


January 2010

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Recommended Citation

Rendleman, James D. (2010) "Lawful Response to Attacks on Space Systems," *Space and Defense*: Vol. 4: No. 0, Article 3.

DOI: 10.32873/uno.dc.sd.04.01.1165

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Lawful Response to Attacks on Space Systems

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What means may a nation lawfully employ to respond to and to defeat threats and attacks on its space systems? Treaties and customary law provide a strong incentive to limit space activities to non-aggressive “peaceful purposes.” They do not, however, proscribe space warfare or preparation for such conflict. Space system components are thus at risk, and can be attacked, degraded, or destroyed, simultaneously or each in detail. The use of force is allowed only in self-defense against an “armed attack” or in accord with authorization of the United Nations (UN). Kinetic, electromagnetic, or information operation attacks against space systems are each an “armed attack” to which the use of force is permitted. The right of self-defense is subject to the Law of Armed Conflict (LOAC) and other treaties and agreements. Even if lawful means and methods are employed and targets engaged, physical, technical, environmental, political realities, and their risks and benefits limit options to defend and fight space systems. Decades of senior policy-makers have recognized the importance of the space domain, assessed the risks in their context, and provided measured and calm global leadership to preserve access to it.

The United States (U.S.) utilizes space more than any other nation, not only for national security, but in the private sector as well. The complete mix of civil, military, national, and multinational commercial space capabilities are important enablers for successful 21st Century militaries, economies, information transfer, diplomatic communications, and collaboration. Space-based capabilities – precision-navigation-timing (PNT), battlefield

and battlespace characterization, missile warning and defense, weather, communications, intelligence, surveillance, and reconnaissance – enable the U.S. and its allies to reach out, shape, support, and control events in any part of the globe.

Taking down space capabilities offers a means by which adversaries can degrade the significant asymmetric advantages offered. Consequently, the recent 11 January 2007 test of a Chinese ground-based, direct-ascent anti-satellite (ASAT) interceptor against one of their own defunct Feng Yun-1C weather satellites generated considerable concern across the U.S. and international space and related defense communities.

How should capabilities presented by space systems be protected? The U.S. approach to securing and protecting the space domain has been and will continue to be rooted in rational policy making and municipal (i.e., domestic, national) and international law. Long-standing treaties and policy support the peaceful uses of space for civil, commercial, and military purposes. Yet, these may fail in times of conflict. Accordingly, the U.S. cannot wholly depend on passive defensive capabilities, or diplomatic engagement and awareness, to secure itself.

Recognizing the importance of protecting satellites as strategic assets, the U.S. has employed a comprehensive strategy to accomplish this objective since the inception of the Space Age. During the Cold War, hardening military satellites against potential destruction was commonplace, though

“development of specific weapons to target hostile satellites or threats to U.S. satellites was politically eschewed. The U.S. desire to protect its satellites was overridden by wanting to avoid what were considered potentially destabilizing efforts, and what seemed as an inevitable arms race in space.”¹ Contemporary and emerging capabilities posed by hostile states and non-state actors now serve as a catalyst for a reappraisal of tools one might employ to achieve deterrence and even defeat such threats.

Considering the complexities of the threat environment, the strategy to assure the U.S. and its allies have access to space capabilities depends on four mutually supportive elements or pillars:²

- Global Engagement.
- Space Situational Awareness (SSA).
- Responsive Infrastructure.
- Deterrence and Defense.

Global engagement leverages long-standing approaches to securing and protecting the space domain through recognized international law, policy, and diplomacy. SSA enables the monitoring of environmental factors and prediction of threats essential to decision-making to assure mission success. This allows a policy-maker or commander to differentiate between purposeful attacks and natural environmental hazards; to anticipate space events and clarify intentions; this, in turn, reduces the potential for misperception or miscalculation. SSA also enhances opportunities to avoid disruptive or destructive events. A robust and responsive infrastructure

enables a spacefaring nation with the abilities to present agile responses to changes and threats in the space environment to assure viability of systems. Deterrence strategies and approaches are important and inhibit potential attacks by adversaries; however, they do not fully assure access to space. A variety of defenses can complement deterrence by giving tools needed to respond to human-made and environmental threats. In sum, employing these four pillars have in the past and will in the future enable U.S. and friendly space systems to continue to perform their missions for the short and long terms.

With the possibility of space conflict and combat, policy-makers and commanders must balance the benefits with the risks. Decisions to employ this conflict/combat aspect of the fourth pillar of space assurance, deterrence and defense, must not be taken lightly. Given their diversity, deterring, defeating, or eliminating human-made threats will be difficult to achieve. This is the case even though a myriad of combat tactics can be employed against those who attempt to deny access to space capabilities.

When planning to employ space defense strategies and respond to attacks on space systems, decision-makers must consider a particularly important factor – the law. Some rail against any use of force to protect access to space, unmindful of the risk, suggesting such actions could somehow constitute violations of treaty, custom, domestic law, policy, or LOAC. Granted, those who argue against “any use of force” are in a minority, but many do make earnest arguments for significant limitations to space warfare. In contrast, in the military space field only a decade or so ago people talked about Space Control. In fact, Space Control is still one of the four space mission areas discussed in Joint Publication 3-14, *Space Operations* (6 January 2009), and *Counterspace Operations*, Air

¹Joan Johnson-Freese, “The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control,” *INSS Occasional Paper* 30, U.S. Air Force Institute for National Security Studies (INSS), January 2000, p. 1.

²The four pillars of space assurance are more fully discussed in James Rendleman, “Space Assurance for the 21st Century,” *High Frontier* 5: 2 (February 2009): 46-53.

Force Doctrine Document 2-2 (2 August 2004). Proponents have been arguing that the U.S. should prepare for winning in a contested space domain, a concept described as “space dominance;” this objective has been broadened by advocates to “full spectrum dominance.”³ The current 2006 U.S. National Space Policy precepts and space control doctrine suggest the U.S. should proactively control the environment – to assure access by U.S. and allied systems, defeat threats, and deny adversaries access to their own space capabilities if required.⁴ There must be a proper balance of all these divergent interests.

Assuming the U.S. or any other nation believes it is compelled to use force to respond to threats or attacks on its space systems and/or those of its allies, the proposition to be surveyed and examined in this paper is: *what means may a nation lawfully employ to respond to and defeat threats to and attacks on its space systems?*

This paper will examine how relevant treaties, customary law, LOAC, and other legal principles substantially restrict space warfare options, but also reduce the potential for conflict among law-abiding spacefaring nations. We will identify legal principles supporting the right to defend a national or allied space system. Following this, we will apply these principles with a dose of engineering and policy concerns to discuss lawful and unlawful means and methods to prosecute the right of self-defense and to defeat threats to space systems.

³Dwayne Day, “Space Policy 101,” *The Space Review* 15 June 2009, <http://www.thespacereview.com/article/1397/1> (accessed January 2010).

⁴*Fact Sheet on U.S. National Space Policy*, National Security Presidential Directive 49, 31 August 2006.

Space Capabilities and Threats

Because the complexities of space combat pose significant legal issues, the technical, historical, and policy taxonomies of potential threats and attacks on space systems that could initiate such conflict must be fully understood. A satellite system consists not only of spacecraft, but supporting infrastructure, including ground stations, tracking and control links – commonly referred to as the tracking, telemetry, and control (TT&C) – and data links; launch facilities, supporting infrastructures and the industrial base are also vital. These components are all at risk to threats of physical and cyber attack and sabotage, and can be attacked, disrupted, degraded, or destroyed, simultaneously or each in detail.

Space-based threats to satellites are proliferating as a result of the ever-growing global availability of space technology; states can reach out to space and “touch” satellite payloads and their supporting buses through a variety of kinetic and non-kinetic means; even non-state actors could potentially access some of these technologies and space systems and cause problems. It takes little imagination to envision multiple means by which a satellite payload and/or its bus can be disrupted, degraded, destroyed, or otherwise disabled.⁵ Spacecraft are vulnerable to direct ascent weapons as demonstrated by the Chinese ASAT test and also to a variety of other ground-based, airborne, and space-based ASAT systems. These require sophisticated boosters, launch facilities, and high-tech terminal guidance capabilities; this is not an easy system to generate and field without state sponsorship. Direct-ascent launched or orbit-

⁵Every satellite has a “payload” and a “bus.” The payload contains all the equipment a satellite needs to perform its mission functions. The bus supports the payload and provides electrical power, computers, and propulsion for the entire spacecraft.

based nuclear devices can be detonated, generating energetic electrons and other particles, radiation belts, and other effects that can fry unshielded satellite circuitry over a wide lethal range. Space mines can be deployed in close proximity to satellites or be employed to generate debris clouds that destructively engage whole classes of low Earth orbit (LEO) satellites in the same orbital plane or in crossing orbits, or to create problems among satellites in geosynchronous orbits (GEO). Ground, space-based, or airborne lasers could wreak havoc upon satellite components. Blinding operations could be employed and achieve a variety of effects from a temporary “dazzling” with a laser to permanent burnout of optical or other sensors with an otherwise intense energy burst.

Vital command and control and communications stations, and their links to satellites and each other are also at risk.⁶ At a fundamental level, they are vulnerable to classically accepted terrestrial land, sea, or air kinetic attacks, including sabotage.⁷ Some unprotected stations, links, and user segments are susceptible to electronic attack that can degrade, neutralize, or destroy their capabilities. These threats and attacks encompass jamming and electromagnetic deception techniques. Jammers disable the means of command and control and data communications, and in this manner render

satellites inoperable or unavailable. A variety of jammers emit signals that mask or prevent reception of desired signals; these methods can disrupt unprotected uplinks, downlinks, and even cross-links. Electromagnetic deception and spoofing techniques can be employed to confuse unprepared and unprotected systems; this could include sending false, but deceptively plausible, commands that cause spacecraft to perform damaging or wasteful maneuvers, modify databases or configuration changes, or otherwise destroy it. Similarly, supporting terrestrial ground stations, computer networks, and links are vulnerable to information operation attacks. This could involve executing denial of service tasks, injection of fake commands, malicious software and viruses, unauthorized monitoring and disclosure of sensitive information (data interception), and unauthorized modification or deliberate corruption of network information, services, and databases.

While achieving success would be difficult to achieve and is unlikely, offensive information operations can be undertaken against on-orbit satellites seeking to effect shutdown operations, where an adversary gains access to a satellite’s control program and directs it to cease functioning for some length of time. This could be orchestrated to coincide during the initial critical moments of a simultaneous and parallel terrestrial attack, or involve a permanent command to never resume operations. While not physically damaging the satellite, the result would be the same. It would deprive the owner/operator of its use precisely when the system is most needed. Directing a permanent shutdown could cause total loss of for any owner not able to reaccess the platform and override the command. Similarly, an attitude movement could be directed by accessing the satellite’s control program, ordering the satellite platform to rotate on its axis, or pointing the mission

⁶Control stations track and control satellites to ensure they remain in proper orbits and properly perform their missions. Communications ground stations process satellite mission data and link that data to ground-based networks and users. TT&C links exchange commands and status information between control ground stations and satellites. Data links exchange mission data between communications ground stations and satellites. These links may pass through ground stations or satellites and relayed as appropriate.

⁷Ground stations are often located in remote and hard to get to places. Orchestrating an attack on them is feasible, though perhaps impractical. Most sites are well protected and the logistics needed to achieve a successful attack could be difficult to assemble.

sensor, communications antennae, receiver, solar cells, or any other directionally-dependant system in the wrong direction. Such an attack would be effective against a satellite whose effectiveness depends on payload and communication systems pointing at precise transponder and receiver targets, or sensors aimed at a particular area of interest.

A translation movement attack involves directing the activation of a satellite's thrusters and sending the platform into a new orbit. This could also cause loss of the satellite or require the system to expend vital on-orbit resources to correct its position; the expenditure of resources to correct the satellite's orbit or orientation could significantly limit the system's life. The destruction of the satellite could be accomplished by issuing damaging commands to its control program, e.g., to mismanage propellant temperature controls to the point of tank or propellant line rupture.

Lastly, an appropriation or impressment attack involves transfer of control of the satellite system to an adversary. The satellite's control program is accessed and altered, denying the launching state use of its own platform. Worse than mere destruction, the satellite's capabilities are then placed at the disposal of an attacking state.⁸

Given these threats, the 2007 Chinese ASAT test stoked the fires of a long-running debate over whether and how the U.S. and its allies should prepare for space conflict. More terrifying:

Some have argued that the test is evidence of a lack of communication

among various parts of the Chinese government, with the People's Liberation Army (PLA) carrying out the test without the knowledge of the Chinese Foreign Ministry or other parts of the government. "Put bluntly, Beijing's right hand may not have known what its left hand was doing," writes Bates Gill and Martin Kleiber... "This may be a more troubling prospect than anything the test might have revealed about China's military ambitions or arms control objectives."⁹

Moreover, Chinese military strategist, Wang Fa'an, has proposed the PLA set up its own space forces in the future to protect China's growing space assets.¹⁰ However, Chinese capabilities do not pose the only concerns. There have been attacks on space systems by other actors and the U.S. and the global space community have had good reason to take notice. Given the proliferation and diversity of other global threats, China's ASAT test only served to provide an important exclamation point on the specter of space conflict. As observed by retired Congressman Terry Everett in his Fall 2007 article written for *Strategic Studies Quarterly*:

...In the past few years, we have seen a handful of global positioning system (GPS) and increasing numbers of satellite communications (SATCOM) jamming incidents. In the early stages of Operation Iraqi Freedom, U.S. forces encountered a GPS jamming situation. In this case, precision munitions were used to hit these jamming sources, which allowed our forces to quickly resume operations. We have seen several SATCOM jamming incidents, including Iranian jamming of a U.S.

⁸For a worthwhile overview of potential attacks on space systems, see Thomas C. Wingfield, *Legal Aspects of Offensive Information Operations in Space*, 23 March 2000, pp. 3-4 [unpublished manuscript], <http://www.au.af.mil/au/awc/awcgate/dod-io-legal/wingfield.doc> (accessed January 2010).

⁹Jeff Foust, "The Chinese ASAT enigma, *The Space Review* 7 May 2007, <http://www.thespacereview.com/article/864/1> (accessed June 2009).

¹⁰Peng Kuang and Cui Xiaohuo, "PLA Should Play Role in Space: Strategist," *China Daily*, 16 June 2009.

satellite from Cuba in July 2003; ongoing jamming by Iran against PanAmSat Corporation, Asia Satellite Telecommunications Co. Ltd., Arab Satellite Communications Organization, and Eutelsat S.A. from June 1997 to July 2005; and Libyan jamming of two international SATCOM systems in December 2005. Last fall it was reported that a Chinese ground-based laser illuminated a National Reconnaissance Office intelligence-gathering satellite. What is most troubling is that these attacks are coming during a period of widespread use of GPS, satellite communications, and space-based imagery.

...There is a spectrum of potential threat capabilities looming on the horizon to include electronic jamming, low-power laser blinding, high-energy lasers, microsattellites, direct-ascent ASATs, cyber attacks, physical attacks to ground stations, and possibly even a nuclear explosion. These threats can target satellites in orbit; their communications links to and from the ground; and their ground-based command, control, and receive stations. All produce the same general result – they render our space capabilities temporarily or permanently useless. Many of these anti-satellite technologies exist today, and many are dual-use in nature, including a microsattellite that could be used as an experimental spacecraft or, with a simple command, could shadow or collide with another satellite.

Space is no longer a sanctuary. Those who wish to challenge America's role in the world increasingly recognized the strategic importance of space and are more willing to deny us freedom of action in space by employing a wide range of methods.¹¹

¹¹Terry Everett, "Arguing for a Comprehensive Space Protection Strategy," *Strategic Studies Quarterly* (Fall 2007): 23-24, citing Jim Garamone, "CENTCOM Charts Operation Iraqi Freedom Progress," *American Forces Press Service*, 25

In sum, the contemporary, emerging threats to space systems posed by hostile states and non-state actors are fundamentally different from that experienced during the Cold War. Vulnerabilities span the whole of the space community, and these weaknesses have been studied by adversaries to the U.S. and its allies. These adversaries are now much more diverse, sophisticated, and technologically competent; they are equipped and able to disrupt space activities. Defending space assets demands new tools as deterring or eliminating evolving threats will be difficult.

Securing the High Frontier of Space

U.S. law and policy place great emphasis on diplomacy and international engagement; it is a centuries-old practice that has secured borders, enhanced commerce, and brokered and resolved disputes. Assuming adversaries, and friends, pay heed to customary and treaty-based provisions of international law, the global engagement pillar of space assurance affords the space community a respectable measure of confidence they can all have assured access to space. Even so, given the present minimal international law restrictions on space activities, smart decision-making is also vital to operate safely and securely. The complete span of international legal, policy, diplomacy, and engagement implications should therefore be fully considered when planning for and executing space assurance activities. The U.S. has done this for decades; it has applied significant experience and

March 2003; Major General William L. Shelton, commander, 14th Air Force, "Update on Space Operations," Air Force Association National Symposium on Space, Beverly Hills, California, 17 November 2006; Warren Ferster and Colin Clark, "NRO Confirms Chinese Laser Test Illuminated U.S. Spacecraft," *Space News* 2 October 2006; and Office of the Secretary of Defense, *Military Power of the People's Republic of China 2007*, Annual Report to Congress (Washington, DC: Department of Defense, 2007).

wisdom to prepare for and take care of threats posed by ASAT and other systems for the entirety of the Space Age.

