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James D. Rendleman, JD, LL.M.
 Research Analyst
 Colorado Springs, Colorado

Abstract

What means may a nation lawfully employ to respond to and defeat threats to and attacks on its space systems? Treaties and customary law provide a strong imperative 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. 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 is more dependent on space than any other nation, not only for national security but its private sector as well. The complete mix of civil, military and national and multinational commercial space capabilities are important enablers for successful 21st century militaries, economies, information transfer, diplomatic communication and collaboration. Space-based capabilities (precision navigation and timing, battlefield and battlespace characterization, missile warning and defense, weather, communications, intelligence, surveillance, and reconnaissance) enable the United States and its allies to efficiently and effectively reach out, shape, support and control events in any part of the globe.

Taking down space capabilities offers means by which adversaries can eliminate the significant asymmetric advantages offered. Consequently, the recent 11 Jan 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 alarm across the U.S. and international space and related defense communities.

How should capabilities presented by space systems be protected? The United States’ approach to securing and protecting the space domain has been and will continue to be rooted in rational policy making and municipal (domestic) and international law. Long-standing treaties and policy support the peaceful uses of space for civil, commercial, and military purposes. But these may fail. Accordingly,

the United States 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 United States’ 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, emerging capabilities posed by hostile states and non-state actors now serve as a catalyst for 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 United States and its allies have access to space capabilities depends on four mutually supportive elements, or pillars: *global engagement, space situational awareness (SSA), responsive infrastructure, and deterrence and defense.* Global engagement

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

leverages long-standing approaches to securing and protecting the space domain through recognized international law, policy, and diplomacy. SSA enables the monitoring 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; and enhances opportunities to avoid disruptive or destructive events. A robust infrastructure enables space-faring nation abilities to present agile responses to changes in the space environment, to threats, and 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 organic and sophisticated defenses can complement deterrence by giving tools needed to respond to manmade and even environmental threats. In sum, employing these four pillars have and will enable U.S. and friendly space systems to continue to perform their missions for the short and long term.²

With possibilities of space conflict and combat, policy makers and commanders must balance the benefits with the tremendous risks. Decisions to employ this conflict/combat aspect of the fourth pillar of space assurance, *deterrence and defense*, must not be taken lightly. Deterring, defeating, or eliminating manmade threats will be difficult to achieve given their diversity; this is the case even though a myriad of combat tactics can be employed against those who attempt to deny one 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 the laws of armed conflict. 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.’ That soon became ‘space dominance,’ which then broadened to

‘full spectrum dominance.’”³ The current 2006 U.S. National Space Policy precepts and space control doctrine also 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 United States 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?* We will examine how relevant treaties, customary law, the law of armed conflict (LOAC), and other legal principles substantially restrict space warfare options, but also reduce the potential for conflict among law-abiding space-faring nations. We will identify legal principles supporting the right to defend a national or allied space system; then, applying these principles with a dose of engineering and policy concerns, we will discuss lawful and unlawful means and methods to prosecute this right of self defense and to defeat threats.

Space capabilities are at risk to a myriad of 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) links) 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, 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; even non-state actors can reach out to space and “touch” satellite payloads and

² See generally, James Rendleman, “Space Assurance for the 21st Century,” *High Frontier*, Vol. 5, No. 2 (February 2009), pp. 46-53.

³ Dwayne Day, “Space policy 101: military space 2009,” *The Space Review*, 15 Jun 2009.

⁴ See generally, *Fact Sheet on US National Space Policy*, National Security Presidential Directive No. 49, 31 August 2006.

their supporting buses. It takes little imagination to envision multiple means by which a satellite payload and/or its bus can be destroyed or 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. Direct-ascent launched or orbitally-based nuclear devices can be detonated, generating electromagnetic pulses (EMP), frying 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 satellites in the same orbital plane or in crossing orbits. Ground, space-based or airborne lasers or particle-beam weapons 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 & 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. Stations and links are also 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 & 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 uplinks, downlinks, and even cross-links. Electromagnetic deception techniques can be employed to confuse systems; this could include sending false, but

⁵ Every 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.

⁶ Control 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. Telemetry, tracking and control (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.

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.

Offensive information operations can also be undertaken against on-orbit satellites and effect shutdown operations, where an adversary gains access to a satellite's control program and directs it 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 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.⁷

Given these threats, the 2007 Chinese ASAT test stoked the fires of a long-running debate over whether and how the United States 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 with out 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"⁸

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.⁹ However, Chinese capabilities don't pose the only concerns. There have been attacks on space systems by other actors and the United States 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 (R-AL), 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, US 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 US 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.

