralize the two dozen single-warhead ICBMs that are capable of reaching the United States and that China now possesses. Thus, China worries that a US missile defense system could politically or strategically subject China to nuclear blackmail. …
>
> China has concerns that US missile defense plans will inevitably intensify competition in outer space. To develop strategic missile defense systems, the US would have to develop and use its military assets in outer space and deploy space-based missile defense components which will function as a space weapon system. And the missile defense system itself could be used as anti-satellite weapons (ASAT). Meanwhile, such a missile defense system will encourage other countries to deploy ASAT weapons."[56]

Russia joined the call for PAROS negotiations in 2002, following the abrogation of the Anti-Ballistic Missile (ABM) Treaty by the administration of U.S. President George W. Bush. On June 27, 2002, Russia and China (along with several other nations including Syria) submitted to the CD a joint 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."[57]

Between 2002 and 2008, Russia and China also submitted a number of "non-papers" regarding various aspects a potential PAROS treaty—as the CD continued fruitless

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[55] Karen E. House, United States Public Delegate to the 63rd Session of the United Nations General Assembly, Delivered in the Debate on Outer Space (Disarmament Aspects) of the General Assembly's First Committee, Oct. 20, 2008, *Arms Control Update*, U.S. Delegation to the Conference on Disarmament, Geneva, http://geneva.usmission.gov/CD/updates/1020OuterSpace.html

[56] Hui Zhang, "China And A Fissile Material Cutoff Treaty," presented at the 43rd Annual Meeting of the Institute for Nuclear Materials Management, June 23-27, 2002, p.2, http://belfercenter.ksg.harvard.edu/files/inmm2002_zhang.pdf

[57] Found at: http://www.reachingcriticalwill.org/political/cd/speeches02/chiruswp_062702cd.html

informal discussions on the issue and even more fruitless efforts to agree a program of work. This was despite a move by China and Russia in 2003 to break the deadlock on CD work by dropping its demand that PAROS negotiations begin along with those on FMCT and instead calling for "discussions leading to negotiations" of PAROS to commence in tandem with formal FMCT negotiations.[58] (The problem was a shift in the U.S. position on the viability of FMCT verification in 2004—a position that the Obama administration reversed in early 2009[59]—as well as linkages to nuclear disarmament moves called for by several other countries.)

A Treaty to Ban Weapons in Space

Nonetheless, Russia and China continued to press the PAROS issue in hopes of opening negotiations. On Feb. 12, 2008, Russian Foreign Minister Sergey Lavrov, on behalf of Moscow and Beijing, formally presented the CD with a draft treaty: "Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects" (PPWT) and called for the launch of negotiations based on the text.[60] The treaty text was based on both the 2002 working paper, and informal discussions of the concept led by Russia and China during 2006.

While many nations welcomed the move, predictably, the Bush administration rejected the need for any such treaty, and criticized the draft for a number of reasons—perhaps most vociferously because it focuses on weapons based in space and fails to bar development, testing and deployment of ground-based ASATs. As House told the First Committee: "As we noted in CD/1847, to which we refer all interested parties, the Russian–Chinese draft treaty introduced in Geneva contains no prohibitions on the research, development, testing, production, storage, or deployment of terrestrial-based anti-satellite weapons. Therefore, the treaty would do nothing to impede the development of military systems such as the direct-ascent ASAT weapon that China flight-tested in January 2007."[61]

Russia and China have called on other nations to make comments on the draft treaty text, and at a special March 7, 2009, CD plenary session, Lavrov said the two delegations would soon circulate a summary of the comments and responses to them.[62]

To be fair to the Bush administration, a number of other governments and NGOs have expressed similar concerns about loopholes in the PPWT. These include: the question of terrestrial-based ASATs (which as noted above are the most serious near-term threat to space security); the vagueness of the definitions of "weapon" and the "threat of force"; failure to ban testing; and the lack of a verification protocol.[63]

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[58] "FMCT and Issue Linkage," Fact Sheet, Federation of American Scientists, http://www.fas.org/programs/ssp/nukes/armscontrol/fmctlinkage.html

[59] Aernd Meerburg and Frank N. von Hippel, "Complete Cutoff: Designing a Comprehensive Fissile Material Cutoff Treaty, *Arms Control Today*, March 2009, http://www.armscontrol.org/act/2009_03/Meerburg_VonHippel

[60] Found at: http://www.reachingcriticalwill.org/political/cd/papers08/1session/Feb12%20Draft%20PPWT.pdf