What are the applicable foundations of international law? First, treaties and other bilateral agreements to which sovereign states are signatories, and which govern issues of interest; and second, multinational agreements among sovereigns. International agreements are governed, not by contract law, but by the *Vienna Convention on the Law of Treaties*.¹² Under the *Vienna Convention*, states can do anything they want and agree to, unless what is contemplated violates a peremptory norm (i.e., a fundamental principle of international law that is accepted by the international community of states as a norm from which no derogation is permitted). While the U.S. has not ratified the *Vienna Convention*, it treats the bulk of its rules as compelling under customary international law, which is a third foundation of international law. The fourth foundation deals with general principles common to mature legal systems. And the fifth, deals with the subsidiary “municipal” determinations of law (e.g., national decisions, such as those rendered by the U.S. Supreme Court).¹³

International law is an integral part of the U.S. legal system. Its founding fathers convened at the 1787 Philadelphia Constitutional Convention to revise the unwieldy and moribund Articles of Confederation; the impetuses for their meeting were intractable commercial, trade and defense issues, also important in the international arena. The framers knew international law existed, its

importance, and the document reflects this. The Constitution, Article I § 8, Clause 10 sets out in pertinent part: Congress has the power “to define and punish offenses... against the Law of Nations.” Treaties are concluded under the authority of the Constitution, Article II § 2, Clause 2, which declares the President “shall have Power, by and with the Advice and Consent of the Senate, to make treaties, provided that two-thirds of the Senators present concur.”¹⁴ Article VI, Clause 2 provides: “...all Treaties made, or which shall be made, under the Authority of the U.S. the name of the U.S., shall be the supreme Law of the Land.”¹⁵ Generally, treaty terms take precedence over conflicting U.S. statute terms.¹⁶

With relatively few treaty restrictions governing activities in space for military or other purposes, some might think the U.S. is faced with a dilemma – should it only abide by a permissive “letter of the law” standard or the “spirit of the law”? If only the letter of the law, what approach should it want to see adopted by current or fledgling space nations? Actually, the choice is not between the letter and spirit of the law; on the whole, the U.S. abides by both standards. Decades of senior policy-makers within the Executive and Congressional branches of the U.S. Government have recognized the importance

¹²See *Vienna Convention on the Law of Treaties*, 23 May 1969.

¹³Article 38 of the *Statute of the International Court of Justice* defines its sources. See Nathaniel Burney, “International Law: A brief primer for information purposes only,” http://www.burneylawfirm.com/international_law_primer.htm (accessed January 2010).

¹⁴Under international law, the terms “treaty” and “international agreement” are synonymous, although the terms do have different meanings within the U.S. Department of Defense (DOD). DOD Document 5530.3, *International Agreements*, 11 June 1987, Enclosure 2, defines “international agreement” more broadly, to include agreements between lower levels of nations’ governments (e.g., the U.S. Departments of Defense) that are under the umbrella of a treaty, but have not themselves been ratified (“advice and consent”) by the U.S. Senate.

¹⁵Customary law is not part of the “supreme Law of the Land” though some U.S. Supreme Court Justices are now making some rather disconcerting noises about incorporating portions of such law into the U.S. constitutional system.

¹⁶The major exception to this is when Congress intends for a later statute to override the conflicting treaty provision.

of the domain; assessed risks associated with not providing measured and calm global leadership to preserve access to it; and made decisions in accord with those assessments.¹⁷ In turn, the U.S. encourages comparable policy-making by other states of the global community.

As it executes global engagement activities, the U.S. has been and will be on the receiving end of criticisms and exhortations that it does not follow the spirit of the law when refusing to accede to new agreements, standards, rules, and practices affecting space activities. But this refusal involves instruments whose terms lack precision, are unverifiable, fail to comprehensively address issues, or place the U.S. and its allies' defense and economic security interests at risk. These critiques must be expected in the rough and tumble of the global stage, where each state jockey for its own national or regional advantage.

Treaties, conventions, and agreements already in force regularize space activities despite their minimalist nature. As such, they help protect capabilities of systems that have been or are about to be placed on orbit. Bilateral and multilateral arms control treaties also preserve some of the sanctuary aspects of space by prohibiting "interference" with "national technical means" (NTMs), which can include missile warning and reconnaissance satellites used to verify treaty compliance. Confidence-building procedures

¹⁷While diplomatic engagement has been helpful, there is an element of risk in relying solely on it to assure access to space capabilities. Enforcement mechanisms for violating treaties and agreements relating to space are rather limited. There are no specific enforcement mechanisms in place to address violations of space related treaties, and this increases the risk of depending on such documents and handshakes to protect or assure access to space. Violations of treaties and other agreements should nominally be responded to through economic means and diplomatic consultation, and if necessary, other sanctions, assuming a nation or some part of the global community agree to them.

have been agreed to and these have improved opportunities for transparency between potential adversaries, perhaps improving dialogue to prevent any dispute from devolving or escalating into armed conflict or to a nuclear catastrophe. Other treaties and conventions, such as those involving the International Telecommunications Union (ITU) address vexing spectrum management issues, which have profound impacts on military, civil, and commercial space systems. The ITU presently attempts to equitably reconcile the explosion of information technologies, exponential user growth and needs, all within nature's limited useable bandwidth in the electromagnetic spectrum.

The *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* of 1967, or the Outer Space Treaty (OST) as the treaty is informally known, forms the basis for much of international space law, including its important legal principles and prohibitions. Under the treaty, all nations share the global space commons; notably, it is also an important foundation of the entire U.S. military, civil, and commercial space programs. The treaty was consummated at a time when U.S. policy-makers concluded space offered unique benefits for the military and political dimensions of the Cold War national security strategy. They hoped to fashion an agreement to preserve access to the domain, and these motivations and the document have endured and continue to serve the U.S. and its allies' national interests. Assuming the mantle of the world's leading spacefaring nation, the U.S. helped lead the way on discussions relating to the treaty's formation, crafting the treaty instruments, and forging a global consensus to set a tone and worldview that space activities should be prosecuted for peace and the benefit of mankind.

As a signatory to the OST, the U.S. supports freedom of access to space by all spacefaring powers, agreeing to treaty language that provides: “Outer space ...shall be free for exploration and use by all States without discrimination of any kind...”¹⁸ The treaty also declares nations should have “freedom of scientific investigation in outer space.” Addressing topics that affect the potential for space conflict, the OST provides that international law applies. “...Article III [of the OST] incorporates the application of international law, and specifically the Charter of the UN, in outer space, making it a vital part of the *corpus juris spatialis*.”¹⁹ This incorporation of international law, not just the UN Charter, is important and guiding.

Every major spacefaring nation is a signatory to the OST. Rights and obligations of non-

¹⁸See *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* (Outer Space Treaty).

Article I – “The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind. Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies. There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation.”

Article III – “States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the UN, in the interest of maintaining international peace and security and promoting international co-operation and understanding.”

Article IV – “States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner...”

¹⁹P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008.

signatories can be found in international customary law. Customary international law “...consists of rules of law derived from the consistent conduct of States acting out of the belief that the law required them to act that way.”²⁰ OST signatories

...the U.S. supports freedom of access to space by all spacefaring powers...

can look to both treaty and customary law sources, as customary law may be applied whether or not a state is a treaty party. The vast majority of the world, including the U.S., accepts in principle the existence of customary

international law even though there are often differing opinions as to what rules are contained in it. Article 38(1)(b) of the Statute of the International Court of Justice (ICJ) acknowledges the existence of customary international law, and the ICJ rules are incorporated into the UN Charter by Article 92, which sets out in pertinent part: “The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply...international custom, as evidence of a general practice accepted as law.”²¹

Customary international law is something done as a general practice – not because it is expedient or convenient, but because it is considered law, arising out of a sense of legal requirement. According to Shabtai Rosenne, there are three elements that must be satisfied before one can conclude a rule is part of customary international law. First, a rule can be discerned by a widespread repetition by states of similar international acts over time (state practice); second, the acts by states related to the rule must occur out of a sense of

²⁰Shabtai Rosenne, *Practice and Methods of International Law* (Oceana Publications, July 1984), p. 55.

²¹UN Charter, Article 92.

legal obligation; and third, these acts must be taken by a significant number of states and not be rejected by a significant number of states. A marker of customary international law is consensus among states exhibited by widespread conduct together with a discernible sense of obligation.²²

Under customary international law, what is done, written, or said can establish legal precedent. But not always as such matters do not usually undergo examination in a courtroom setting. This presents an opportunity for mischief, even if only in a diplomatic drama. This explains why U.S. policy-makers feel compelled from time-to-time to rein-in senior officers and officials who speak out on topics or matters related to space security, space conflict, or other important issues before a decision has been made by the entire U.S. national security policy community. Uncoordinated speeches, doctrine, concepts of operations, and other instruments can have a corrosive effect on the formation of space policy. They can, unwittingly, establish policy and potentially legal precedent in advance of a comprehensive interagency consensus. While fundamental principles of good faith and equity apply in international law, no seemingly innocuous comment goes unpunished. Actions and words can have a legal, policy, and diplomatic effect – even where no specific legal document or other agreement memorializes them.

Under customary international law, what is done, written, or said can establish legal precedent.

Three concepts apply to the formulation of customary law – recognition, acquiescence, and estoppel. According to Malcolm Shaw:

Recognition is a positive act by a state accepting a particular situation, and even though it may be implied from all the relevant circumstances, it is nevertheless an affirmation of the existence of a specific factual state of affairs even if that accepted situation is inconsistent with the term in a treaty. Acquiescence, on the other hand, occurs in circumstances where a protest is called for and does not happen, or does not happen in time in the circumstances. In other words, a situation arises, which would seem to require a response denoting disagreement, and since this does not transpire, the state making no objection is understood to have accepted the new situation. The idea of estoppel in general is that a party, which has made or consented to a particular statement upon which another relies in subsequent activity to its detriment or the other's benefit, cannot thereupon change its position.²³

Provocative or unintentional jamming or dazzling incidents involving space systems may require immediate response and even protest, or a state may risk a determination in customary law that it has acquiesced to the events.

Estoppel involves a legal concept “whereby states deemed to have consented to a state of affairs cannot afterwards alter their position.”²⁴ As an example, State Party A states something to induce an expectation, stating: “Party A will monitor the space environment and warn all spacefaring nations of potential space collision threats.” Though

²²Shabtai Rosenne, *Practice and Methods of International Law* (Oceana Publications, July 1984).

²³Malcolm Nathan Shaw, *International Law* (Cambridge University Press, 5th Edition, 2003), p. 437.

²⁴*Ibid.*, p. 439.

no specific agreement is made with Party A for the provision of such services, State Party B justifiably believes Party A's statements that Party A will employ its SSA capabilities as stated. Party B refrains from securing such tools, and relies on Party A in operating its space systems. Assuming a Party B satellite is damaged by a collision to which Party A had the sufficient resources and specific information to warn of the problem, then the doctrine of estoppel could offer Party B some possible legal or diplomatic recourse.

The classic example of actions having legal effect or precedent in the space context is the launch of the Sputnik satellite system over a half-century ago. This launch established the legal precedence and customary international law for free passage of space systems and over-flight rights while on-orbit. Some suggest that President Dwight Eisenhower directed a slowing of pending U.S. space launch activities so the Soviets could successfully launch first, allowing their actions to establish customary over-flight rights. According to Nancy Gallagher and John D. Steinbruner:

A 1950 RAND report that has been called "the birth certificate of American space policy" underscored the practical importance of legal justification. The report emphasized the "vital necessity" of improved intelligence about the closed Soviet Union, but cautioned that because the existence of spy satellites could not and should not be kept secret for long, creating a favorable context in which to use the new technology would be just as important as developing the capability itself. The authors recognized that reconnaissance satellites would pose a dilemma for Soviet leaders, who would see the loss of secrecy as a major violation of sovereignty and a quasi-permanent threat to security. But U.S. satellites would be too high to shoot down, at least initially, so

Soviet response options would be limited to legal and diplomatic protests, attacks on ground stations, or total war. If the U.S. paid careful attention to political and psychological issues associated with space technology, the RAND report argued, it could constrain the Soviet counter reaction, strengthen deterrence, reduce Politburo resistance to international inspections of atomic installations, and possibly elicit a radical reorientation of Soviet behavior along more cooperative lines.

To establish a favorable political context and set a precedent that could be used to legitimize future reconnaissance satellites, the Eisenhower administration decided to start by launching a scientific satellite even though military alternatives would have been ready sooner. The launch coincided with the International Geophysical Year, and the satellite, launched using a modified research rocket, was placed in an orbit that would not traverse the Soviet Union. The U.S. decision to wait until it could launch a scientific satellite allowed the USSR to create a public sensation by being the first country to launch a man-made satellite, but one of Eisenhower's military advisors remarked that the Soviets "had done us a good turn, unintentionally, in establishing the concept of freedom of international space." That judgment reflected an appreciation that space could not be physically controlled by military force in the manner that territory on Earth or the airspace over it is controlled.

Some accommodation in space for mutual benefit would be necessary even in the context of global confrontation. Khrushchev appeared to have recognized this logic, as well. After the Soviets shot down an American U-2 reconnaissance plane in May 1960, Charles de Gaulle asked about cameras in the Sputnik orbiting over France, and Khrushchev said that he objected to airplane

overflights, not satellite-based surveillance.²⁵

The Eisenhower Administration's objective to obtain universal acceptance of the concept of satellite free passage and overflight rights was more fully achieved years later when these customary law principles were included in the OST. In the meantime, statements of such principles were presented and discussed within various global community and UN forums, and can be found in a number of disparate documents including the 1958 National Aeronautics and Space Act, and UN General Assembly resolutions.

Free passage and overflight rights continue to be matters that warrant interest. This is an important issue as air space is subject to sovereignty rules; in contrast, signatories to the OST make no such claims on outer space. If violated, this may justify self-defense or reprisal responses by objecting states, especially with regard to spacecraft and related equipment transiting what would traditionally be considered air space during spacelift or de-orbit mission phases. Current international community treaty and customary law treatments of free passage and overflight rights have been pushed to the limits by the rogue North Korea bogeyman. North Korea arguably exploits the rules to facilitate and prosecute provocative ballistic missile

development activities. It has launched long-range ballistic missiles over the Japanese Islands, but claims its launches are part of developing a new satellite system. The North Korean April 2009 launch has contributed to the controversy.

North Korea claims that the mission was a peaceful attempt to launch a communications satellite into orbit, but the image suggests otherwise, according to Geoffrey Forden, a physicist and arms-control analyst at the Massachusetts Institute of Technology. Forden triangulated the trajectory of the rocket using the contrail in the image, the position of the satellite taking the picture, and North Korea's declared 'splashdown zones' for the first and second stages.

Based on his analysis, the TD-2's [Taepodong 2] course appears to be too shallow to be a space launch. To reach orbit, Forden says, the rocket should have been travelling almost vertically in an attempt to gain altitude early on in its flight. Instead, it appears to be pitching horizontally, sacrificing height for distance in a trajectory that would allow it to sling a warhead as far as possible. Such a trajectory could be consistent with that of an intercontinental ballistic missile (ICBM).²⁶

Presenting a threat to peace, the North Korean ballistic missile and nuclear proliferation activities have been deemed violations of UN Security Council Resolution 1718, which demands the country not conduct new nuclear tests nor launch a ballistic missile.²⁷ Nevertheless, North Korea, who only recently acceded to the OST on 3 May 2009, insists its April 2009 rocket launch is part of an effort to

²⁵Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts and Sciences, Reconsidering the Rules of Space Project, Cambridge, Massachusetts, 2008, pp. 7-8. The adviser was Donald Quarles, Eisenhower's assistant secretary of defense for research and development. See A. J. Goodpaster, "Memorandum of Conference with the President," 8 October 1957, Dwight D. Eisenhower Presidential Library. Also, see Dwight D. Eisenhower, *Waging Peace* (Doubleday, 1965), p. 556; and George B. Kistiakowsky, *A Scientist at the White House* (Harvard University Press, 1976), p. 334. "In other settings, the Soviets did not initially distinguish between satellite and aerial overflights and denounced both as an illegal infringement on national sovereignty." See Gerald Steinberg, *Satellite Reconnaissance: The Role of Informal Bargaining* (Praeger, 1983), pp. 26-29.

²⁶Geoff Brumfiel, "Analysts spar over launch image", *Naturenews* 8 April 2009.

²⁷Joanne Irene Gabrynowicz, "Satellite spots activity at North Korean missile site, officials say," *Res Communis* 29 March 2009, <http://rescommunis.wordpress.com> (accessed March 2009).

put a satellite in orbit; it argues this activity falls under the treaty's allowances that outer space "shall be free for exploration and use by all states without discrimination of any kind."²⁸ The argument has gained traction in parts of the global community. China has refused to condemn the launches asserting North Korea has the right to peaceful use of space.²⁹ Even Japan agrees North Korea has a right to a space program, "but only after it denuclearized and no longer posed a threat."³⁰

"The Korean communist regime has been careful to follow the spirit of the treaty, keeping the world apprised of its plans, unlike its unannounced missile launches in 1998 and 2006."³¹ In asserting its rights to launch a satellite, North Korea notified the International Civil Aviation Organization and International Maritime Organization that it intended to launch an "experimental communication satellite."³² It also made a notification of the launch in accord with the Registration Convention.³³ Despite these efforts, and underscoring the potential for an underlying deception, North Korea did not

follow all necessary international procedures for launching a satellite:

The Radio Regulations of the International Telecommunication Union (ITU), to which North Korea also belongs, stipulates that the launch of a communications satellite needs to be announced in advance. The regulations also require member states to give prior notice of a satellite's operating frequency, its orbital location and other information to the ITU two to seven years before a satellite goes into use. However, North Korea did not give such prior notice to the ITU, the sources said.³⁴

The North Koreans protest that they are only engaged in *peaceful* space activities. Yet they make bellicose threats of dire consequences for any one attempting to interfere with them or other state activities. These mixed signals complicate planning for potential missile defense intercepts of these launched systems, since the U.S., its allies, and most nations subscribe to the free passage rules for space. The U.S. does not want to be seen as denying that right even if the complaining nation is involved in a ruse.

Beside the North Korean launches, other proposals related to free passage remain in controversy, and could also be sources of conflict involving space systems. For example, some argue for a new legal definition for the demarcation between a country's air space (Earth's atmosphere) and outer space. The U.S. does not officially accept a specific "boundary;" instead, it employs a functional approach to assert space-related free passage and transit rights. Unfortunately, if boundaries for the definition of space are strictly defined sometime in the

²⁸Joanne Irene Gabrynowicz, "North Korea launch a test for international law", *Res Communis* 2 April 2009, <http://rescommunis.wordpress.com> (accessed April 2009).

²⁹"China says North Korea has right to peaceful use of space," *The China Post* 8 April 2009.

³⁰"Japan Says North Korea Space Program OK after Denuclearization," *Space War* 7 April 2009, http://www.spacewar.com/reports/Japan_Says_NKorea_Space_Program_OK_After_Denuclearisation_999.html (accessed April 2009).

³¹Joanne Irene Gabrynowicz, "North Korea launch a test for international law" *Res Communis* 2 April 2009, <http://rescommunis.wordpress.com> (accessed April 2009).