⁷ See generally Thomas C. Wingfield, "Legal Aspects of Offensive Information Operations in Space," March 23, 2000, pp 3-4. www.au.af.mil/au/awc/awcgate/dod-io-legal/wingfield.doc, for a worthwhile overview of potential attacks on space systems.

⁸ Jeff Foust, "The Chinese ASAT enigma," *The Space Review*, 7 May 2007, <http://www.thespacereview.com/article/864/1>, accessed 21 Jun 2009.

⁹ Peng Kuang and Cui Xiaohuo, "PLA Should Play Role in Space: Strategist," *China Daily*, 16 Jun 2009.

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.

...[T]here is a spectrum of potential threat capabilities looming on the horizon to include electronic jamming, low-power laser blinding, high-energy lasers, microsatellites, 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 antisatellite technologies exist today, and many are dual-use in nature, including a microsatellite 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.¹⁰

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 United States 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.

¹⁰ Terry Everett, "Arguing for a Comprehensive Space Protection Strategy," *Strategic Studies Quarterly*, Fall 2007, pp. 23-24, citing: Jim Garamone, "CENTCOM Charts Operation Iraqi Freedom Progress," *American Forces Press Service*, 25 Mar 2003; Maj Gen William L. Shelton, commander, 14th Air Force, "Update on Space Operations" (briefing, Air Force Association National Symposium on Space, Beverly Hills, CA, 17 Nov 2006; Warren Ferster and Colin Clark, "NRO Confirms Chinese Laser Test Illuminated U.S. Spacecraft," *Space News*, 2 Oct 2006, p. 10. ; 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).

Law & policy secure 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 United States has done this for decades; it has applied significant experience and 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 sovereigns states are signatories, and which govern issues of interest; second, multinational agreements among sovereigns. International agreements are governed, not by contract law, but by the *Vienna Convention on the Law of Treaties*.¹¹ Under the Vienna Convention, states can do anything they want and agree to, unless what is contemplated violates a peremptory norm (a topic that will be treated shortly). While the United States has not ratified the Vienna Convention it still treats the bulk of its rules as compelling under customary international law, which is a third foundation of international law; fourth, general principles common to mature legal systems; and fifth, subsidiary "municipal" determinations of law (e.g., national decisions such as those rendered by the U.S. Supreme Court).¹²

International law is an integral part of the United States legal system. Its founding fathers convened at the 1787 Philadelphia Constitutional Convention to

¹¹ See *Vienna Convention on the Law of Treaties*, May 23, 1969, 1155 U.N.T.S 331, 8 *International Legal Materials* 679 (1969).

¹² Article 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, 2008, retrieved 7 Mar 2009.

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 "[t]o 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."¹³ Article VI, Clause 2 provides: "...all Treaties made, or which shall be made, under the Authority of the United States the name of the United States, shall be *the supreme Law of the Land*."¹⁴ (Emphasis added) Generally, treaty terms take precedence over conflicting U.S. statute terms.¹⁵

With relatively few treaty restrictions governing activities in space for military or other purposes, some might think the United States 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 United States, abides by both standards. Decades of senior policy makers within the executive and congressional branches of the U.S. government have recognized the importance of the domain; assessed risks associated with not providing measured and calm global leadership to preserve access to it; and made

¹³ Under international law, the terms "treaty" and "international agreement" are synonymous, although the terms do have different meanings within the US Department of Defense (DoD). DoDD 5530.3, *International Agreements*, 11 June 1987, Encl 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 Senate.

¹⁴ Customary law, which will be covered shortly, 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.

¹⁵ The major exception to this is when Congress explicitly intends for a later statute to override the conflicting treaty provision.

decisions in accord with those assessments.¹⁶ In turn, the United States encourages comparable policy making by other members of the global community.

As it executes global engagement activities, the United States 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. Fortunately, 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. Bi-lateral and multi-lateral arms control treaties also preserve some of the *sanctuary* aspects of space by prohibiting "interference" with "national technical means" (NTMs) such as missile warning and reconnaissance satellites used to verify treaty compliance. Confidence-building procedures 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, exponentially user growth and needs, all within nature's limited useable bandwidth in the electromagnetic spectrum.

The *Treaty on Principles Governing the Activities*

¹⁶ While 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.

of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 1967, or the Outer Space Treaty 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 program. The treaty was consummated at a time when U.S. policy makers concluded space offered breathtakingly-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 space-faring 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 Outer Space Treaty, the United States supports freedom of access to space by all space venturing powers, agreeing to treaty language that provides: "Outer space ... shall be free for exploration and use by all States without discrimination of any kind..."¹⁷ The treaty also

¹⁷ *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 treaty states in pertinent part: 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 United Nations, 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

declares nations should have “freedom of scientific investigation in outer space.” Addressing topics that affect the potential for space conflict, the Outer Space Treaty provides that international law applies. “...Article III [of the Outer Space Treaty] incorporates the application of international law, and specifically the Charter of the United Nations, in outer space, making it a vital part of the *corpus juris spatialis*.”¹⁸ This incorporation of international law, not just the United Nations Charter, is important and guiding.