[61] House, op cite; the U.S. statement at CD in response to the PPWT is found here: http://www.reachingcriticalwill.org/political/cd/papers08/3session/CD1847.pdf

[62] *CD Report*, Reaching Critical Will website, March 7, 2009, http://www.reachingcriticalwill.org/political/cd/speeches09/reports.html#7march

[63] See: "Preventing the placement of weapons is outer space: A backgrounder on the draft treaty by Russia and China," Reaching Critical Will, http://www.reachingcriticalwill.org/legal/paros/wgroup/PAROS-factsheet.pdf; and, Theresa Hitchens, "Russian and Chinese Weapons Ban Proposal: A Critique," published in Security in Space: The Next Generation, United Nations Institute For Disarmament Research Conference Report, 31 March-1 April,

Further, while China and Russia intend to respond to comments and concerns about the PPWT, representatives of both governments have indicated that they have no plans at this time to introduce a revised treaty based on those reactions. Thus, it is unclear whether any progress toward negotiations will be made—even if the Obama administration is willing to consider negotiations on a space-related treaty. Such an about-face in the American position, however, is not at all a sure thing. Until recently the White House website contained the following statement of space policy:

> "The Obama-Biden administration will restore American leadership on space issues, seeking a worldwide ban on weapons that interfere with military and commercial satellites. They will thoroughly assess possible threats to U.S. space assets and the best options, military and diplomatic, for countering them, establishing contingency plans to ensure that U.S. forces can maintain or duplicate access to information from space assets and accelerating programs to harden U.S. satellites against attack."

However, almost immediately following the appearance of the statement, U.S. officials began to signal that the language had not been vetted and did not represent official policy. In fact, some officials explained that this language was crafted from campaign literature by a White House junior staff member working without supervision.[64] And indeed, sometime at the beginning of May, the White House replaced the language with a statement that, to understate the case, is much less forward leaning:

> "The full spectrum of U.S. military capabilities depends on our space systems. To maintain our technological edge and protect assets in this domain, we will continue to invest in next-generation capabilities such as operationally responsive space and global positioning systems. We will cooperate with our allies and the private sector to identify and protect against intentional and unintentional threats to U.S. and allied space capabilities."[65]

Indeed, Gary Payton, deputy undersecretary of the Air Force for space programs, said on May 11 that the U.S. administration had launched a space posture review.[66] That review is being done in tandem with a National Security Council review of U.S. nuclear posture, which is not expected to be finished until early 2010. This arguably prohibits any launch of PAROS-related treaty negotiations this year—despite the fact that Washington did not oppose establishing the working group within the CD. Indeed, the Bush administration had earlier signaled that it would be willing to countenance talks as long as there was no pledge to formally negotiate embedded in the mandate. The lack of linkage in the new CD program of work, known as CD/1853, was critical in allowing the United States to sign on. While both Russia and China expressed disappointment that the PAROS working group language embedded in the CD program of work did not mention negotiations, both Moscow and Beijing apparently calculated it would be better to allow the CD to formally discuss the

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2008, pp. 153-157, UNIDIR, Geneva, http://www.unidir.org/pdf/ouvrages/pdf-1-978-92-9045-192-1-en.pdf

[64] Brian Weeden, "Alternatives to a space weapons treaty," April 17, 2009, Bulletin of the Atomic Scientists (web edition), http://www.thebulletin.org/web-edition/op-eds/alternatives-to-space-weapons-treaty

[65] See: http://www.whitehouse.gov/issues/defense/

[66] Andrea Shalal-Esa, "U.S. 'harvesting' canceled satellites for future uses," *Reuters*, May 11, 2009, http://www.reuters.com/article/domesticNews/idUSTRE54A6HY20090511

PAROS question—as well as to begin negotiations on an FMCT—than to block the consensus.

This by no means indicates that a treaty, or any kind of legally binding accord at all, will emerge from the PAROS discussions. First, given the continued agitation in U.S. military circles regarding the Chinese ASAT test, any movement at all by Washington toward a space accord is likely to be contingent on—at a minimum—some reassurances from Beijing regarding future pursuit of ASATs. Vice versa, any Chinese acceptance of constraints on its proven ASAT capabilities will likely be dependent on assurances from Washington that the United States no longer intends to pursue space-based missile defenses. Finally, Moscow may well want to also wrap missile defense writ large (particularly the thorny issue of Bush administration moves to place interceptors in Central Europe) into any future space accord—which in the long run may prove more difficult for any U.S. administration than that of the space-based option. This is because the concept of missile defense has become not only widely accepted by the U.S. public, but also has become embedded as a key tenet of Republican Party doctrine.