³²Joanne Irene Gabrynowicz, "North Koreans have notified several UN agencies that they plan on launching", *Res Communis* 12 March 2009, <http://rescommunis.wordpress.com>, quoting, Robert Wood, U.S. Department of State, Daily Press Briefing – March 12 (accessed March 2009).

³³Joanne Irene Gabrynowicz, "North Korea Accedes to Registration Convention", *Res Communis* 11 March 2009, <http://rescommunis.wordpress.com> (accessed March 2009).

³⁴Joanne Irene Gabrynowicz, "North Korea 'ignored satellite procedures'", *Res Communis* 8 April 2009, <http://rescommunis.wordpress.com>, citing *The Daily Yomiuri* (accessed April 2009).

future by action of treaty or through customary international law development, this could dangerously affect necessary space-related rights. The development of customary law on the subject of free passage and transit rights has been described by Isabella Diederiks-Verschoor:

Some seem to accept silent acquiescence as sufficient ground for the existence of a rule of custom, others feel that explicit recognition is an essential requirement... Clearly, the crux of the matter centers around the element of 'recognition' as evidence of acceptance of a specific practice, and the form such recognition can take.

...Van Bogaert considers it an essential necessity that states show 'by diplomatic intercourse' that they recognize a certain norm as legally binding. Custom inevitably implies a certain period of time, but Van Bogaert feels that there is no need for a practice to be long-lasting, provided recognition is properly signaled. He also notes that it might be logical to consider approval by the UN General Assembly as an expression of such recognition.

As regard to the time factor, Judge Lachs of the International Court of Justice agrees that that a short period of time is not in itself a bar to the formation of a new rule of customary law. He suggests that a kind of 'right of innocent passage' has evolved on the basis of reciprocity, pointing out that on a number of occasions states engaged in space activities, which did not inform other states of their plans to launch space objects or ask permission to pass through the airspace of other states, did not meet objections from the states concerned, nor did those states reserve for themselves the right to object to such flights.

The debate on this matter has hitherto remained entirely academic: both the USA and the former USSR, responsible as they are for most space object launchings, have always been

careful to carry them out from their own territories, and no protests have ever been recorded in respect of any launchings, wherever they took place. However, as Wassenbergh observes, 'There is not a right of instant customary international law that space objects can "freely" transit through foreign airspace. The fact that in practice so far no objections have been raised against foreign space objects transiting a State's airspace is no reason to refer to a customary right of transit, as too few States are considered to be confronted with such transit (and none have been), and no *opinion juris* with respect to such practice has been pronounced as yet.

Even if a right of transit for space objects through the airspace of foreign countries is universally agreed upon it will always have to be subject to guarantees of safety and security.

All this leads you to conclude that customary law is already playing a significant role in space law, and that states have evidently found it necessary, if not expedient, to abide by its rules.³⁵

Some proponents argue space should be defined as beginning at 100 kilometers (km) above sea level. This is known as the Kármán Line, calculated by and named for Theodore von Kármán. This demarcation has been accepted by the Fédération Aéronautique Internationale (FAI).³⁶ However, if adopted by action of treaty or customary law, returns of U.S. and allied spacecraft could be threatened. The threat would not be limited to just purely military systems, as civil and commercial systems would be put at risk. The Soviet

³⁵See Isabella Henrietta Philepina Diederiks-Verschoor, *An Introduction to Space Law* (Kluwer Law International, 1999), pp. 11-12.

³⁶See "The 100 km Boundary for Astronautics," Fédération Aéronautique Internationale Press Release, 24 June 2004, http://www.fai.org/press_releases/2004/documents/1204_100_km_astronautics.doc (accessed June 2009).

Union reserved the right to shoot or bring down aircraft in its airspace, and did so with alarming and tragic deadly effect for Korean Air Lines 007 during the early 1980s, and with other highly publicized commercial aircraft incidents. Given the risks, the U.S. and its allies might be forced to employ deterrence strategies and/or prepare for conflict if a state wanting adoption of the Kármán Line also threatens spacecraft that cross below it above their territory. Given these complications, the U.S. has not agreed to the definition.

Another important legal concept, the peremptory norm (also called *jus cogens*, Latin for “compelling law”), affects state and non-state actor obligations with regard to space conflict. The concept is related to, but differs, from customary law. The peremptory norm is a principle of law from which no violation is permitted, even by treaty. “Unlike ordinary customary law that has traditionally required consent and allows the alteration of its obligations between states through treaties, peremptory norms cannot be violated by any state.”³⁷ Under the *Vienna Convention*, any treaty that conflicts with a peremptory norm is void.³⁸ New peremptory norms can develop under the Convention,³⁹ but the document does not itself specify any specific norms or how they are developed or created.

Peremptory norms have not been fully itemized, but they include injunctions against waging aggressive war, crimes against humanity, war crimes, maritime piracy, genocide, apartheid, slavery, and torture.

³⁷U.S. Legal Definitions, “Peremptory Law & Legal Definition,” <http://definitions.uslegal.com/p/peremptory> (accessed January 2010).

³⁸*Vienna Convention on the Law of Treaties*, Article 53.

³⁹“Emergence of a new peremptory norm of general international law (*jus cogens*): If a new peremptory norm of general international law emerges, any existing treaty which is in conflict with that norm becomes void and terminates.” See *Vienna Convention on the Law of Treaties*, Article 64.

These norms have arisen out of case law and changing political policy-making attitudes, and can be found where there is a clear international disapproval of specific practices or acts.

There is some disagreement over how peremptory norms should be acknowledged and put into force. The relatively new concept conflicts with the traditional consensual nature of treaty and customary international law that ensures state sovereignty. According to Rafael Nieto-Navia, there are three pre-requisites (some a bit tautological in nature) for a norm to be “elevated” to the status of a norm of *jus cogens*.⁴⁰ First, the peremptory norm must be a norm of general international law. General international law is international law binding on most, if not all, states; however, not all facets of general international law have the character of *jus cogens*. The rules do not exist “to satisfy the need of the individual states, but the higher interest of the whole international community...”⁴¹ This need can be seen in rules created to achieve humanitarian purposes.

Second, the norm must be “accepted and recognized by the international community of States as a whole.”⁴² Accepting and recognizing a norm within the international community can be either express or implied. Ascertaining the minimum breadth necessary for acceptance is subject to debate; the international community tries to avoid situations whereby one or a few rogue states can effectively negate any decision to designate a norm as peremptory. Thus, a norm can be considered as *jus cogens* if it is accepted and recognized by the international

⁴⁰Rafael Nieto-Navia, “International Peremptory Norms (*Jus Cogens*) and International Humanitarian Law,” 2003, <http://www.iccnw.org/documents/WritingColombiaEng.pdf>, (accessed June 2009), p. 10.

⁴¹*Ibid.*

⁴²*Ibid.*

community of States as a whole; consent of all states is not required (similar in the way in which principles of general customary international law are formed). In this way, norms of *jus cogens* can be drawn from the traditional sources of international law – treaties, international custom, and the like.⁴³

It is a well-accepted principle that treaties do not bind non-parties without their consent. Nieto-Navia contends that exceptions to this principle are those conventions or treaties whose objects and purposes render them *more important*. Ultimately, if provisions of treaties or conventions satisfy the *more important* criteria to be recognized as *jus cogens*, states not party to them will also be bound by their provisions. Of course, a large portion of international law remains customary in nature and treaties often only codify the existing customary law rules, and do not establish peremptory norms.⁴⁴

As a third prerequisite, the norm must be one from which no derogation is permitted. It can be modified only by a subsequent norm of general international law of the same character. This “is in fact the main identifying feature and “essence” of a norm of *jus cogens*.”⁴⁵

Nieto-Navia suggests it is possible to classify norms that are not subject to derogation by treaties or otherwise. These are: norms that have a fundamental bearing on the behavior of the international community of states as a

whole and from which no derogation is permitted at all; norms which are necessary for the stability of the international juridical order; norms having humanitarian objects and purposes including certain principles of human rights and international humanitarian law; norms of general interest to the international community as a whole or to international public order; and norms, which are binding on all new states even without their consent as being established rules of the international community.⁴⁶

Without question, international law undergoes continuous change and is constantly evolving. This means new norms of *jus cogens* should at least in theory continue to develop with respect to the law of space systems, their operations, and space warfare. Examples of acts being contrary to the norms of *jus cogens* would appear to include interfering with some important space systems, especially those presenting NTM, missile warning, emergency communications, and even PNT capabilities.

Space-borne NTMs serve an important role: assuring adversaries that they have complied with arms control treaty terms; providing transparency, enhancing confidence in actions of others, and diffusing tensions; and helping stem the potential of a nuclear holocaust, which would produce a catastrophe whose damaging effects would be global in nature. Reserving access to such NTM systems by antagonists would therefore appear to be a peremptory norm; hence, this would proscribe any attacks on such systems to destroy, disable, or otherwise interfere with them. Proscribing such attacks would satisfy the higher needs and general interest of the whole international community.

Interestingly, the term “National Technical Means” (NTMs) was not specifically defined

⁴³Ibid., pp. 10-11.

⁴⁴Ibid., p. 11.

⁴⁵Ibid., p. 12.

⁴⁶Ibid., pp. 12-13.

Without question, international law undergoes continuous change and is constantly evolving.

and detailed in the original Anti-Ballistic Missile (ABM) Treaty, nor in subsequent arms control treaties. Some argue this could lead to a finding that if satellite systems were not specified and described fully in the treaty they should somehow not warrant the treaty's protection.⁴⁷ While not specific, the "NTM" term references the variety of land, air, sea, and space technologies and systems that can be used to monitor and verify treaty compliance. If the treaty's language could be interpreted to disallow classifying of any system as an NTM, even a space system, then the provision barring interference would appear to have no meaning or effect. Nothing in the record supports such a result as the intent of the signatories. The *Vienna Convention* holds that treaties are to be interpreted "in good faith"⁴⁸ and "ordinary meaning given to the terms of the treaty in their context and in the light of its object and purpose."⁴⁹ Consent may be implied if the other parties fail to explicitly disavow an initial unilateral interpretation, particularly if that state has acted upon its view of the treaty without complaint. For the purposes of this discussion, satellite systems can be employed to monitor treaty compliance and thus can be classified as NTMs.

⁴⁷Peter L. Hays suggests that the language of the ABM Treaty "clearly stops well short of being a blanket anti-satellite (ASAT) weapons ban or even a clear approval of all spying from space." He argues: "it is questionable just how much protection or legitimization it provides for NTM or satellites more generally." See Peter L. Hays, "U.S. Military Space: Into the Twenty-First Century," *INSS Occasional Paper 42* (U.S. Air Force Institute for National Security Studies (INSS) and Air University Press, 2002), p. 58.

⁴⁸"Every treaty in force is binding upon the parties to it and must be performed by them in good faith." See *Vienna Convention on the Law of Treaties*, Article 26.

⁴⁹"A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose." See *Vienna Convention on the Law of Treaties*, Article 31.1.

Indeed, this point was raised in a formerly classified document, where the late Secretary of Defense Melvin R. Laird argued the U.S. should acknowledge:

...the fact that national technical means of verification for the U.S. and the USSR include satellite based reconnaissance. We should further state that all our legitimate national technical means, including satellite based reconnaissance, taken together, give us confidence that we can verify compliance with the provisions of these agreements within satisfactory limits... the fact of U.S. satellite reconnaissance is widely known. I believe that acknowledging this fact in connection with the strategic arms limitation agreements has the important advantage of muting possible adverse reaction...⁵⁰

The Russian and the U.S. positions on limiting interference with NTMs have been set out in treaty and agreement. China, Canada, the United Kingdom, France, and other significant spacefaring powers have made pronouncements condemning interference with such systems, and supporting the transparency efforts. A norm that favors protection of spaceborne NTMs should be supported at least by global spacefaring nations, if not the international community of states as a whole; no overarching alternate norm, stripping these protections, has been proposed.

Similar arguments can be made with regard to spaceborne missile warning and emergency communication capabilities that these should not be attacked or interfered with. These systems would help adversaries to understand,

⁵⁰See Melvin R. Laird, "Memorandum for Assistant to the President for National Security Affairs, Subject: Revelation of the Fact of Satellite Reconnaissance in Connection with the Submission of Arms Limitation Agreements to Congress," 8 June 1972, <http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB231/doc02.pdf> (accessed January 2010).

manage, and limit the extent of damage associated with exchanges of weapons of mass destruction, all to the benefit of the global community. Arguments that peremptory norms proscribe attacks on space-based PNT capabilities could also be made. Proponents for this position would be bolstered by demonstrating the dimensions of the effects and global chaos that could occur in the commercial and civil communities as a result of the destruction of these capabilities. While these arguments are less compelling from ones tied to preventing conflict with weapons of mass destruction, they could be made just the same and, perhaps, accepted.

No matter their importance, it would seem NTMs and/or other systems would warrant less protection if their mission payloads become blended with other more active, non-protected warfighting functions (e.g., supporting integrated fire control and targeting functions for missile defense, or deploying spacecraft platforms or collocating command and control stations that involve a myriad of payloads, not just protected missions and payloads, but other militarily important payloads). If a peremptory norm applies, this could complicate national security space system acquisition and operational strategies, limiting how systems could be configured, in order to preserve any *jus cogens* protection rights. Since NTMs and other systems are usually employed to support a wide variety of warfighting missions, this reality could swallow whole the concept of a peremptory norm protecting them, unless their mission attributes and operations are carefully restricted. Protections for such blended systems would need to be found elsewhere in treaty or customary law.

Peter Hays spotted this problem when he posed the following questions and suggested the ABM Treaty might not provide protected status to some spy satellite activities:

How are the parties to judge whether space-based NTM are engaged in legitimate treaty compliance verification or in general espionage and how much noninterference should they be given in either case? An ASAT attack on space-based NTM attempting to verify compliance with the treaty would surely constitute “interference,” but how about lesser levels of nondestructive interference such as laser “dazzling?” What about interference that takes place in portions of the orbit that do not pass over the territory of the treaty signatories? Based on these questions and despite the NTM protection these provisions were often alleged to provide in the heyday of détente, the provisions in the ABMT [ABM Treaty] should not be seen as constituting an ASAT prohibition or as granting a strong and specific level of legal protection for NTM at all times. Even more importantly, the amount of “protection” this language provides for all other civil, commercial, and military space systems – including commercial remote sensing systems that might or might not be performing NTM missions – would seem to be even more tenuous.⁵¹

Treaties and Customary Law

Article III of the OST declares that states parties must conduct their space activities “in the interest of maintaining international peace and security.” The treaty’s preamble also recognizes “the common interest of all mankind in the progress of exploration and use of outer space for peaceful purposes.”⁵²

⁵¹Peter L. Hays, “U.S. Military Space: Into the Twenty-First Century,” *INSS Occasional Paper* 42 (U.S. Air Force Institute for National Security Studies (INSS) Air University Press, 2002), pp. 58-59.

⁵²Article IV places the “peaceful purposes” restriction on the Moon and other bodies; it suggests that States may engage in non-peaceful activity in space as long as it does not occur on a

Though crafted before the space era, a careful reading of the UN Charter shows its terms are fully consistent with and encourage peaceful space activities. The first purpose of the UN is to “maintain international peace and security, and to that end: to take effective collective measures for the prevention and removal of threats to the peace, and for the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace.”⁵³

The UN and its 1945 Charter arose out of the ashes of the League of Nations and failures of the international community that led to World War II. Despite its inadequacies, the League helped establish the groundbreaking *Kellogg-Briand Pact* of 1928, also known as the Pact of Paris – this treaty is continues in force today. In *Kellogg-Briand*, the signatories condemned recourse to war as a solution to international controversies, and renounced it as an instrument of national policy in their relations among each other. It proscribed the threat and use of force in contravention of international law, and territorial acquisitions resulting from such actions.⁵⁴

The UN Charter’s language expands on the terms set out in *Kellogg-Briand Pact*. Article 2(3) provides: “All members shall settle their international disputes by peaceful means in such a manner that international peace and

security, and justice, are not endangered.”⁵⁵ Article 2(4) of the Charter presents another significant rule: “States shall refrain from the threat of or use of force against the territorial integrity or political independence of any state.”⁵⁶ The phrase “international peace and security” contained in Article 2(3) is echoed in the later agreed-to OST. The repetition of the words “international peace and security” in the OST links “peaceful purposes” back to norms of “peaceful means” enunciated in the UN Charter.⁵⁷

Some believe that under the UN Charter, war was outlawed.⁵⁸ While not entirely correct, the Charter firmly establishes the general principle that armed conflict is neither proper nor inevitable, irrespective of the political purposes or merits. This new view replaced the ancient Augustinian “just war” formulation.⁵⁹ Still, despite its imperative for preserving international peace and security, the Charter does not ban all use of force. The document outlaws the aggressive use of force, and the aggressive use of force has become an international crime.⁶⁰

“Acts of aggression” are not defined within the Charter. Indeed, the definition for “act of aggression” has been debated over the decades. Some argue the term was left undefined on purpose, that if a list of acts were specifically set out as “aggression.” then anything not making the list might not count;

⁵⁵UN Charter, Article 2(3).

⁵⁶UN Charter, Article 2(4).

⁵⁷J.P. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p.3.

⁵⁸Oscar Schachter, “The Right of States to Use Armed Force,” *Michigan Law Review* 1620 (1984).

⁵⁹Saint Augustine believes that a war was just when it was waged in order to redress a wrong or unjust enrichment.

⁶⁰See UN Charter 1(1), and, generally, Antonio Cassese, *International Criminal Law* (2003), pp. 110-125.

celestial body. Indeed, some argue this is how the U.S. officially interprets this article.

⁵³UN Charter, Article 1(1).