Every major space faring nation is a signatory to the Outer Space Treaty. Rights (and obligations) of non-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.”¹⁹ Outer Space Treaty signatories 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 United States, accepts in principle the existence of customary international law (although 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 United Nations 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.”²⁰

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 which 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);

weapons on celestial bodies, or station such weapons in outer space in any other manner....

¹⁸ 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, at the International Astronautics Congress, Glasgow, UK, October 2008, p.1.

¹⁹ Shabtai Rosenne, *Practice and Methods of International Law*, Oceana Publications (July 1984), p. 55.

²⁰ U.N. Charter, Article 92.

second, the acts by states related to the rule must occur out of a sense of legal obligation; 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.²¹

Under customary international law, what is done, written or said can establish legal precedent. But not always; such matters do not usually undergo examination in a courtroom setting. This in turn presents an opportunity for mischief, even if only in a diplomatic drama. This explains why U.S. policymakers feel compelled from time-to-time to reign in senior (and junior) 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.

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 (cit.om.), even if that accepted situation is inconsistent with the term in a treaty. (cit.om.) Acquiescence, on the other hand, occurs in circumstances where a protest is called for and does not happen (cit.om.) or does not happen in time in the circumstances. (cit.om.) 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. (cit.om.) 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.

²¹ Shabtai Rosenne, *Practice and Methods of International Law*, *supra*.

(cit.om.)²²

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.”²³ As an example, State Party A states something to induce an expectation, stating “Party A will monitor the space environment and warn all space faring nations of potential space collision threats”. Though 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 space situation awareness (SSA) capabilities as stated. Part B refrains from securing such tools, and relies on Party A’s 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 President Dwight Eisenhower directed a slowing of pending US space launch activities so the Soviets could successfully launch first, allowing their actions to establish customary over-flight rights. The author is not so sure this is what happened but it serves as a charming anecdote. Nevertheless, according to Nancy Gallagher and John D. Steinbruner, there is some basis for the story:

A 1950 RAND report that has been called “the birth certificate of American space policy” underscored the practical importance of legal justification. (cit.om.) 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 United States paid careful attention to political and psychological issues associated with space technology, the RAND report argued, it could constrain the Soviet counterreaction, strengthen deterrence, reduce Politburo resistance to international inspections of atomic installations, and possibly elicit a radical reorientation of Soviet behavior along more cooperative lines. (cit.om.)

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. (cit.om.) 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.”(cit.om.) 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. (cit.om.)

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. (cit.om.)²⁴

The Eisenhower Administration’s objective to obtain universal acceptance of the concept of satellite free passage and overflight rights was more fully

²² Malcolm Nathan Shaw, *International Law*, 5th Edition, Cambridge University Press, 2003, p. 437.

²³ *Ibid.*, p. 439.

²⁴ Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts & Sciences, *Reconsidering the Rules of Space Project*, Cambridge, MA (2008), pp. 7-8. “The adviser was Donald Quarles, Eisenhower’s assistant secretary of defense for research and development. A. J. Goodpaster, “Memorandum of Conference with the President,” October 8, 1957, 2, Dwight D. Eisenhower Presidential Library, <http://www.eisenhower.archives.gov/dl/Sputnik/Sputnikdocuments.html>...see also Dwight D. Eisenhower, *Waging Peace* (Garden City, NY: Doubleday, 1965), 556; and George B. Kistiakowsky, *A Scientist at the White House* (Cambridge, MA: Harvard University Press, 1976), 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* (New York: Praeger, 1983), 26–29.

achieved years later when these customary law principles were included in the Outer Space Treaty. In the meantime, statements of such principles were presented and discussed within various global community and United Nations' 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 which warrant interest. This is an important issue as air space is subject to sovereignty rules; in contrast, signatories to the Outer Space Treaty 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 deorbit 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 in Cambridge. 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).²⁵ (emphasis added)

Presenting a threat to peace, the North Korean ballistic missile and nuclear proliferation activities have been deemed violations of U.N. Security Council Resolution 1718, which demands the country not conduct new nuclear tests nor launch a ballistic

missile.²⁶ Nevertheless, North Korea, who only recently acceded to the Outer Space Treaty on May 3, 2009, insists its April 2009 rocket launch is part of an effort to 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."²⁷ 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.²⁸ Even Japan agrees North Korea has a right to a space program, "but only after it denuclearised and no longer posed a threat."²⁹

"The Korean communist regime has been careful to follow the spirit of the treaty, keeping the world apprised (sic) of its plans, unlike its unannounced missile launches in 1998 and 2006."³⁰ 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."³¹ It also made a notification of the launch in accord with the Registration Convention.³² Despite these efforts, and underscoring the potential

²⁶ Joanne Irene Gabrynowicz, "Satellite spots activity at North Korean missile site, officials say", *Res Communis*, 29 Mar 2009, <http://rescommunis.wordpress.com>, citing CNN.