Obstacles to progress toward a PAROS treaty could also come from outside the great power triangle. In India, in particular, there have been behind the scenes debates among the political and military elite about whether India ought to conduct an ASAT test not simply to counter the Chinese test, but to put itself in a position of relative parity in any upcoming negotiations. The Indian political elite has never gotten over the fact that New Delhi's failure to conduct a nuclear test prior to the negotiation of the 1968 Nuclear Non-Proliferation Treaty (NPT) demoted India to a "have not" status. For example, Sreeram Chaulia, an Indian scholar at the Maxwell School of Citizenship in New York, said in a recent op ed that the time to test an ASAT capability is now, before any treaties or regimes present restraints.[67] In France, there has been (as noted above) much discussion among military officials and think tanks about the possible need for France to develop "counterspace" capabilities as a deterrent against others who might wish to attack France's considerable military space assets. Several other nations, such as Pakistan, Iran and North Korea, also may be considering their ASAT options as they further develop their long-range missile and space launch capabilities. Thus, real progress in the CD's PAROS discussions may be elusive in the short- and medium-term.

Transparency and Confidence Building Measures

Alongside the debate about the need for a treaty banning space weapons, there has been growing interest by some nations in discussions and perhaps even negotiations at the CD on transparency/confidence and security building measures. The charge is being led by Canada, whose Ambassador to the CD, Marius Grinius, currently leads the informal working group talks on space. On March 26, 2009, Grinius formally tabled a Canadian working paper (presented at an earlier informal session) titled, "The Merits of Certain Draft Transparency and Confidence Building Measures and Treaty Proposals for Space Security."[68]

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[67] Sreeram Chaulia, "Should India Also Develop Satellite-Killing Capability?" *Thaindian News*, March 2, 2008, http://www.thaindian.com/newsportal/sci-tech/should-india-also-develop-satellite-killing-capability_10023097.html

[68] See: http://www.reachingcriticalwill.org/political/cd/speeches09/1session/26March_Canada-PAROS.pdf

The concept of agreed transparency and confidence building measures (TCBMs) for space is not new. In 2005, 2006, 2007 and 2008, Russia introduced a resolution in the UN General Assembly on TCBMs that call on states to make concrete proposals regarding measures that might be adopted in the future—resolutions that, with the exception of the United States and Israel, have been overwhelmingly supported. The 2007 version of the resolution notes "the constructive debate which the Conference on Disarmament held on this subject in 2007."[69]

As alluded to above, the U.S. rejection of the resolutions during the Bush administration hinged on the linkage of the TCBM concept with PAROS negotiations. According to Bush administration officials, Washington tried hard in 2008 to negotiate away the linkage language but failed. The 2008 version of the resolution instead arguably tightened that link, given that it specifically mentions the Russian–Chinese draft PPWT.[70]

The 2009 Canadian paper, however, goes far beyond what might be considered traditional transparency and confidence building activities, such as data exchange, consultations and the like. Instead, as Grinius stated, Canada is seeking to:

> "[Advance] the cases that (TCBMs) can serve as important instruments in their own right, as well as elements toward an eventual treaty. The paper argues that the CD should consider security guarantees, such as a declaration of legal principles, a code of conduct, or a treaty, that would: (a) ban the placement of weapons in space, (b) prohibit the test and use of weapons on satellites so as to damage or destroy them, and (c) prohibit the use of satellites themselves as weapons. Agreement on robust security guarantees as a first step could help in laying the foundation and building the momentum for future legal protections."[71]

Canadian officials make it clear that they are seeking a "third way" between non-binding TCBMs and the PPWT—an approach that can capture a wider universe of concerns. While it seems likely that Canada may table a formal draft treaty proposal based on the working paper in the upcoming PAROS working group at the CD, chances for action on such a proposal are unclear.

First of all, the traditional U.S. position has been that while discussions of confidence building measures are welcome, such discussions should take place outside the CD. The U.S. has long been a champion of "separation between church and state" regarding the role of the CD and that of COPUOS, and TCBMs for Washington have fallen in the COPUOS basket. Moreover, for decades Washington has been interested only in non-binding measures regarding space—even during the Clinton administration. And as noted above, the Obama administration may be re-thinking the campaign's enthusiasm for a space treaty.