⁵⁴The Pact was concluded outside the League of Nations and remains a binding treaty. Importantly, the *Kellogg-Briand Pact* was used as a foundation for the post World War II prosecutions at Nuremberg.

the signatories did not want to leave an opening for unseemly argument by aggressors.⁶¹ Even so, insight into the term's meaning can be found in UN General Assembly Resolution 3314 (1974).⁶² "This resolution defines aggression as 'the use of force by a State against the sovereignty, territorial integrity or political independence of another State, or in any other manner inconsistent with the Charter of the UN.' Since one of the UN Charter's purposes is to maintain international peace and security, States may not use force in a way that disturbs international peace and security."⁶³

Given the over-half century of rule-making and statecraft just discussed, P.J. Blount argues the OST's principles of peaceful purposes for outer space can now be found in international customary law. According to Blount:

The principle of the peaceful uses of outer space can be found throughout the literature on space law; however, the Outer Space Treaty only uses the term "peaceful purposes" to refer to outer space in the preamble of the treaty. It is used in the body of the treaty to refer to the Moon and other celestial bodies, but not to outer space in general. There is, however, strong support for the term applying to outer space via customary international law from the term's use in the preambles to both the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space and in the Outer Space Treaty to its use in laws, policies, and

official statements of numerous States dealing with their respective space programs.⁶⁴

While the principle of "peaceful purposes" has most likely entered customary international law and now applies to space activities, the meaning of that term is even now a bit uncertain – uncertain in part because the phrase is undefined and because nations apply it in different ways.⁶⁵ Some argue the phrase means any military use of space violates the treaty.⁶⁶ This is a decided minority view. Though there are limits, the alternate U.S. view is military space activities are presumed to be allowed unless specifically prohibited by law. Naturally, the permissive U.S. position generates consternation within peace elements of the international community, who argue the U.S. seeks to preserve its hegemony in and dominance of the space domain. Nevertheless, the U.S. view is compelling, convincing, and clarifying – longstanding customary practice and law permits military use of space. As noted by Adam Frey:

Military use of space in support of operations – such as communications, intelligence gathering, and precision targeting – is commonly considered peaceful if it does not violate other international law. In other words, space operations are considered peaceful, provided they are not "aggressive." Space may still be used as a medium of warfare: the treaty does not prohibit anti-satellite (ASAT) weapons or even nuclear weapons that merely transit space. Other weapons may be deployed in

⁶¹"Indirect aggression," however, has not found favor as an "act of aggression."

⁶²See Definition of Aggression, UN General Assembly Resolution 3314, UN GAOR, 29th Session, Supplement No. 31, UN Doc. A/9631 (1974).

⁶³P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*," IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008.

⁶⁴*Ibid.*, p. 2.

⁶⁵*Ibid.*, p. 2.

⁶⁶Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008), <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/win08/frey.html> (accessed June 2009). Also, see Joan Johnson-Freese, "The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control," *INSS Occasional Paper 30* (U.S. Air Force Institute for National Security Studies (INSS), January 2000), p. 10.

space so long as they are neither nuclear weapons nor weapons of mass destruction. Furthermore, self-defensive acts in space are also permissible, provided they do not violate other treaty restrictions.⁶⁷

As touched on above, the “U.S. employs a permissive interpretation of the OST and the other rules regulating military activities in space.”⁶⁸ The traditional U.S. interpretation, shared by most other spacefaring countries, is “nonaggressive” military support activities are not inconsistent with the peaceful-use principle.⁶⁹ But what are “aggressive acts” in space? How should they be defined? Should such acts be defined and limited to effects produced on just spacecraft, or should effects to the entirety of space systems be considered (e.g., spacecraft, their constellations, links, footprints for sensor and communications activity, ground control stations, or even sustainment and acquisition activities)? Some suggest the definition of “aggressive acts” should encompass actions, such as the use of force from space or in space when not consistent with exceptions found within the UN Charter. Others argue the “peaceful purposes” clause should be interpreted to mean states cannot use outer space for full-scale warfare, particularly nuclear war.⁷⁰

Those who continue to argue any military use of space violates peaceful use principles ignore reality of the long-standing

militarization of space by the global powers.⁷¹ The intent of the OST’s framers and an interpretation of its terms allowing military activities in space can readily be ascertained by looking to the practices of major spacefaring powers. They continue to use space for military purposes following endorsement of the OST.

When U.S. defense officials’ writings mention the OST, they typically insist U.S. policy and military uses of space not explicitly prohibited in Article IV (i.e., no weapons of mass destruction in orbit and military activities on celestial bodies) are permitted.⁷² Some suggest this posture ignores Article III’s declaration that space activities must be performed in accord with international law, including the UN Charter’s rules about the threat or use of force.⁷³ Nonetheless, and consistent with its views, the U.S. has steadily expanded the scope of its “peaceful” non-aggressive

⁶⁷Ibid.

⁶⁸Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts and Sciences, Reconsidering the Rules of Space Project, Cambridge, Massachusetts, 2008, p. 42.

⁶⁹Ivan Vlasic, “The Legal Aspects of Peaceful and Non-peaceful Uses of Outer Space,” in *Peaceful and Non-peaceful Uses of Space*, Bhupendra Jasani, ed., (Taylor and Francis, 1991), pp. 37–55.

⁷⁰Christopher M. Petras, “Space Force Alpha: Military Use of the International Space Station and the Concept of ‘Peaceful Purposes,’” *Air Force Law Review* 53 (2002): 157-61.

⁷¹According to Thomas C. Wingfield, “Legal Aspects of Offensive Information Operations in Space,” 23 March 2000, p. 6, <http://www.au.af.mil/au/awc/awcgate/dod-io-legal/wingfield.doc> (accessed January 2010): “Nowhere in the Outer Space Treaty is the term [“Peaceful purposes”] defined, and two opposing views have developed. The majority opinion, certainly among spacefaring nations, is that “peaceful” means “nonaggressive,” a relatively high standard allowing for considerable military operations in space. The minority view, more common among the less advanced, non-spacefaring nations, is that “peaceful” means “nonmilitary,” setting such a low threshold that even routine, peacetime military business, such as communications and weather observation, would be prohibited.”

⁷²Interestingly, during hearings on the ratification of the Outer Space Treaty, it was noted that “Secretary of State Dean Rusk asserted that while the U.S. was confident in its ability to adequately verify the OST prohibition on nuclear weapons and weapons of mass destruction, that ‘the treaty does not inhibit, of course, the development of an anti-satellite capability in the event that should become necessary.’” See Peter L. Hays, “U.S. Military Space: Into the Twenty-First Century,” *INSS Occasional Paper* 42 (U.S. Air Force Institute for National Security Studies (INSS), Air University Press, 2002), p. 70.

⁷³Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts and Sciences, Reconsidering the Rules of Space Project, Cambridge, Massachusetts, 2008.

military space activities, often for the betterment of the global community and benefiting potential adversaries. GPS (Global Positioning System) PNT, SSA, missile warning, and communication services operated by U.S. military systems have been used and exploited by global military, civil, and commercial communities.

A tacit acceptance of the U.S. behavior has emerged; indeed, all of the major spacefaring nations have expanded their military activities in space. Also, performing military activities in space may have inherently humane ends, even in support of destructive or deadly military operations. Elizabeth Waldrop correctly notes LOAC principles of discrimination and proportionality are enhanced by the use of space assets “to successfully carry out near-surgical strike with minimum civilian casualties.”⁷⁴ In the end, however, the “various unopposed military uses of space may as a practical matter enlarge the unofficial definition of ‘peaceful purposes’ to the point that specific arms control agreements may be the only effective limitation on development and deployment of various weapons in space.”⁷⁵

Space Warfare

Despite the histrionics of the peace and disarmament community, the conduct of military space activities is an accepted practice and consistent with the OST and other agreements. Plainly, the OST, conventions, and international agreements do not foreclose space warfare or preparation for such conflict. There are caveats to this point, however. The OST expressly limits placement of nuclear weapons and weapons of mass destruction on

orbit, and restricts such weapons and military bases on celestial objects. In parallel, the Limited Test Ban Treaty restricts nuclear explosions in space.⁷⁶ Even so, the UN Charter and OST do “not prohibit States from placing weapons of a defensive nature in space (unless some further meaning can be attributed to the term peaceful purposes) or from placing weapons required by order of the UN Security Council in order to maintain international peace and security. Probably the difference between an aggressive weapon and a defensive weapon can almost always be found in its use.”⁷⁷ Or, the difference can be found in the politics or diplomacy of its use.

What is a “space weapon?” The devil is in the details, especially given the variety of ways we discussed above in which space systems can be attacked and degraded. Should the definition of space weapon include systems or combat operations that attack terrestrial components of space systems, or jam or interfere with system command and control? Should it encompass seemingly innocuous civil satellites or microsatellites that can be vectored to kinetically engage adversary systems; or systems left dead in orbits, without executing end-of-life super-sync or other operations to reduce chances of collisions with other satellites. Perhaps, the definition of “space weapon” should be broad: an instrument or instrumentality of attack or defense used to fight space systems or from the space domain.

⁷⁶Article IV of the Outer Space Treaty restricts military activity and prohibits placing “nuclear weapons or any other kinds of weapons of mass destruction” into orbit or permanently affixing them to a celestial body. Also, the Moon and other celestial bodies may be used only for “peaceful purposes,” and they cannot be used for military bases or weapons testing.

⁷⁷P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p.4.

⁷⁴Elizabeth Waldrop, “Weaponization of Outer Space: U.S. National Policy,” *High Frontier* (Winter 2005): 40–41.

⁷⁵*Ibid.*, 36–37.

U.S. Congressman Terry Everett argues:

Some believe a space weapon is purely a weapons system based in space that collides with another space object or intercepts a missile traveling through space. However, I would argue, the damage caused by a ground-based high energy laser is just as severe for a target satellite as the damage caused by a physical on-orbit collision. The key difference is the latter may create unacceptable debris field, posing further risks to satellites.

It is the ambiguity in definition that makes arms-control measures, which ban space weapons difficult to implement and nearly impossible to enforce. This is compounded by the fact that satellites have tremendous dual-use value, making it very difficult to distinguish a non-weapon space system from a weapon space system. Any satellite could be maneuvered in such a way as to collide with a target satellite. Any ballistic missile, with sufficient orbital ephemeris data and software changes, could be used to target a satellite.⁷⁸

Dr. Michael Rance, a United Kingdom missile defense and space policy expert and leader proffers:

There is no formal definition of “weaponization of space” or “space weapons,” but some have tried. Michael Krepon and Michael Katz-Hyman propose this (citation omitted): “terrestrially based devices specifically designed and flight-tested to physically attack, impair, or destroy objects in space, or space-based devices designed and flight-tested to attack, impair, or destroy objects in space or on Earth.” Bruce DeBlois suggests something similar: “A space weapon is that which is

built with destructive intent to be used in a terrestrial-to-space, space-to-space, or space-to-terrestrial capacity” ...I recognize that alternatives exist, usually depending on which side of the debate the definer sits. Contention focuses on whether ground-based weapons should be included... Some definitions include as a space weapon a defensive interceptor such as THAAD or Aegis SM-3 when the planned interception is OUTSIDE the atmosphere, but exclude the use of Patriot PAC-3 and THAAD when the planned interception is WITHIN the atmosphere. This is a particular issue for THAAD which has both an exo- and an endo-atmospheric capability. There is no consensus [on the definition].⁷⁹

Michael Krepon and Michael Katz-Hyman believe their definition:

...respects the distinction between capability and actuality. It excludes residual or latent space warfare capabilities, such as ballistic missiles. Also excluded in this working definition are satellites that provide essential military functions, but do not serve as weapon platforms. In other words, the definition used here clarifies the essential distinction between the current military uses of space and the flight-testing and deployment of space weapons that some wish to pursue in the future. This definition also excludes activities that are specifically designed to interfere with the uplinks or downlinks of satellites. Jamming is treated separately from direct, physical attacks against satellites because jamming has long been considered a part of warfare, whereas direct attacks in or from space would

⁷⁸Terry Everett, “Arguing for a Comprehensive Space Protection Strategy,” *Strategic Studies Quarterly* (Fall 2007): 32-33.

⁷⁹Michael Katz-Hyman and Michael Krepon, “Viewpoint: Space Weapons and Proliferation,” *Non Proliferation Review* 12: 2 (July 2005): 325-326.

be consequential firsts in the history of warfare.⁸⁰

The challenge of identifying space weapons in terms of just exactly where and under what conditions they exist is highly complex. Robert A. Ramey opines:

(The) basic term space weapon lacks definition in international law. As a result, the concept it represents, which broadly speaking includes any implements of warfare in space, is difficult to isolate. Without this foundational definition, one cannot define phrases on which it might rely. The difficulty comes into particular focus by observing that any comprehensive definition of space weapons will include space systems equally used for nonmilitary, nondestructive, and nonaggressive purposes. Though space weapons may seem to include only a discrete class of armaments with easily definable characteristics, a closer examination “reveals a less obvious and more inclusive set of systems.”⁸¹

Despite the challenges in the definition, no treaty bans conventional space weapon systems, so it can be concluded that “nonnuclear ASAT weaponry is... legal.”⁸² Yet a conclusion that ASAT weapons are legal does not give state parties license or authority to use or station conventional weapons in outer space (on orbit or otherwise); such activities must be conducted within the framework offered under treaties and customary international law, which encourage the non-aggressive “peaceful use” of space. In the end, these activities and interests must be balanced against the other.

⁸⁰Ibid.

⁸¹*Independent Working Group on Missile Defense, the Space Relationship, and the Twenty-First Century, 2007 Report* (Institute for Foreign Policy Analysis, 28 August 2006), p. 73.

⁸²See Bruce A. Hurwitz, *The Legality of Space Militarization* (North-Holland, 1986), p. 127.

Bruce Hurwitz argues in *The Legality of Space Militarization*, “Considering the spirit of the law, the conclusion appears to be that anti-satellite weapons are legal, *de lege late*, but should be illegal, *de lege ferenda*.”⁸³ The principle of non-aggression places an affirmative duty on States not to station weapons of an aggressive nature in outer space; examples of such provocative aggressive acts could be the deployment of a co-orbital mine in the vicinity of a competitor’s military space asset, performing “intercepts,” or creating conditions for or causing conjunctions between satellites and objects on orbit.

Despite the steady expansion in military use of space by global space powers, considerable mutual restraint has been exercised with respect to deployment of space-based weapons. No space-based weapon, that is, an instrument or instrumentality of attack or defense used to fight space systems or from the space domain, is deployed on-orbit today. This reality has occurred because global policy-makers have come to appreciate the terrifying practical consequences of space weaponization and resulting conflict: the debilitating problems and physics of resulting space debris if the weapon systems are used; the indiscriminate nature and consequences of employing nuclear weapons in space as borne out by the Starfish Prime experiment conducted by the U.S. in the early 1960s; the stakes space-dependent nations risk if they plan for such conflict; and the loss of stability in the space domain, which is increasingly globalized in an interdependent world. Keeping in line with this thinking, proscribing interference with NTM monitoring capabilities was a rather pragmatic choice to enable the super powers to advance nuclear weapons reductions over the past four decades.

⁸³Ibid., p. 128.

Some states protest the continuing expansion of some U.S. military space activities, believe more should be done to limit them, and have pushed for adoption of proposed treaties, such as the *Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT)*, presented as part of the UN Conference on Disarmament's (CD) discussion on the Prevention of an Arms Race in Outer Space (PAROS). The proponents suggest the progress of science and technology make it necessary to strengthen international principles relating to reducing potential threats. The Chinese argued that a peaceful and tranquil outer space free from weaponization and arms race serves the common interests of all countries, and the Russians argued that the security of outer space is facing serious challenges.⁸⁴ The PPWT seeks to ban two interrelated conducts: the placement of weapons in outer space; and the threat or use of force against outer space objects.

The proposed PPWT treaty defines "weapon in outer space" as:

Any device placed in outer space, based on any physical principle, which has been specifically produced or converted to destroy, damage, or disrupt the normal functioning of objects in outer space, on the Earth or in the Earth's atmosphere, or to eliminate a population or components of the biosphere, which are important to human existence or to inflict damage on them.⁸⁵

⁸⁴China and Russia jointly submitted the draft Treaty on PPWT to the UN Conference on Disarmament," Ministry of Foreign Affairs of the People's Republic of China, 12 February 2002, <http://www.fmprc.gov.cn/eng/wjb/zzjg/jks/jkxw/t408634.htm> (accessed January 2010).

⁸⁵Proposed *Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects*, Article 1C.

The "threat of the use of force" is defined as:

Any hostile actions against outer space objects including, inter alia, actions aimed at destroying them, damaging them, temporarily or permanently disrupting their normal functioning or deliberately changing their orbit parameters or the threat of such actions.⁸⁶

However, as conceded by Russians and Chinese, verification of such a PPWT treaty would be extremely difficult. Also, the PPWT does not ban development and testing of Earth-based ASATs. Even disarmament groups, like Project Ploughshares, concede the "the PPWT lacks precision, has potential loopholes, or is subject to interpretation."⁸⁷ This is a sad state of affairs for a major arms control proposal. Given these defects, the Russians and others suggest agreements on *Transparency and Confidence Building Measures* could be implemented to compensate for them and move the process along.

For its part, the U.S. has pushed back, first abstaining, then voting "no" to reject the PAROS proposals. Under the George W. Bush administration, it argued the existing multilateral arms control agreement regime is "sufficient," there is no present "problem in outer space for arms control to solve, and the proposed treaty does adequately dispose of threats posed by ground based systems."⁸⁸

Despite its own issues associated with complying with space-related treaty obligations, especially with its 2007 ASAT

⁸⁶Ibid, Article 1E.

⁸⁷Cesar Jaramillo, "In defense of the PPWT Treaty: Toward a space weapons ban," *The Ploughshares Monitor* 30: 4 (Winter 2009): 4.

⁸⁸See *Government space arms control proposals*, Secure World Foundation, http://www.secureworldfoundation.org/index.php?id=151&page=Governmental_Proposals (accessed June 2009).

test, China's representatives disingenuously charge recent U.S. space activities "run counter to the fundamental principle of peaceful use of outer space" and contend the U.S. goal in outer space is to "defy the obligations of international legal instruments and seek unilateral and absolute military and strategic superiority."⁸⁹ These specious claims do not reflect the totality and reality of U.S. space efforts, which span a spectrum of civil, commercial, and military activities and missions. No doubt the Chinese actions and attendant diplomatic overtures are part of a strategic messaging campaign to champion the internal, regional, and global interests of its government. Some could characterize the Chinese actions as a form of "lawfare." "The term lawfare describes the growing use of international law claims, usually factually or legally meritless, as a tool of war. The goal is to gain a moral advantage over your enemy in the court of world opinion, and potentially a legal advantage in national and international tribunals."⁹⁰

...*"peaceful purposes" in space should be construed to mean "non-aggressive;"*...