On the other hand, there has been growing interest in Washington policy circles since the Chinese ASAT test in pursuit of a ban on testing and use of destructive (i.e. debris

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[69] See: http://www.reachingcriticalwill.org/political/1com/1com07/res/L41.pdf

[70] P.J. Blount, et al, "Draft Resolution on Transparency and Confidence-building Measures in Outer Space Activities Approved by the First Committee," *Res Communis*, Nov. 2, 2008, http://rescommunis.wordpress.com/2008/11/02/russian-draft-resolution-on-space-weapons-endorsed-by-the-first-committee/

[71] *Ibid*

creating) weapons. This concept was articulated most recently in a special report of the influential Council on Foreign Relations, "China, Space Weapons and U.S. Security," authored by Bruce W. MacDonald. MacDonald, it should be noted, served as a consultant to the Obama campaign on space matters and was a former Clinton administration official. While generally negative on traditional arms control based on banning technologies (such as the PPWT) and suggesting that the United States will require so-called counterspace capabilities as a deterrent vis-à-vis China (as well as others), the report notes several advantages to a ban on testing and use of debris-creating weapons. It states:

> "One example where arms control could play a supporting role in space security is with a ban on the testing or demonstration of 'hit-to-kill' anti-satellite capabilities, or any act that intentionally produces substantial amounts of space debris. While the covert development of such capabilities remains possible, China would not enjoy the confidence that normal testing would give it. The successful Chinese ASAT test was the third in a series, following two that were unsuccessful. While such a ban would thwart China's 2007-style ASAT, it would not thwart more advanced ASAT technologies that do not rely on smashing into their targets. Furthermore, space debris from such tests would pose a danger to China's own plans for a greater space presence."[72]

It should be noted that the Advisory Committee to the report process included two retired U.S. Air Force generals with solid space backgrounds as well as several Obama campaign advisors, and was chaired by Adm. (ret.) Dennis Blair, who on Jan. 28, 2009 was confirmed as the Obama administration's Director of National Intelligence.[73] While the report is careful to note that membership on the Advisory Committee does not constitute endorsement of the report's findings, the make up of the Committee also cannot be dismissed.

It should be obvious that just as the United States might have reason to pursue a debris-creating weapons ban in part to neuter China's current ASAT capability, Beijing may have absolutely no interest in doing so for the very same reason. China has made no direct statements on the concept, and although China has co-sponsored the Russian General Assembly resolution on TCBMs, Chinese diplomats have consistently argued that confidence-building measures are not a substitute for a weapons ban treaty. That said, it is nonetheless true that continued testing of debris-creating ASATs, or their use in future wars, would put at risk China's growing fleet of spacecraft—as well as Beijing's manned space program. Suffice it to say any Chinese consideration of such a ban would likely hinge on a U.S. move to either accept a ban on space-based weapons, or provide other reassurances that Washington will not continue to pursue space-based missile defenses. Once again, given the early state of play of the Obama space posture review, the question whether the U.S. would be willing to forgo a space option for missile defense remains open.

Conclusion

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[72] Bruce W. MacDonald, *China, Space Weapons and U.S. Security*, Council Special Report No. 38, September 2008, Council on Foreign Relations, Washington, DC, p. 18, http://www.cfr.org/content/publications/attachments/China_Space_CSR38.pdf

[73] *Ibid*, p. 66. In the interest of openness, it should be noted that the author was also a member of the Advisory Committee.

While this paper has focused on threats to space security, and has taken a somewhat skeptical look at efforts to curb those threats, it should be said that the mood among CD delegations during the first session of 2009 (Jan. 19-March 27, 2009) nonetheless has been more upbeat than ever regarding prospects for real movement on both PAROS and FMCT. The May 29 agreement on a program of work was greeted with the sound of champagne corks being popped in the Palais des Nations and across much of Geneva. Much of that up-beat mood has hinged on the change in U.S. administration, and the fact that the Obama administration is sending all the right signals about its willingness to engage across the board on issues of international security. In particular, the Obama administration's support of FMCT negotiations bodes well for actual progress in the CD. And despite the lack of clarity regarding multilateral options for ensuring space security, there are positive signs that the new U.S. administration is at least willing to show flexibility on the issue. U.S. diplomats are continuing to express the need for non-binding best practices in space activities—consistent with the Bush administration's stance—and are engaged in discussions on the issue with allied and friendly nations. However, there has been little concrete said by the U.S. during the first CD session or in other multilateral forums regarding legally binding options, and to be blunt, the administration's current focus in foreign policy is not on space issues, but rather on the nuclear issues, primarily concluding a nuclear arms control treaty with Russia and saving the Non-Proliferation Treaty process in time for the 2010 review conference. The next CD session opens May 18 and continues until July 3, the third and final session runs from Aug. 3 to Sept. 18. Given the increased urgency to find solutions to the looming threats to space security, one can only hope for signs of progress between now and September.