For years, the U.S. has acknowledged the diplomatic posturing relating to space weaponization, summarizing only the points made, but not conceding them. Furthermore, though it has tinkered with the technologies and possibilities from time-to-time, the U.S. has yet to deploy any space-based weapon system. The Obama Administration and its domestic allies propose to negotiate a ban on space weapons, however defined, and even though there is uncertainty about exactly what would be considered acceptable or workable. Interestingly, but not lost on the arms control and space policy community, while references to negotiating such a ban were first posted in January 2009 on the White House website, they were removed only a few months later.⁹¹ This more than likely transpired due to the realities of interagency process, which require measured and thoughtful policy making. Still, the Obama Administration has now endorsed the PAROS-based discussions within the UN CD.

Despite the difficulties, the U.S. should strive to sort through the intractable issues presented by space weapons and weaponization and help establish normative space community behaviors relating to them. It has assumed similar leadership roles for the entirety of the Space Age, serving as a rule-setter and guide to achieve best space practices. It has leveraged its position as the preeminent space

⁸⁹Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts and Sciences, Reconsidering the Rules of Space Project, Cambridge, Massachusetts, 2008, p. 42, citing the "Statement by H.E. [His Excellency] Mr. Li Changhe – Chinese Ambassador for Disarmament Affairs, Head of the Chinese Delegation for the Conference on Disarmament – at the Plenary Meeting of the CD," 12 March 1998, www.nti.org/db/china/engdocs/lich0398.htm (accessed June 2009); Fu Zhigang, "A Chinese View of Star Wars," *The Spokesman* 72 (2000): 17–18; and "Statement by Ambassador Hu Xiaodi for Disarmament Affairs of China at the Plenary of the Conference on Disarmament," 7 June 2001, <http://www.nti.org/db/china/engdocs/cd060701.htm> (accessed June 2009).

⁹⁰David B. Rivkin, Jr. and Lee A. Casey, "Lawfare," *Wall Street Journal* 23 February 2007, A11, <http://online.wsj.com/article/SB117220137149816987.html> (accessed December 2009).

⁹¹After Obama was sworn into office, the official White House Web site was updated with a set of policy guidelines including one on restoring U.S. leadership in space. Under the heading "Ensure Freedom of Space," the statement said the White House would seek a ban on weapons that "interfere with military and commercial satellites." See Turner Brinton, "Obama's Proposed Space Weapon Ban Draws Mixed Response," *Space.com*, 4 February 2009, <http://www.space.com/news/090204-obama-space-weapons-response.html> (accessed January 2010). According to John Logsdon, former director of the George Washington University Space Policy Institute, the text originated from an Obama campaign white paper that was transferred verbatim to the White House website without input from any of the government bodies that manage national policy..

power and used its bully pulpit to influence the global space-airing community. The U.S. assumed such a leadership role on space debris and end-of-life operations back in the 1980s when analysis showed an alarming expansion in space debris arising from space operations.⁹²

Self-Defense and International Peace and Security

As noted above, “peaceful purposes” in space should be construed to mean “nonaggressive;” hence, any use of a weapon in space or any attack on a space system would have to conform to the exceptions to the ban on the use of force found in the UN Charter.⁹³ The first exception applies if the use of force is authorized by the Security Council in order to maintain international peace and security. As a second exception, Article 51 reaffirms that nothing in the Charter should be construed to impair the inherent right of self defense against armed attack. This right of self-defense has always been recognized, whether in municipal or international law, and existed well before the advent of the UN Charter.

Thus, under Article 51, if a state is subject to an armed attack, it may use force to repel the attackers and stop the attack. Alternatively, if it is unclear whether an action constitutes such an attack, Chapter VII of the UN Charter gives the UN Security Council the authority and

responsibility to determine the existence of any “threat to the peace” or acts of aggression. The Council can then recommend and lead an appropriate response; however, because Security Council actions are subject to international political negotiation, any response would not likely be quick or a significant deterrent to an aggressor.⁹⁴

In *Nicaragua v. U.S. (1986)*, the ICJ offered insight into the meaning of the Article 51 right of self defense against armed attack.⁹⁵ In that case, the Soviet Union and Cuba were accused of assisting the Nicaraguan Sandinistas, who were alleged to have committed acts of destruction and atrocities against Honduras and Costa Rica. On the other side, the Nicaraguan Contras were fighting the Sandinistas, and the U.S. was assisting in their counter-revolution against the Soviet-sponsored Marxist regime. The U.S. was accused by the Sandinistas of unauthorized overflights, mining a harbor, and training rebels at an alleged CIA training camp.

In its ruling, the ICJ held it is no longer acceptable to settle disputes with force, what had been customary law for millennia. Importantly, the court held the use of force could now only be justified in one of three ways: (1) self-defense activities recognized as rights under Article 51 of the UN Charter; (2) enforcement actions under Chapter 7 of the UN Charter; and (3) possibly through application of pre-UN anticipatory defense rules of necessity and proportionality.⁹⁶ The

⁹²See *Fact Sheet on Presidential Directive on National Space Policy*, 11 February 1988, which provides in pertinent part: “The directive further states that all space sectors will seek to minimize the creation of space debris. Design and operations of space tests, experiments and systems will strive to minimize or reduce accumulation of space debris consistent with mission requirements and cost effectiveness.”

⁹³P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p.3.

⁹⁴Jia Huang, “New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space,” *Journal of Politics and Law* 2: 1 (2009): 40.

⁹⁵As was its right, the U.S. did not agree to subject itself to jurisdiction by the ICJ, which then proceeded and based its finding of fact based on the presentations made by the Sandinistas. The U.S. still disputes facts in the case, as well as the actual outcome, but it does endorse substantial portions of the ruling and cites it in other cases.

⁹⁶The U.S. and a few other countries assert this third principle of anticipatory defense from time to time; they are the rules

court held states have a right of collective self-defense only if they are under armed attack. Finally, in making an armed response in self-defense under Article 51, a state must also immediately report the fact of the armed attack to the UN Security Council, and the state must also promptly report its own actions in response.

According to the ICJ, the sole justification for U.S. actions in *Nicaragua v. U.S.* was collective self-defense under Article 51. However, the court found none of the states involved the purported collective self-defense reported to the UN that they were subject to armed attacks. In addition, nobody reportedly asked the U.S. to help, nor did the U.S. report an attack to the UN. Hence, the ICJ concluded, the right of collective self-defense could not be invoked.

The ICJ ruled self-defense rights could not be invoked if the threshold of actual armed attack was not reached.⁹⁷ The UN' definition of aggression provided the court a foundation to establish the threshold for an armed attack. According to the Court, an "armed attack" is not the same as an act of aggression. A mere threat of force is not an armed attack, nor would all acts of aggression count. Hence, an opposing state may engage in an illegal use of force, yet that may not constitute an armed attack allowing for the use of force in self-

defense. According to the ICJ, even though Nicaragua may have been guilty of odious violations of international law, absent an armed attack there was no right of collective self-defense that could be invoked by U.S. or its allies and friends. According to the court, the words "an armed attack occurs" speak of the actual commencement of physical violence by armed forces. As we will see, the ICJ ruling on this point is somewhat unrealistic if applied to attacks on space systems.

Use of Force and Self-Defense

Must space systems be subject to some sort of physical violence before a response, armed or otherwise, can be initiated? Should non-kinetic types of attacks against space systems qualify as armed attacks? In short, the answers are "No" and "Yes," respectively.

Threats are no longer presented just in the terrestrial ground, sea, and air environment, or just with classically recognized kinetic weapons. They are now manifested in space, through new and exotic electromagnetic means or information operations. Since the venues and mechanisms for attack are evolving, so too must the vague definition of "armed attack" at least with respect to space systems.

According to Jia Hueng:

...the current international laws have not given any definite definition of the term "use of force" and the information operations in outer space have brand-new features, which are apparently different from those of traditional armed conflicts characterized by the mass of troops and armaments and the invasion of territory. So, we have to consider what actions by or against objects in space will be considered to be uses of force. The international community would probably not hesitate to regard

from *The Caroline Affair* discussed later. In *Nicaragua v. U.S.*, the ICJ held that the UN Charter did not supersede custom, but exists alongside it. The U.S. position is that anticipatory self-defense is inherent in the right of self-defense. The ICJ, however, expressly held that it did not address the legality of anticipatory self-defense because the issue had not been raised. See Joshua E. Kastenberg, "The Use of Conventional International Law in Combating Terrorism: A Maginot Line for Modern Civilization Employing the Principles of Anticipatory Self-Defense and Preemption," *Air Force Law Review* 55 (Spring 2004): 114.

⁹⁷The ICJ also held there is no such thing as a right of "collective" armed response to acts, which do not constitute an "armed attack."

as a use of force the destruction of a satellite by a missile or a laser. It would probably react similarly if it could be proven that one nation took over control of another nation's satellite by electronic means and caused it to fire its retro rockets and fall out of orbit. In such a case, the consequences will probably matter more than the mechanism used. The reaction of the international community to lesser kinds of interference is hard to predict. For example, if one nation were able by electronic means to suspend the operations of another nation's satellite for a brief period, after which it returned to service undamaged, it is likely that the international community would consider such an action as a breach of the launching nation's sovereign rights, but not as a use of armed force.⁹⁸

To hold intentional dazzling, electromagnetic, or information operation activities that target, seek to damage, and actually disable, destroy, degrade, or interfere with space systems as not "armed attacks" would render the word "attack" meaningless. International law must preserve peace and security and, by extension, protect space systems from a wide variety of threats and in venues not contemplated within the UN when it was founded in 1945. In our modern world, a state secures and defends its territory, political independence, and elements of national power (diplomatic, information, military, and economic) with space and space-enabled information systems. They provide the state a myriad of essential services – communications, warning, intelligence, weather, PNT, and missile and space defense. A state must assure itself of the right to exercise jurisdiction and control over these

systems free from interference; to do so a state must have the right to defend them against attack. Limiting the right of self-defense in response to attacks on these capabilities would be illogical, especially since they can be essential to the survival of a state. Such a holding – that there is no such right – would mean the rights of free passage of space systems codified in the OST and found elsewhere within customary law and treaty would be just empty words and mean little. "The maintenance of the right of self-defense is critical for protection of the space network, but recent attempts by international bodies to limit this right signal an apparent trend toward the devolution of the inherent right of self-defense."⁹⁹

Defining intentional and also damaging electromagnetic and information operations as armed attacks are consistent with a necessary expansive reading of Article 51's right of self-defense. Two divergent views have developed concerning Article 51's right of self-defense. The expansive view maintains the word "inherent" in Article 51's right of self-defense provides the customary international law rights of self-defense remained intact and Article 51 simply confirmed the right of self-defense in the particular situation of an armed attack, but did not deny it in others. This is the U.S. view – states retain their rights under international law, especially self-defense principles of necessity and proportionality, except those specifically surrendered under the UN Charter.

The 2006 U.S. National Space Policy is in accord with the expansive interpretation. It frames the primary objective of the Policy as preserving a relative national U.S. advantage,

⁹⁸Jia Huang, "New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space," *Journal of Politics and Law* 2: 1 (2009): 40, citing DOD General Counsel, *An Assessment of International Legal Issues in Information Operations* (May 1999), p. 27.

⁹⁹See Gregory E. Maggs, "The Campaign to Restrict the Right to Respond to Terrorist Attacks in Self-Defense Under Article 51 of the UN Charter and What the U.S. Can Do About It," *Regent Journal of International Law* 4:149 (2006): 155-167.

rather than establishing a mutual benefit, by declaring that freedom of action in space is as important to the U.S. as air power and sea power. The 2006 National Space Policy asserts a broad array of U.S. rights and vital interests in space. It rejects any limitations on the fundamental right of the U.S. to operate in and acquire data from space. The policy also emphasizes that the U.S. is prepared to take unilateral action to dissuade, deter, defeat, and, if necessary, deny space-related activities hostile to its interests.

The alternate restrictive view asserts that the UN Charter allows only for a narrow right of self-defense – a right to respond only in the specific situation of a prior armed attack.

[The restrictive] view has considerable support and is consistent with a number of resolutions passed by the Security Council. Proponents of this view see Article 51 as a partner to Article 2(3), which requires peaceful settlement of disputes, and Article 2(4), which outlaws the use of force. They consider “the permission in Article 51 [to be] exceptional in the context of the UN Charter and exclusive of any customary right of self-defense.” This restrictive approach addresses the fear that expansive interpretations of Article 51 create a loophole through which various countries could rationalize military adventurism.¹⁰⁰

Aggression not formally amounting to “armed attack” can also be just as threatening to the sovereignty and the existence of a state as full military hostilities. Spacefaring states defend their political independence within the confines of the UN Charter. They exercise jurisdiction and control over their space systems, and by preventing and defeating

attacks on those activities. The jurisdiction and control element is quasi-territorial according to Bin Cheng, and this provides accord for a state asserting rights of self-defense for space systems as a defense of national sovereignty, territorial integrity, or political independence.¹⁰¹

Those that argue for narrow, and limiting interpretation, only provoke resort to self-help by states outside the bounds of the Charter. “A legal system which merely prohibits the use of force and does not make adequate provision for the peaceful settlement of disputes invites failure.”¹⁰² Though a bit counter-intuitive, the use of force in self-defense, in turn, enables attainment of the overarching objectives of international peace and security.

Some suggest the restrictive view of self-defense is more analytically sound and widely accepted than the other view. They argue an expansive reading of Article 51 conflicts with the letter and spirit of the UN Charter. Scholars arguing for a restrictive interpretation fail to adequately address the practicalities of modern warfare; a narrow interpretation and definition of attacks and permissible self-defense is simply unworkable as there does not appear to be a happy medium, which actually preserves and protects the spacefaring rights of nations. The covert nature of modern forms of diplomatic, information, military, and economic conflict and the potential for crippling destruction and damage continues to evolve with a potential for catastrophic

¹⁰⁰Norman Menachem Feder, “Reading the UN Charter Connotatively: Toward a New Definition of Armed Attack,” *NYU Journal of International Law & Policy* 395 (1987): 404.

¹⁰¹“...since territorial sovereignty has been banned from outer space and, with it, territorial jurisdiction, the overriding jurisdiction in outer space is quasi-territorial jurisdiction. Bin Cheng, “The Commercial Development of Space: The Need for New Treaties,” *Journal of Space Law* 19: 1 (1997).

¹⁰²Norman Menachem Feder, “Reading the UN Charter Connotatively: Toward a New Definition of Armed Attack,” *NYU Journal of International Law & Policy* 395 (1987), citing Waldcock, “The Regulation of the Use of Force by Individual States in International Law,” *Recueil Des Cours* 81 (1952): 455-456.

consequences.¹⁰³ Kinetic, electromagnetic, and cyber attacks intentionally targeting, damaging, and interfering with satellites and their supporting terrestrial systems would appear logically and realistically to satisfy conceptions of armed attack that would warrant and allow a proportionate response (as provided in the LOAC, described in more detail below) in accord with the UN Charter and customary law of self-defense exceptions. Such attacks should therefore trigger a right of self-defense.

Concluding there is a right of self-defense for attacks on space systems requires an analysis to assess whether an actual attack has taken place. As will be discussed later in this paper's discussion of the ICJ *Case Concerning Oil Platforms*, there are considerable challenges to U.S. abilities to identify, classify, characterize, and attribute space threats and events. Within the hostile physical environment, varied energetic and kinetic events affecting space systems occur on a recurring basis; moreover, satellite electronic, sensor, or other glitches could exhibit attributes of an attack until analysis has resolved the issue. Ultimately, even if one concludes there has been an attack, attributing the source of the event to a particular state or non-state actor could prove to be extremely difficult.

The challenge to resolving information attacks would be similar. According to Jia Huang:

...if an aggressor uses information techniques to conduct the operation and inflicts little or no physical destruction, whether this kind of attack can be regarded as "armed attack" is disputable. If an information attack cannot be

characterized as an "armed attack," then a conventional response may not be warranted. A conventional response, in this case, may in fact be considered the "armed attack" under Article 51. A response alike would not constitute an "armed attack," but there are still at least three obstacles for the retaliation side as follows. Firstly, it is difficult to identify the attacker. Information attack in outer space has the characteristics of long-range and anonymity and the attacker can conduct information attack against space assets in or through foreign countries. Information can flow across international borders while a nation's military, judicial, and security agencies cannot carry out investigations in a foreign country at will and this kind of investigation may be considered as spy so it cannot gain cooperation from related countries. Secondly, it is difficult to produce evidence. Space assets are in an abominable environment characterized by intensive radiation, extreme temperature, and micro-gravity. Occasionally, they may be stricken by small meteors or space debris, which runs at high speed. So they may be damaged by the natural cause. A space asset usually consists of many complex systems and there are frequent malfunctions and program errors. Because of these factors, the offended state cannot produce sufficient evidence that it has suffered from intentional attack. Finally, even though the attacker can be identified and proven to be supported by a foreign government, this foreign country may lack the space information infrastructure that would make it vulnerable to a response alike.¹⁰⁴

¹⁰³The increasingly covert nature of modern form of aggression and their greater potential for devastation have made both scholars and states dissatisfied with the limited legal availability of the justification of self-defense. *Ibid.*, p. 418.

¹⁰⁴Jia Huang, "New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space," *Journal of Politics and Law* 2: 1 (2009).

Anticipatory Self-defense for Space Systems

Some states maintain that within the right of self-defense is a right to prevent an armed attack from occurring by using anticipatory self-defense.¹⁰⁵ The U.S. is one such state. *The Caroline Affair* dispute with the United Kingdom in 1837 gave rise to a formal interpretation in international law setting out the elements of lawful anticipatory self-defense. The case stands for the proposition that the use of force in anticipatory defense may be justified and employed only in matters in which the “necessity of that self-defense is instant, overwhelming, and leaving no choice of means, and no moment for deliberation.” The use of such force must also be proportional. The criterion of immediacy and necessity must be based upon the very fact that there is no other course available to prevent the threatened attack from being executed. By nature, this excludes execution of pre-planned attacks.

Can an anticipatory defense be presented in response to an imminent threat to U.S. space systems? Physics and engineering realities make the immediacy criterion rather difficult to achieve. There will always be time lag and latency associated with detecting and analyzing an event, ascertaining the source and potential for damage, determining that a party intended to cause the damage, and then mobilizing weapons in response to perform space or terrestrial-based combat. Complicating these problems, U.S. SSA assets are underfunded and overtaxed though they have been described repeatedly by U.S. Department of Defense (DOD) and U.S. Air Force space officials as a top priority; the

shortfalls exacerbate the time lag and analysis challenges.

Assuming they have been identified as a lawful target, terrestrial components of space and ASAT systems can be struck within days, hours, or minutes depending upon the proximity of military forces to the target. The U.S. Strategic Command and Air Force Space Command have toyed with the idea of a conventional strike missile from time to time, though that system is subject to a number of limitations, and developing workable rules of engagement for its employment should prove difficult. As to potential space-based targets, systems could be deployed to engage such targets, but the delay could be hours, days, weeks, months, or even more; the timing for strikes with kinetic or particle beams, or other systems would be dependent on the prospective target’s orbit, intercept physics, and readiness of the sensor, shooter, and command and control systems employed.

The case for using force for anticipatory defense of space systems can be compared to performing anticipatory defense in the event of a potential nuclear strike. The signs of preparedness for employing nuclear weapons would have to be so overwhelming that only a definite intention to use them would logically explain the actions being undertaken. Since the risks of inaction could be catastrophic, they would demand immediate action. However, Louis-Philippe Rouillard suggests the fueling of one missile or even of a region’s missiles might not be enough to justify an attack based on anticipatory self-defense, since some might think no country would use a limited amount of nuclear weapons on a first strike as this would leave it open to utter destruction upon a retaliatory strike.¹⁰⁶ Would

¹⁰⁵Some argue the drafters of the UN Charter intended to restrict the right of self-defense under the Charter and customary international law and state practice involving anticipatory defense measures was not accepted.

¹⁰⁶See Louis-Philippe Rouillard, “The Caroline Case: Anticipatory Self-Defense in Contemporary International Law,” *Miskolc Journal of International Law* 1: 2 (2004): 117.

an analogous circumstance apply to a potential attack on a space system? Probably not. The loss or potential loss of a single satellite or redundant ground node of a space system should not present a serious enough threat that a state should not first attempt to resolve the developing dispute through diplomatic, economic, or global engagement means. Law on the use of force only “allows States to respond with force when a peaceful settlement of the dispute cannot be negotiated.”¹⁰⁷

Law of Armed Conflict

“States may use force to defend themselves or to defend others, however, there are accepted limitations to this exception.”¹⁰⁸ Before using force, one must evaluate not only space law, but also assess use of force and LOAC humanitarian law considerations. The LOAC is a body of international law that sets boundaries on the use of force during armed conflicts through application of fundamental principles or rules.¹⁰⁹ LOAC principles and rules combine elements of treaty and customary international and municipal law. The LOAC sets limits on when and to what degree force may be used, targeting, and treatment of noncombatants, civilians, and

prisoners of war. Its fundamental targeting rules are very relevant to concepts of space warfare. The overarching LOAC considerations are: necessity, distinction or discrimination, proportionality, humanity, and chivalry.

Space warfare possibilities present policy and law challenges, but rules for them can be derived and applied through analogy from terrestrial venues. As one might expect, the traditions, principles, and rules that might apply in space arenas were initially developed to apply in traditional terrestrial venues – land, sea, and air. Important components of space systems are terrestrially based; LOAC targeting considerations for targeting and also defending terrestrial components are better understood and established. Even so, not all rules are directly translatable to the space environment. Some even believe LOAC principles are inapplicable to unmanned space-based components of satellite systems, but that is, however, a rather limited viewpoint. In the end, each LOAC considerations must be considered before prosecuting military conflict in space or against terrestrially-based space system support, command and control, and user components.

¹⁰⁷ P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p. 4.

¹⁰⁸ *Ibid.*

¹⁰⁹ DOD policy is to comply with the Law of War “in the conduct of military operations and related activities in armed conflict, however such conflicts are characterized.” See *DOD Law of War Program*, DOD Directive 5100.77, 9 December 1998. Chairman, Joint Chief of Staff Instruction (CJCSI) provides that the U.S. “will apply law of war principles during all operations that are categorized as Military Operations Other Than War.” See *Implementation of the DOD Law of War Program*, CJCSI 5810.01, 27 August 1999. Under the U.S. military’s Standing Rules of Engagement (SROE), “U.S. forces will comply with the Law of War during military operations involving armed conflict, no matter how the conflict may be characterized under international law.”

The first LOAC principle to consider, “military necessity,” provides “a person or object should not be targeted unless doing so gives an attacker some real advantage.”¹¹⁰ Military necessity requires combat forces engage in only those acts necessary to

¹¹⁰ Adam E. Frey, “Defense of U.S. Space Assets: A Legal Perspective,” *Air & Space Power Journal* (Winter 2008), <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/win08/frey.html> (accessed June 2009). According to Frey, “The principle has four elements: the user of force must be capable of regulating it; force must be necessary to achieve, as quickly as possible, the enemy’s partial or complete submission; it must be no greater in effect on the enemy’s personnel or property than needed to achieve victor; and it must not otherwise be illegal.”

accomplish a legitimate military objective. “The U.S. formally acknowledged this principle when it signed the 1907 Hague Convention, which prohibits any action to destroy or seize the enemy’s property, unless such destruction or seizure is imperatively demanded by the necessities of war. The Nuremberg trials also explained that destruction as an end-in-itself is a violation of international law. There must be some reasonable connection between the destruction of property and the overcoming of the enemy forces.”¹¹¹

Military necessity only allows that degree of force required to defeat an enemy. In addition, attacks must be limited to military objectives whose “nature, purpose, or use makes an effective contribution to military action and whose total or partial destruction, capture, or neutralization at the time offers a definite military advantage.”¹¹² In applying military necessity to targeting, the rule generally allows targeting those facilities, equipment, and forces which, if destroyed, would lead as quickly as possible to the enemy’s partial or complete submission.

Applying the rule of necessity in engaging space systems, warfighters must take into account the nexus between the adversaries’ war effort and the space system. Importantly, targeting on-orbit spaceborne assets may be unnecessary if the same military necessary result can be obtained by targeting terrestrially-based components, or jamming up and down links.

¹¹¹See “Convention (IV) Respecting the Laws and Customs of War on Land and Its Annex: Regulations Concerning the Laws and Customs of War on Land, the Hague, 18 October 1907,” Article 23(g), International Committee of the Red Cross (ICRC) International Humanitarian Law Database, <http://www.icrc.org/ihl.nsf/385ec082b509e76c41256739003e636d/1d1726425f6955aec125641e0038bfd6> (accessed June 2009).

¹¹²See *Protocol Additional to the Geneva Conventions*, 12 October 1949, Articles 51-54.

Related to necessity, the central idea of distinction is one may only engage valid military targets. Military objectives must be separated and distinguished from protected civilian objects to the maximum extent possible. An indiscriminate attack is one that strikes military objectives and civilians or civilian objects without an attempt to distinguish between military and nonmilitary targets. Additional Protocol 1 to the Geneva Conventions limits targets “strictly to ...those objects which by their nature, location, purpose, or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.”¹¹³ Civilians and civilian property are prohibited targets.¹¹⁴

Distinction also requires defenders to separate military objects from civilian objects to the maximum extent feasible.¹¹⁵ If system is to be civilian in nature, it needs to be separated from military systems. This is difficult and complex to achieve with some spaceborne systems – communications, PNT, weather, or classically constituted imagery systems have dual civilian and military applications. For example, the global PNT resource, GPS, is operated by the U.S. Air Force, and it produces vital effects for the civil and commercial communities. Important weather satellites relied on by the U.S. military and its allies, but also global civil and commercial communities, are operated by the U.S. Department of Commerce; the U.S. Air Force provides a back-up command and control center for the Defense Meteorological Satellite Program (DMSP). The U.S. obtains large portions of its satellite communications

¹¹³See *Ibid.*, Article 52(2).

¹¹⁴See *Ibid.*, Articles 51-54.

¹¹⁵In a space context, it would be inappropriate to locate a civil space habitat for spacecraft personnel next to an adjoining space weapon or military system.

capability by leasing international commercial transponders, as do other militaries, civil, and commercial users. Similarly, significant portions of remote sensing and supporting launch capabilities are produced by commercial providers, consistent with U.S. remote sensing and commercial space launch policies that encourage such relationships. Attacking such objects may hinder an enemy, but civilians would suffer tremendously as an outgrowth of this mixed civil and military use of space systems.

Under Additional Protocol 1 to the Geneva Conventions, limits are imposed on attacks on civilian objects¹¹⁶ and attacks that cause “widespread, long-term, and severe damage” to the environment.¹¹⁷ Consequently, a weapon must be targeted with discrimination. What then should be done to address the tricky issue of space debris? The creation of space debris must be expected and considered if kinetic or otherwise destructive weapons are about to be employed. Substantial debris fields should be reasonably foreseen to cause damage to other civilian space assets. Since kinetic or otherwise destructive engagements could break the threshold of “widespread, long-term, and severe damage” to the environment, the focus should be on assessing the number and size of pieces of expected space debris, their orbits, the length of time on orbit, the ability to track the debris, and potential damage. The 2007 Chinese ASAT left thousands of pieces of space debris on orbit, at altitudes where they will remain on orbit for hundreds to thousands of years, presenting long-term threats to imagery, environmental, and communication systems.

¹¹⁶See *Protocol Additional to the Geneva Conventions*, Article 52.

¹¹⁷See *Ibid.*, Article 55. Protocol Additional restrictions apply to land, sea, and air combat and these limitations are echoed elsewhere in other treaties and in customary international law.

Given the prevalent global understanding of the problems of space debris and their physics, a spacefaring state cannot reasonably contend it could not foresee the damage that would occur as a consequence of initiating a kinetic or other destructive ASAT event. If so employed, it could be reasonable to conclude the attacking state executed an indiscriminate attack, one where the means of attack “employs a method or means of combat the effects of which cannot be limited as required.”¹¹⁸ For this reason, employing ASAT weapons would appear to be unlawful if they create space debris that damages civilian space systems, regardless of whether or not the damage occurs during or after the time of conflict.

Would deploying or exploding space mines be lawful? Probably not, but this assumes the mine is designed to explode, fragment, and riddle space with debris.¹¹⁹ What if the mine is kept on orbit for an extended period? In such event, P.J. Blount opines we should look by analogy to the restrictions placed on unsecured naval mines:¹²⁰

According to the Hague Convention VIII, these mines must be disabled within an hour of release due to the way in which they might move and destroy nonmilitary objectives. While the ban is not directly translatable to space due to physics, the principle behind this ban is. So placing a weapon in space that engages targets at random would also be unlawful. The principle could be extended by an analogy to torpedoes, which must be disabled if they miss their targets.

¹¹⁸*Ibid.* and *Relating to the Protection of Victims of International Armed Conflicts* (Protocol 1), 8 June 1977, Article 51(4).

¹¹⁹It might be possible to develop and field space mines designed to minimize space debris or other long-term problems.

¹²⁰“These would be contact mines that are not secured by a mooring or anchor and have the ability to be swept away in a current.”

A weapon in space that misses its target and continues to pose a threat due to its capabilities might also be illegal (e.g., a warhead being used as an ASAT that misses its mark).¹²¹

Another distinction relates to a potential for causing damage or injury to humans in space. Civilians may not be made the object of a direct attack; however, the LOAC recognizes a military target need not be spared because its destruction may cause collateral damage that results in unintended death or injury to civilians or damage to their property. Commanders and their planners must take into consideration the extent of unintended indirect civilian collateral destruction and probable casualties that will result from a direct attack on a military objective and, to an extent consistent with military necessity, seek to avoid or minimize civilian casualties and destruction. Anticipated civilian losses must be proportionate to the military advantages sought. In the end, it could be difficult to justify some losses without compelling “survival of the State” rationales. It would appear to be illegal to conduct activities that might cause damage to the International Space Station, or other manned civil space systems, or injury to their space personnel, whether on orbit, or during lift and return operations.

Proportionality prohibits the use of any kind or degree of force exceeding that needed to accomplish a military objective. An attacker must therefore balance the expected damage against the military advantage to be gained.¹²²

¹²¹P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008. Kinetic ASATs are typically launched on sub-orbital trajectories so if they miss they come right back down, like an ICBM warhead. Co-orbital ASATs generally require larger boosters to achieve their mission objectives.

¹²²Robert A. Ramey, “Armed Conflict on the Final Frontier: The Law of War in Space,” *Air Force Law Review* 48 (2000): 79-82. “The proportionality test is the U.S.’ preferred method

This requires a balancing test between the substantial, actual, and direct military advantage anticipated by attacking a legitimate military target and the expected incidental and unfortunate civilian injury or damage. Under this test, excessive incidental losses are prohibited. This principle encourages combat forces to minimize collateral damage – the incidental, unintended destruction that occurs as a result of a lawful attack against a legitimate military target, and leverages the rules relating to necessity and discrimination. This principle is also reflected in Additional Protocol 1, which prohibits “an attack, which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”¹²³

An action causing excessive or catastrophic damage to civilians or property should be illegal. Since Additional Protocol 1’s test is subjective, commanders could reasonably disagree on whether attacking these objects truly “offers a definite military advantage.”¹²⁴ The principle of proportionality offers some guidance with regard to using force against space systems: since collateral damage to civilians is considered a natural consequence of combat, the proportionality test should be applied to determine if an attack on a dual-use object warrants the consequences to the

of determining whether a target is a permissible one. The U.S. has declined to sign certain treaties, or portions thereof, that prohibit certain targets without any balancing test.”

¹²³*Protocol Additional to the Geneva Conventions and Relating to the Protection of Victims of International Armed Conflicts* (Protocol 1), Article 51(5)(b), ICRC International Humanitarian Law Database, <http://www.icrc.org/ihl.nsf/FULL/470> (accessed June 2009).

¹²⁴J. Ricou Heaton, “Civilians at War: Reexamining the Status of Civilians Accompanying the Armed Forces,” *Air Force Law Review* 57 (2005): 182-183.

innocent.¹²⁵ Hence, attacking and destroying vital PNT systems, such as GPS, may be held illegal since global society at large relies upon the use of these systems.¹²⁶ The same conclusion may apply to attacks on environmental monitoring systems, especially if used to protect civilians from weather, natural disaster or other environmental threats. If necessary to engage these systems, then it may be more acceptable, and lawful, if the damaging effects are reversible or temporary during specific periods of military activity.

What of nuclear weapons? The OST bans the stationing of nuclear weapons and weapons of mass destruction in space. Also, “the Nuclear Test Ban treaty prohibits states from causing nuclear explosions in outer space.”¹²⁷ Such weapons present significant distinction/discrimination challenges. As noted, the space and defense communities learned of these issues during the 1960s Starfish Prime and other upper atmospheric nuclear weapons experiments. So the use of nuclear weapons in space, aside from transit of a nuclear warhead that most concede can be legally executed in certain conflicts, should,

¹²⁵The expression “definite military advantage” is derived from the Hague Rules of Air Warfare. The idea conveyed is that of “a concrete and perceptible military advantage rather than a hypothetical and speculative one. The advantage must be military and not purely political, and involve an evaluation of the long-term military benefits of any action contemplated. See *Yoram Dinstein, The Conduct of Hostilities under the Law of International Armed Conflict* (Cambridge University Press, 2004), pp. 83-86.

¹²⁶The U.S. GPS system is a free global utility, but until recently the U.S. reserved the right to control and degrade its signal. Current U.S. policy is to distribute the system’s PNT signal without any control or degradation. In September 2007, the U.S. announced its decision to procure the future generation of GPS satellites, GPS III, without the selective availability (signal degradation) technical feature. “DOD Permanently Discontinues Procurement of Global Positioning System Selective Availability,” *DOD News Release* 1126-07, 18 September 2007. Russia, China, Europe, Japan, and India have deployed, or plan to deploy, their own spaceborne PNT systems.

¹²⁷*Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*, 10 October 1963, Article 1.

on first blush, be completely foreclosed. However, according to Blount:

...the International Court of Justice’s (ICJ) *Advisory Opinion on Legality of the Threat or Use of Nuclear Weapons* might have created an exception to this rule. The ICJ ruled that in general the use of nuclear weapons would be “contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law.” However, the court states that a State may use a nuclear weapon when the “very survival of a State would be at stake.” Since the court treats this as a moment of necessity in which both customary and treaty law can be suspended, it is feasible that the Outer Space Treaty and the Limited Test Ban Treaty could also be suspended and that a State may, during “an extreme circumstance of self-defense” use a nuclear weapon in space.¹²⁸

Under what circumstances employment of a nuclear weapon in space could be legally envisioned? Perhaps to defeat on-orbit weapons of mass destruction or nuclear weapon system posing a serious violation of the Outer Space and Limited Test Ban treaties or an otherwise serious provocation. Such use would require balancing the risks to the space environment and other space systems, and considering peace and security options associated with failure against possibilities of defeating the threat. Could using the same argument allow use of nuclear weapons against pure space assets presenting communications, PNT, warning and other capabilities that enable 21st Century militaries operations by adversaries? Probably not, but

¹²⁸P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p. 8.

approving that argument would create an exception that would negate arms-control and peacekeeping aspects and limitations imposed by the Outer Space and Limited Test Ban treaties, the UN Charter, and other bilateral agreements.

A state must do “everything feasible to verify that the objectives to be attacked are military objectives.”¹²⁹ However, operations in this context, requires use of the panoply of space capabilities – satellite imagery, satellite PNT systems, satellite communication systems, and even meteorological data. Denying an adversary access to space systems may relieve him of some portion of this important obligation to mitigate civilian casualties by employing such techniques and technologies.¹³⁰ Furthermore, a weapon that could be used in a nondiscriminatory manner or in such a way it would cause unnecessary suffering is only banned if it can also be used in a discriminatory manner and cause limited suffering. “In such a case it is the illicit use of the weapon that is outlawed and not the weapon itself.”¹³¹

War must be waged in accordance with widely accepted formalities, and avoid unlawful treachery. These principles impose an obligation to reduce noncombatant civilian casualties and damage, but this can be difficult to achieve as military and civilian space systems become more and more intertwined. The concept of “neutrality” may also limit military space conflict activities. Belligerents should have no right to attack neutral satellite

communications systems, even in self-defense. Articles 8 and 9 of the Hague Convention V, which was concluded in 1907, decades before satellite communications systems were even envisioned, provide a neutral state is not required to restrict a belligerent’s use of “telegraph or telephone cables or of wireless telegraph apparatus belonging to it or to companies or private individuals” as long as these facilities are provided impartially to both belligerents. It appears these Articles would apply to modern day satellite communications, though some think this remains an open question.

Another issue that must be addressed is how to treat neutrality rights in time of conflict. Since space law accords states the responsibility over their private entities involved in space operations, an argument can be made to hold a neutral state responsible for the actions of its private entities. According to Elizabeth Waldrop:

...when a State issues a license authorizing a private entity to provide certain services, there can be little argument that the State should be held responsible for subsequent conduct of the private entity. Accordingly, if a neutral State permits its space systems to be used by a belligerent military, the opposing belligerent would have the right to demand that the neutral State stop doing so. If the neutral State is unwilling or unable to prevent such use by one belligerent, it would seem reasonable to authorize the other belligerent to prevent the offending use. In the context of space systems used in time of conflict, before resorting to force a belligerent could (or should) demand a neutral nation not to provide satellite imagery, navigation services, or weather information to its adversary.¹³²

¹²⁹*Protocol Additional to the Geneva Conventions*, Article 57(2)(a)(i).

¹³⁰Of course, denying an adversary access to space assets might save lives if the adversary is using them to target innocent civilians.

¹³¹P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p. 6.

¹³²Elizabeth S. Waldrop, “Integration of military and civilian space assets: legal and national security implications”, *Air*

Law on the Use of Force

Given the realities of operating in space, its global nature, and the fact threats are manifested nearly always outside the territory of a state, self-defense measures invariably require military activities conducted outside the confines of that state. Some suggest the ICJ objected to such extra-territorial self-defense measures in its 6 November 2003 ruling in the *Case Concerning Oil Platforms* (Islamic Republic of Iran v. United States of America), a dispute involved issues arising out of the Tanker War of 1984-1988 and analogous to space conflict.

The term Tanker War was first applied to a series of naval battles and incidents in the Persian Gulf from 1984-1988 that was part of the larger Iran-Iraq War that spanned most of the decade. For two years, the U.S. was involved in the Tanker War to counter the hostile actions of military and paramilitary forces of the Islamic Republic of Iran. These forces engaged in a broad pattern of low-level, yet unlawful, uses of force, targeting not only U.S. forces, but also U.S.-owned and flagged commercial shipping, foreign commercial activities, and the strategically important Persian Gulf waterway itself in the form of mine-laying in international waters.¹³³

In arriving at its ruling, the ICJ addressed issues associated with the “inherent right of self-defense.” It held the facts presented with regard to missile attacks on U.S.-flagged tankers and mining incidents and attacks on U.S. warships in the Gulf were not sufficient to support an invocation of an inherent right to

Force Law Review, Spring 2004, 157-231, citing DOD General Counsel, *An Assessment of International Legal Issues in Information Operations* (May 1999).

¹³³Darren Huskisson, “Protecting the Space Network and the Future of Self-Defense,” *Astropolitics* 5 (2007): 123-143.

exercise self-defense under international law. In disposing of the U.S. position, the Court expressed interest and concern with where the vessels were attacked, especially since they were not located in U.S. territorial waters. The ICJ concluded the U.S. could not assert a right of self-defense in defense of third parties unless those parties requested “collective self defense,” and mere ownership of a vessel was not sufficient to assert the right. The ICJ placed the burden on the U.S. to show the attacks on its vessels were of such a nature as to be qualified as armed attacks within the meaning of that expression in Article 51 of the UN Charter, and as understood in customary law on the use of force.¹³⁴ The ICJ concluded the right of self-defense can be asserted only if it can detect, and attribute, and conclusively prove, an attack by the hostile actor.¹³⁵

Confirming the applicability of the international law criteria of necessity and proportionality in relation to the use of force in self-defense, the ICJ ruled it was not satisfied the U.S. attacks were necessary to respond to the shipping incidents in the Gulf and constituted a proportionate use of force in self-defense. Some suggest this formulation could have strict and adverse implications for future claims of a right of anticipatory or pre-emptive self-defense insofar as it holds that an armed attack is a prerequisite to the right of self-defense under Article 51 of the UN Charter and under customary international law.¹³⁶ Darren Huskisson has written a critique of the ICJ *Oil Platforms* decision and its potential importance.¹³⁷ The case presents

¹³⁴*Case Concerning Oil Platforms* (Islamic Republic of Iran v. United States of America).

¹³⁵*Ibid.*

¹³⁶The Court was not faced with an issue of anticipatory or pre-emptive self-defense since the alleged attacks against U.S. flagged and owned shipping had already occurred.

¹³⁷See Darren Huskisson, “Protecting the Space Network and the Future of Self-Defense,” *Astropolitics* 5 (2007): 123-143.

substantial implications for space conflict issues:

A Space War would have factual similarities to the 1987-1988 phase of the Tanker War. One could envision a regional conflict, even one in which the U.S. is not directly involved, that would have spill-over effects on the U.S. space networks as the belligerents attempted to deny the other the use of space services, just as Iran and Iraq tried to deny each other the commercial use of the Persian Gulf during the Tanker War. The U.S. would likely use force in response to any severe instances of harmful interference, such as attacks against U.S.-owned and registered space systems and foreign commercial systems and even potentially in response to the emplacement of space mines. Due to limited space situational awareness (SSA), the U.S. could expect a space adversary to conduct its operations under an even stealthier cloak of deniability than existed in the Tanker War.

The specter of a Space War raises many questions... May the U.S. defend portions of the space network located outside the U.S. territory? Would it be permissible to use force to defend non-U.S. territory? Would it be permissible to use force to defend non-U.S. registered space assets? What is the standard of proof for establishing an "armed attack" on the space network, thus triggering the right of self-defense? Must the U.S. ascertain the intent of the attacker before initiating an armed response? Is the gravity of the attack on the space network relevant to the triggering of the right of self-defense?¹³⁸

No doubt, the ICJ was unwilling at any level to conclude the myriad of actions taken by the Iranians arose to any level constituting an

"armed attack." At best, the ICJ ruling can be viewed as a political verdict,¹³⁹ perhaps mischaracterizing the evidence on a shooting war that took place nearly two decades earlier during the Reagan Administration, then shaping its decision to telegraph displeasure with the George W. Bush Administration's campaign to develop and employ a coalition to remove the murderous Sadaam Hussein regime from power in Iraq, and battle Al Qaeda proxies in Afghanistan and globally. Despite these faults, the Court's reasoning cannot be dismissed as wholly in error. Yet careful analysis shows the ruling does not impose new or unreasonable burdens on those, such as the U.S. and its allies, who seek to defend their space systems.

The Court was clearly troubled the U.S. had reflagged U.S. and non-U.S. owned vessels and inserted itself into the controversy and shooting war between Iran and Iraq and between other states in the region of the Persian Gulf/Gulf of Arabia. The ICJ looked for and apparently required a stronger nexus and compelling interest for self-defense between the Tankers being attacked and their relationship with the U.S. The ICJ was looking to see if sovereigns having significant local territorial interests in protecting the tankers invoked collective self-defense obligations with the U.S. That had not happened, nor was there any general invocation by the parties of the right of collective defense.

Given the foundational defects in the *Oil Platforms* ruling, Huskisson's analogy between the tankers and space systems being attacked is incomplete. Contrary to the situation involving tankers in *Oil Platforms*,

¹³⁸Ibid.

¹³⁹The Court found no evidence of intent by Iran to specifically target U.S. ships with either a missile strike or mining operations, even if they were fired; thus the court concluded no "armed attack" occurred which could give rise to self-defense measures.

U.S. space systems present clear and compelling capabilities vital to insuring the extensive and instant U.S. global diplomatic, informational, military, and economic interests. This is in accord with the OST, which provides spacefaring powers retain jurisdiction and control over their space objects and operations even if no signatory shall assert rights of sovereignty to portions of outer space. A state must be able to defend such jurisdiction and control rights.

By his complaint, Huskisson presents the very solution necessary to perfect the right of self-defense for a U.S. owned space asset, or defending a foreign registered system. U.S.-owned space systems need only be registered by the U.S. If the U.S. proposes to invoke self-defense rights for a foreign registered space system that must involve and be performed in accord with an invocation of collective defense rights by the registering State. Although the current version of the Registration Convention does not direct re-registration of space objects launched into space upon transfers of ownership, control, and operation (this is a subject for a future modification of the Convention or a treaty affecting the use of force and LOAC).¹⁴⁰ Pending such changes, perfecting self-defense rights for transferred systems could be achieved by invoking the rights with an Article 51 submission to the UN Security Council.

Huskisson worries the Court's opinion establishes a burdensome requirement to identify the hostile actor attacking a U.S. space system. He rightly concedes an important point of international law relating to the use of force that a nation asserting a right of self-defense must attribute an attack to a

specified hostile actor. With regard to LOAC issues, a military action must be necessary and distinguish between combatants and noncombatants. Huskisson dismisses these evidentiary requirements of ascertaining the hostile actor as unreasonably difficult to achieve given the current state of SSA capabilities; he correctly spots SSA challenges as its capabilities are best equipped to provide a forensic understanding of recent events rather than real-time feedback on on-going events. Huskisson wrongly infers the evidentiary requirement should be partly ignored or accommodated because it could be overly difficult to satisfy.

Current SSA tools and overall capabilities need to be improved given the ICJ's opinion in the *Oil Platforms*. This is a correct result, and encourages appropriate planning and resource development. It would be far more destabilizing to encourage commanders or national leaders to authorize or engage in military actions based on "hunches" that an attack has or is about to happen, and "hunches" as to who made the attack.

Huskisson also complains about the Court's requirement that a state ascertain the intent of the attacker before initiating an armed response. Again, Huskisson misses the Court's important point. Not all events causing damage to space systems are the result of an attack. To find otherwise would ignore a half century of space physics, engineering, and operational experiences. This would risk peace and security over accidents or other non-hostile events. Space systems are continually battered with a variety of environmental events – space debris, electrical charging, cosmic rays and energetic particles, and others. Assuming an event can be traced to some state or actor, a strong factual determination must nonetheless be made as to whether the interference or damage occurred inappropriately or by accident. For example,

¹⁴⁰*Convention on the Registration of Objects Launched into Outer Space*, 15 September 1979, also known as the Registration Convention, at Article II.

jamming incidents affecting space systems occur in many venues, most inadvertent, some not. An assessment and inquiries must be made to determine the true context of the event to satisfy LOAC requirements of necessity, distinction, and proportionality.

Finally, Huskisson complains about whether the gravity of an attack on a space system is relevant to the triggering of the right of self-defense. Huskisson again missed the ICJ's point. The ICJ ruling encourages application of classic necessity and proportionality rules when executing purported self-defense actions. Peace and security interests can best be achieved and preserved if necessary and proportionate responses are presented in response to armed attacks.

Attacks on Space Systems

Conflict in outer space or affecting the domain is also limited by a myriad of space governance, environmental, disarmament, and arms control agreements. There are boundaries on these limits. For example, under the Vienna Convention during time of conflict, treaty terms inconsistent with a state of armed conflict may not apply between belligerents, unless the terms of the treaty itself are specifically intended to apply during conflict.

The Liability Convention¹⁴¹ expands on a topic noted in the Outer Space Treaty that "launching states" are liable to other states for damage caused by space objects, including debris. States are liable only for direct damage caused by a space object (i.e., loss of life, personal injury or other impairment of health, or loss of or damage to property). If damage is

caused to another space object in outer space, liability is based on fault. On the other hand, if damage is caused by a space object on earth or to an aircraft in flight, liability is absolute.

Notably, there can be more than one launching State – a launching state is any state that launches an object, procures the launch of an object, or from whose territory or facility an object is launched. If there is more than one launching State, joint and several liability rules would apply. States may make indemnification agreements and apportion liability among themselves. Since allied nations supporting space conflict activities could be construed as launching states, liability issues and allocation of liability issues should be resolved before engaging in such activities.

Does the Liability Convention offer an exclusive remedy for rights of a state in event of an attack on its space systems? No – the Liability Convention does not exclude or limit the right of self-defense affirmed in Article 51 and such a reading cannot be found in its negotiation or record of the U.S. Senate ratification. The Liability Convention presents other challenges, however, and does not offer a satisfactory disposition to attacks. According to Adam Frey:

Although it clarifies some of the Outer Space Treaty's ambiguity, the Liability Convention still faces criticism. First, its definition of an "object" as including "component parts" does not specify whether this includes debris, so some suggest a launching state might not be liable for debris-based damage. Second, although the convention imposes a "fault" standard for damages, it does not define how much care should be exercised during a launch. In other words, if two space objects collide, one state could argue that it took all reasonable precautions, while the injured state could argue that it did

¹⁴¹See *Convention on International Liability for Damage Caused by Space Objects*, September 1972, known as the Liability Convention.

not. Third, fault may be difficult to prove since specific pieces of debris can be difficult to identify and track, and the cause of a collision can prove equally elusive... the mere fact of a collision does not automatically put the state that created the debris at fault. Finally, there is no established system for processing claims or for interpreting or enforcing the convention's terms. The convention's litigation mechanisms have never been used, so their effectiveness remains unknown.¹⁴²

Similar to the Liability Convention, the OST does not set out substantive remedies for a state that has had its space assets attacked by another state or non-state party. Nonetheless, some, including Frey, suggest the OST may provide "an appropriate response" if a state interferes with another's space activities. It is based on consultation:

Articles [VI] and [VII] hold states liable for damage caused by their space activities and launches, whether such activity is conducted "by governmental agencies or by non-governmental entities" within the state. Further, Article [IX] requires states to avoid the "harmful contamination" of outer space and celestial bodies. If a state believes that its activities could cause such

harm, it must undertake "appropriate international consultations" before proceeding. Conversely, if a state believes it could be harmed by another's actions, it "may request consultation concerning the activity or experiment." Article [X] further allows states to request observation of each other's launches, and Article [XII] requires any space facilities and equipment to be open for observation. However, the treaty provides no right of appeal if two states cannot resolve these issues themselves.¹⁴³

In the end, the Liability Convention's real limitations on space conflict activities arise out of its provision for liability associated with causing damage to third-parties. These liability issues must be evaluated, addressed, and/or mitigated by law-abiding states before performing self-defense military activities that could cause damage to third-party space systems. Planners must account for payment of damages or plan to limit such problems.

The 1963 *Treaty Banning Nuclear Weapon Test in the Atmosphere, in Outer Space, and Under Water*, also known as the Partial (or Limited) Test Ban Treaty (PTBT), prohibited "any nuclear weapon test explosion, or any

¹⁴²Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008), <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/win08/frey.html> (accessed June 2009). The statement by Frey that "fault may be difficult to prove since specific pieces of debris can be difficult to identify and track, and the cause of a collision can prove equally elusive... the mere fact of a collision does not automatically put the state that created the debris at fault" has been forced to the forefront by the 10 February 2009 collision between the Iridium 33 and Cosmos 2251 communications satellites. The impact between the Iridium Satellite LLC-owned satellite and the 16-year-old defunct Russian military satellite occurred at 780 kilometers, a low Earth orbit (LEO) altitude used by satellites that monitor weather and carry telephone communications. It is considered the most crowded area of space. See "When Satellites Collide: Iridium 33 Strikes Defunct Russian Sat in Unprecedented Accident," *GPS World*, 12 February 2009.

¹⁴³Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008), <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/win08/frey.html> (accessed June 2009). On the matter of consultation, while it appears the Chinese did not offer to engage in such discussions, it appears from news reports of the incident the U.S. knew the ASAT test was pending. "The events show that the [U.S.] Administration felt constrained in its dealings with China because of its view that it had little leverage to stop an important Chinese military program, and because it did not want to let Beijing know how much the U.S. knew about its space launching activities." Further, the U.S. did not request consultation even though the Outer Space Treaty states this was its right. Had the U.S. been willing to discuss the military use of space with the Chinese that might have been enough to dissuade them from going through with it. See Michael R. Gordon and David S. Cloud, "U.S. Knew of China's Missile Test, but Kept Silent," *The New York Times* 23 April 2007, http://www.nytimes.com/2007/04/23/washington/23satellite.html?_r=2&hp=&pagewanted=print&oref=slogin (accessed June 2009).

other nuclear explosion” in the atmosphere, underwater, or in outer space.¹⁴⁴ PTBT is superseded by the Comprehensive Test Ban Treaty (CTBT) that bans all nuclear testing in all mediums, though the CTBT has not as of yet entered in force.¹⁴⁵ The OST does not specifically prohibit testing weapons in outer space itself, as opposed to on celestial bodies, instead it proscribes the stationing of nuclear weapons on orbit. With PTBT and CTBT, testing and subsequent use of nuclear weapons in response to attacks on space systems appear to be banned, unless employed in a possible narrow exception that allows such devices to be employed to preserve the “survival of a State.” Employing nuclear weapon systems against conventional space systems probably could not be shown to support such a survival objective.

A series of bilateral agreements between the U.S. and the former Soviet Union, now held to be binding on Russia by protocol, prohibit interference with early warning systems and NTMs. As noted earlier, NTMs include a variety of technologies and systems. The definition should include space (e.g., photo-reconnaissance satellites) and terrestrial assets (e.g., land-based radars, seismographs, radar and intelligence systems on ships and aircraft, etc.) that can verify arms control treaty

¹⁴⁴Nuclear powers France and China did not sign or ratify the PTBT. Also, the PTBT did not ban underground nuclear testing.

¹⁴⁵Nuclear powers China, Israel, and the U.S. signed, but have not ratified the CTBT. As of October 2009, 151 States have ratified the CTBT. Thus, one could argue that the norms of the Treaty to ban all nuclear testing in all mediums is emerging as a universal norm binding upon states that have not ratified the Treaty. Entry into force of the CTBT is an achievable goal. The CTBT is entering “the most defining period of its existence,” as there has been a “paradigm shift” in support for the Treaty since U.S. President Obama set out the U.S. agenda for non-proliferation and arms control in April 2009 followed by his agreement with Russian President Medvedev in London in 2009 to seek entry into force of CTBT, <http://www.ctbto.org/press-centre/press-releases/2009/after-ten-year-hiatus-entry-into-force-of-comprehensive-test-ban-treaty-an-achievable-goal> (accessed January 2010).

compliance. Since they provide transparency, NTM systems are thought to help reduce the risk of nuclear war. The earliest of these provisions was contained in the 1972 ABM Treaty between the Soviet Union and the U.S.¹⁴⁶

While the U.S. has withdrawn from the ABM Treaty, other treaties in force today contain this same prohibition, including the 1987 Intermediate-Range Nuclear Forces Treaty (INF), 1992 Strategic Arms Reduction Treaty (START I), and 1990 Treaty on Conventional Armed Forces in Europe (CFE). Recognition of the important role played by NTMs has been made evident. Given the importance of spaceborne NTMs role in stemming the potential of a nuclear holocaust, non-interference rules that preserve and allow adversary access to their systems would appear to be taking on the trappings of a peremptory norm that nations may want treaties to perfect.

The Environmental Modification Convention of 1978¹⁴⁷ prohibits all military or hostile environmental modification techniques that might cause long-lasting, severe, or widespread environmental changes in Earth’s atmosphere or outer space. “Each State Party to this Convention undertakes not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting, or severe effects as the means of destruction, damage, or injury to any other State Party.”¹⁴⁸ “Widespread” is defined as “encompassing an area on the scale of several hundred square kilometers;” “long-

¹⁴⁶See *Treaty between the U.S. of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems*, 3 October 1972, but no longer in effect as of 13 June 2002 due to U.S. withdrawal.

¹⁴⁷*Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques*, 5 October 1978, known as the Environmental Modification Convention.

¹⁴⁸*Ibid.*, Article I(1).

lasting” is defined as “lasting for a period of months, or approximately a season;” and “severe” is defined as “involving serious or significant disruption or harm to human life, natural and economic resources, or other assets.”¹⁴⁹ The Environmental Modification Convention focuses on proscribing military weapons, tactics, and techniques that deliberately change natural processes.¹⁵⁰

Would the use of nuclear weapons in space violate the Environmental Modification Convention? Perhaps, yes, but only if used with hostile intent, to deliberately manipulate space environmental processes, with widespread, long-lasting, or severe effects, causing damage or destruction to space-based systems, and directed against another party to the treaty.

Would employing systems attacks that create widespread, long-lasting, or severe space-based debris fields, be unlawful? Again, yes, if the essential elements of the Convention are violated. A state that creates debris intentionally in order to ruin the environment for use by its adversary would violate the Convention.

¹⁴⁹Ibid.

¹⁵⁰The U.S. Delegation Statement provides: “The Environmental Modification Convention is not an Environmental Protection Treaty; it is not a treaty to prohibit damage to the environment resulting from armed conflict. Rather, the Environmental Modification Convention fills a special, but important niche reflecting the international community’s consensus that the environment itself should not be used as an instrument of war.” The U.S. position on “criteria that have been established for determining what constitutes a prohibited action under the convention: first, the convention specifies military or any other hostile use. The U.S. understanding is that hostile intent is a precondition for a violation; second, it must meet the definition of an environmental modification technique, that is the deliberate manipulation of a natural process; third, effects must be widespread, long-lasting or severe as defined in Article II and related understandings; fourth, these effects must be the means of destruction, damage or injury; and fifth, it must be directed against another state party. Only if all of these criteria are met is an action prohibited by the convention.”

What should be concluded if a party protests the effects and damage were unintended? Some suggest a state that creates orbital debris while targeting specific adversary targets would not violate the Convention, but that act would instead only constitute a violation of the Geneva Additional Protocol 1. However, as to the space environment, the science and danger of orbital debris is now very much acknowledged, notwithstanding denials and protests of any potential offending state. Perhaps the requisite hostile intent and deliberate manipulation elements could be deduced from the willful and wanton disregard for the damage that occurs and the recklessness of the act. This same reasoning could also be made to prohibit the use of nuclear weapons in defense of space systems.

Agreements, such as the 1971 Accidental Measures Agreement (updated in 2004), the 1988 Ballistic Missile Launch Notification Agreement, and the 1990 Dangerous Military Activities Agreement address dangerous laser use and dangerous interference with nuclear weapons command and control systems, and so potentially limit possible space warfare activities.¹⁵¹ They are intended to prevent outbreak of nuclear war due to misunderstanding, accidental launch, or misinterpretation of unidentified objects detected by early warning systems, and are primarily focused on the topic of intercontinental ballistic missiles (ICBMs). These agreements basically seek to prevent miscalculation by requiring parties to provide notice whenever there is an accidental launch of a ballistic missile in the direction of the

¹⁵¹See *Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the U.S. of America and the Union of Soviet Socialist Republics*, 30 September 1971; *Ballistic Missile Launch Notification Agreement*, 31 May 1988; and *Agreement between the Government of the U.S. of American and the Government of the Union of Soviet Socialist Republics on the Prevention of Dangerous Military Activities*, 12 June 1989.

other party, or when a party's early warning system detects an unidentified object.

These agreements affect the prosecution of self-defense in response to attacks on space systems. For example, the Accidental Measures Agreement with Russia requires the parties to take measures to guard against an accidental or unauthorized use of nuclear weapons. It requires a party to notify the other immediately if an accidental or unauthorized incident occurs, if an early warning system detects an unidentified object, or if there is any other unexplained event involving possible detonation of nuclear weapons.

Importantly, the Accidental Measures Agreement requires a party to provide advance notice of any planned missile launches beyond the territory of the launching party and in the direction of the other party. The Launch Notification Agreement requires a party to provide at least 24-hour advance notice of the date, launch location, and estimated impact area for any ballistic missile launch. These notification requirements could require potentially disruptive or compromising information exchanges with Russia before prosecuting military space activities, especially if space launches are required. Such exchanges could limit the ability of the U.S. to prosecute space-related military/conflict-related activities.

Although not traditional space "arms control" agreements, the U.S. is party to numerous bilateral or multilateral agreements that may restrict and limit "space activities" from being performed in or from the territory of another state party. For example, in the U.S. pursuit of a global ballistic missile defense system, it is entirely foreseeable that states where key components are located could impose restrictions on U.S. space or other activities in exchange for the U.S. right to base ground- or link- segments in that state. In the recent past,

several long-standing allies limited their cooperation with the U.S. on missile defense related activities, not wishing to participate, support, or cause a potential violation of the ABM Treaty, even though they were not signatories to that agreement. These positions have evolved as perceptions of threats to national interests changed and the U.S. withdrew from the ABM Treaty in 2002. The existence of such agreements and potential limitations on space activities should not be ignored in a discussion of the law relating to space conflict activities.

Citing a changed global environment, the U.S. withdrew from the ABM Treaty in 2002. Assuming a new ABM Treaty is negotiated on the same or similar terms, where would such a treaty leave ASATs from a legal perspective? There is, not surprisingly, more than one answer. Some analysts suggest that it may be impossible to distinguish between ABM directed-energy space vehicles and those deployed exclusively for anti-satellite purposes.¹⁵²

Hurwitz argues that "all extraterrestrial autonomous weapons are illegal. However, non-nuclear weapons, which are not autonomous, may be stationed and, in accordance with generally accepted principles of international law, used in Earth orbit."¹⁵³ In short, while the ABM Treaty appears to prohibit the use of directed-energy weapons in an ABM mode, "the same technology when used in the development/testing/deployment of ASATs is not prohibited.

Given the overlap of technologies, careful consideration must be given to whether

¹⁵²Joan Johnson-Freese, "The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control, *INSS Occasional Paper 30*, U.S. Air Force Institute for National Security Studies (INSS), January 2000, p. 16.

¹⁵³Bruce A. Hurwitz, *The Legality of Space Militarization* (North-Holland, 1986), p. 135.

systems might be favored in one case as an ABM system, but not as an ASAT, or vice versa. This issue generated considerable political debates in the 1980s, when debates involving the SDI were also fought over ASAT technologies, options, opportunities, and related programs.¹⁵⁴ U.S. ASAT technology development efforts have continued on and off for decades. Peace and disarmament advocates now attack U.S. missile defense systems as fledgling ASAT systems, a topic brought to the forefront by the 2008 interception of the disabled USA 193 intelligence satellite by a modified Aegis cruiser and missile defense missile over the Pacific.

Conclusions

“Arming the heavens” might seem a most tempting option to respond to threats to U.S. space systems. Regardless of the wisdom of such action, the facts remain that the U.S. is dependent on use of space systems for military operations and security; that these systems are vulnerable to disruption, attack, and even destruction; and that at stake are the

“Arming the heavens” might seem a most tempting option to respond to threats to U.S. space systems.

¹⁵⁴Once the Strategic Defense Initiative was politicized during the 1980s, debates ran the gamut of the defense and policy communities. Opponents posed objections, most technical, to missile defense claiming – the Soviet ABM radars complexes were not violations of the ABM treaty; propulsion, sensor, and targeting systems could not be miniaturized for a kinetic kill vehicle; kinetic kill technologies could not be integrated on the battlefield; command and control systems could not be developed to engage ballistic missiles; software programs needed to manage an effective ABM system requires too many lines of code; lasers cannot engage and defeat missile targets; withdrawal from the ABM treaty would lead the U.S. straight into World War III; and the like. Each of the technical objections has been defeated by “smart” technical programs.

asymmetric advantages space capabilities provide the U.S. and its allies. Adversaries can easily see the tremendous leverage they can obtain by disrupting space systems. Given these pressures, space presents a feasible arena for conflict activities.

Policy, law, and resulting strategy formulation for defense of space systems requires more sophistication. Provocateurs advocating and planning for unconstrained space warfare have been marginalized over the decades as seasoned and knowledgeable leaders in the executive and military departments, congressional delegations, and international community approach such options with extreme caution. If performing self-defense activities, lawful options must be considered and selected by a state in event an adversary or entity threatens or attacks its space systems? Employing space systems in accord with international law is vital to ensure continued access to space capabilities and that the space domain remains a peaceful environment as envisioned by the OST Regime. By doing this, the U.S. will maintain not only an ultimate strategic high ground, but also a moral one.

We know that under treaty and customary law, the U.S., as well as member states of the UN and states that have ratified OST, must use space for peaceful purposes, refrain from using space aggressively, take care to preserve the space environment, and be prepared to indemnify if it damages another non-belligerent state’s assets. Applicable international treaties, conventions, customary law, and LOAC principles do not specifically describe what the U.S. should or can do in preparation for or in response to an attack on space systems. Rather, as some contend, they highlight what cannot be done.

The right to respond to attacks against space systems is limited. Relevant treaties,

customary law, the LOAC, and other legal principles substantially restrict space warfare options and the potential for such conflict among law-abiding nations. The use of force is allowed only in self-defense or in accord with authorization of the UN to maintain international peace and security. Kinetic, electromagnetic or information operation attacks against space systems are each an “armed attack” to which the use of force is permitted in accord with the self-defense exception. The right to conduct conflict and space warfare activities involving space systems is constrained by the LOAC, and the right of anticipatory self-defense may lawfully be employed in defense of space systems only in limited circumstances.

The right to respond to attacks against space systems is limited.

If engaged in space-based warfare, a state must comply with the legal obligations set out in the OST, Registration Convention, Liability Convention, PTBT/CTBT, Environment Modification Convention, and other treaties. Certain satellite systems and their supporting ground-based, and command and control systems should not be attacked; this could include spaceborne components of NTMs, especially if they are necessary and important to reduce chances of a full-fledge nuclear conflagration, or resolution of such a conflict. Even if lawful means and methods are employed and targets engaged, physical, technical, environmental, and political realities, and their risks and benefits, still limit options to defend and fight space systems; specifically, they limit the when, where, and how adversary space systems can, or should not, be engaged.

The U.S. can lawfully take a passive approach to defend its space systems, allowing it to treat

some attacks and threats as a mere distraction. Satellite vulnerabilities can be reduced by using anti-jamming measures; hardening to protect against electromagnetic pulses, radiation, or explosions; improving maneuverability to actively avoid attacks. Yet as we have seen with developments in North Korea, developing states and terrorist groups can gain access to space system and propose to engage in serious mischief. Attacks could range the span of space systems – terrestrial, link, and on-orbit assets. There is no assurance a self-restraint option will protect orbital assets.

If deterrence fails, a lawful self-defense “punishment strategy” can be employed. Absolute flexibility should be maintained by the U.S. and its allies in the way they wield such deterrence, if they choose to wield it at all. The lawful range of diplomatic, information, military, and economic instruments of national power should be considered and employed. These instruments are not limited to just offensive or defensive counterspace or space control activities, though preparing for destructive space-based combat activities must be carefully considered and generally deferred given the risks such conflict presents to the very space environment the U.S. wishes to protect. Nevertheless, preparing to employ a complete suite of these instruments “would signal to any adversary considering U.S. space systems as a legitimate target that the U.S. has the means and resolve to respond if it so chooses.”¹⁵⁵ Preparing for the lawful use of U.S. and allied retaliatory measures can encourage or, if necessary, compel offender reconsideration of its course of action and compliance to international morays or legal obligations if engagement cannot succeed.

¹⁵⁵See John B. Sheldon, “Space Power and Deterrence: Are We Serious,” *Marshall Institute Policy Outlook* (November 2008): 3-4.

Important, but lost on many who seek to contest the space domain, a retaliatory deterrence strategy for the U.S. has little credibility if directed at adversary space assets since the U.S. "...is the most space-reliant country today. Threatening to attack adversary satellites in response to attacks on U.S. systems may prove fruitless if the adversary in question does not leverage significant military, diplomatic, and economic power through such systems..."¹⁵⁶ Presently, the U.S. is the only globally space-enabled power, so adversary spaceborne components probably should not be engaged tit-for-tat.¹⁵⁷ Such would only be a pyrrhic act. This may change as other nations gain the wherewithal, experience, and access to space capabilities and fully exploit them for military purposes.

Non-aggressive weaponization of space is legal as is the use of force in self-defense against space systems components whether in space or the terrestrial environment. Treaty and U.S. policy allows developing and deploying systems designed to protect satellites, or defeat ASAT and strategic threats (e.g., ICBMs). Employing a weapon system in self-defense to engage targets, whether ground, air, or space-based, if accomplished in such a way the combat event does not create space debris, and is targeted in accord with LOAC principles, appear to be lawful under current treaty and customary law. Jamming technologies can be employed to deny adversary access to space and protect spacecraft, and their effects may be reversible

and not contaminate the environment. SSA and other sensor systems, command and control, and shooter capabilities may not be powerful and nuanced enough over the near-term to achieve all the results needed and desired. That may change as space control technologies evolve.

In the event of war, the U.S. and its allies may defend components of their space systems that are subject to jamming and cyber attack since such attacks can be considered armed attacks in a modern context. In doing so, they must accurately determine the source of the attack and confirm adversary state or non-state actors intended to target the system at issue and cause destructive effects. The U.S. should be able to treat certain adversary satellites and supporting systems as legitimate targets only after ensuring that satellite's loss would not excessively harm civilians or the space environment, or violate other peremptory norms. The U.S. response must be necessary and proportional; not more than that amount necessary to accomplish military objectives to defeat adversary forces and to achieve the enemy's partial or complete submission.

Attacks against adversary NTMs capabilities should be avoided as attacking them could violate peremptory norms to take all actions necessary to prevent nuclear war, ensure compliance with nuclear weapons arms control agreements, and prevent attacks by weapons of mass destruction. On the other hand, the U.S may lawfully respond to attacks against its own national NTMs and nuclear command and control capabilities under rules relating to self-defense and, if necessary, reprisal.¹⁵⁸

¹⁵⁶Ibid.

¹⁵⁷Joint Publication 3-14, 6 January 2009, p. II-5. Negation includes "Active and offensive measures to deceive, disrupt, deny, degrade, or destroy an adversary's space capabilities. Negation includes actions against ground, data link, user, and/or space segment(s) of an adversary's space systems and services, or any other space system or service used by an adversary that is hostile to U.S. national interests." Also, see the 2006 U.S. National Space Policy which states: "...the U.S. will ...deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests."

¹⁵⁸Reprisals are acts taken in response to LOAC violations. Such an act of reprisal would be otherwise forbidden if it was not for the prior unlawful act of the enemy. A lawful act of reprisal cannot be the basis for a counter-reprisal. To be lawful, a reprisal must: timely respond to grave and manifestly (clearly) unlawful acts; be for the purpose of

Conflict involving space systems need not be space-based. In defending its systems, the U.S. could lawfully use existing terrestrially-based military systems to defeat and/or prevent adversary weapons from entering space, or from being successfully operated there. Adversary ground control stations could be engaged and command and control linkages interrupted, reduced, or destroyed.

If facts establishing conditions of immediacy and necessity to U.S. and allied systems are satisfied, anticipatory self-defense actions could be undertaken. The goal of such anticipatory self-defense actions could involve targeting the enemy's systems before and during launch. Jammers could also be located, degraded, and destroyed; e.g., GPS jammers were engaged and destroyed during Operation Iraqi Freedom by GPS-aided Joint Direct Attack Munitions described as precision guided munitions or "smart bombs." Spacelift facilities could also be engaged to disable adversary launch capabilities.

The U.S. is obligated to protect the space environment. Obligations imposed by the Outer Space and Environment Modification treaties, Liability Convention, and other agreements, and physical reality, make it politically wise, and immensely practical to keep space safe and usable. As the nation that exploits space capabilities to their maximum extent, the U.S. has the most to lose if the domain is compromised and lost to unwise operations or conflict. Self-defense acts that seek to or actually damage the space

environment for extended periods may be impermissible; hence, the U.S. must observe the obligation to avoid and minimize the creation of debris when operating defensive space weapons. "Soft-kill weapons that disable are clearly acceptable and favored if weapons need to be employed against space based components. Explosive weapons, such as space mines surrounding satellites, are not, especially since they can create significant space debris."¹⁵⁹ Given the potential for resulting debris, taking action to destroy or damage adversary space systems "may violate the duty to avoid the harmful contamination of space" except in the most pressing circumstance.¹⁶⁰

The U.S. is the global leader in space and has filled this role for half a century. Its systems work and have been revolutionary in presenting new capabilities in the civil, commercial, and military arenas. As it has done for decades, the U.S. enjoys a unique position to shape the direction of global space activities for this new century. With this position comes great responsibility – to forge behaviors to mitigate space debris, prevent armed conflict, and enhance the peace, security, and prosperity of spacefaring nations and the rest of the world. Space capabilities are at risk to a myriad of threats, but continued efforts to improve space governance by international treaties, customary law, best practices, policy, strategy, and overarching global behaviors will secure the high frontier.

compelling the adversary to observe the LOAC and not for revenge, spite, or punishment; give reasonable notice that reprisals will be taken; have had other reasonable means attempted to secure compliance; be directed against the personnel or property of an adversary; be proportional to the original violation; be publicized; be authorized by national authorities at the highest political level. Only the President of the U.S., as Commander-in-Chief, may authorize U.S. forces to take such actions.

¹⁵⁹Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008).

¹⁶⁰*Ibid.*