²⁷ Joanne Irene Gabrynowicz, "North Korea launch a test for international law", *Res Communis*, 2 Apr 2009, <http://rescommunis.wordpress.com>, quoting Kelly Olsen, "North Korea launch a test for international law", *Associated Press*, 2 Apr 2009

²⁸ "China says NKorea has right to peaceful use of space", *The China Post*, 8 Apr 2009.

²⁹ "Japan Says NKorea Space Program OK after Denuclearisation", *Space War*, 7 Apr 2009, http://www.spacewar.com/reports/Japan_Says_NKorea_Space_Program_OK_After_Denuclearisation_999.html.

³⁰ Joanne Irene Gabrynowicz, "North Korea launch a test for international law", *Res Communis*, *supra*.

³¹ Joanne Irene Gabrynowicz, "North Koreans have notified several UN agencies that they plan on launching", *Res Communis*, 12 Mar 2009, <http://rescommunis.wordpress.com>, quoting, Robert Wood, U.S. Department of State, Daily Press Briefing – March 12.

³² Joanne Irene Gabrynowicz, "North Korea Accedes to Registration Convention", *Res Communis*, 11 Mar 2009, <http://rescommunis.wordpress.com>, quoting the Treaty Section of the United States: The following Depositary Notification has been issued:

Subject: Outer Space

Title: Convention on registration of objects launched into outer space

Action: Democratic People's Republic of Korea:Accession

Reference: C.N.154.2009.TREATIES-1 (Depositary Notification)

²⁵ Geoff Brumfiel, "Analysts spar over launch image", *Naturenews*, 8 Apr 2009

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.³³

The North Koreans protest that they are only engaged in *peaceful* space activities; but then 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 United States, its allies, and most nations subscribe to the free passage rules for space. The United States doesn't 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 United States 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 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 centres 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

³³ Joanne Irene Gabrynowicz, "North Korea 'ignored satellite procedures'", *Res Communis*, 8 Apr 2009, <http://rescommunis.wordpress.com>, citing *The Daily Yomiuri*.

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. (cit.om.)

As regards 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. (cit.om.)

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. (cit.om.)

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.³⁴

Some proponents argue space should be defined as beginning at 100 kilometers 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).³⁵ However, if adopted by

³⁴ Isabella Henrietta Philepina Diederiks-Verschoor, *An Introduction to Space Law* (Kluwer Law International, 1999), pp. 11-12, citing E.R.C. van Bogaert, *Aspects of Space Law*, 1986, p. 20, Manfred Lachs in his Closing Speech of the Session on Customary International Law and General Principles of Law, in *Environmental Aspects of Activities in Outer Space (Proceedings of a Colloquium)*, Cologne, 1988, K.-H. Böckstiegel, ed.), pp. 187-190 at p. 188, and H.A. Wassenbergh, *Principles of Outer Space Law in Hindsight*, 1991, p. 36.

³⁵ "The 100 km Boundary for Astronautics" (DOC). Fédération Aéronautique Internationale Press Release. 24 June

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, civil and commercial systems would be put at risk. The old paranoid Soviet 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 United States 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 United States 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 a bit from customary law. The peremptory norm is a principle of law from which no violation is ever 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."³⁶ Under the *Vienna Convention*, any treaty that conflicts with a peremptory norm is void.³⁷ New peremptory norms can develop under the Convention,³⁸ but the document does not itself specify any specific norms or how they are developed or created.

"A treaty is void if, at the time of its conclusion, it conflicts with a peremptory norm of general international law. For the purposes of the present Convention, a peremptory norm of general international law is a norm accepted and recognized by the international community of states as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character."³⁹

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. 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; this creates some uncertainty. 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 According to Nieto-Navia:

Rules of *jus cogens* can be defined in general terms as being non-derogable rules of international 'public policy.' (cit.om.) Given their overriding importance and indeed because often they involve matters of international public order it can be stated that each and every State has a legal interest therein. (cit.om.) As a result, one can state that peremptory obligations are owed by all States (and other subjects of international law) to the international community of States as a whole.⁴³

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

2004. http://www.fai.org/press_releases/2004/documents/12-04_100km_astronautics.doc. Retrieved 18 Jun 2009.

³⁶ US Legal Definitions, "Peremptory Law & Legal Definition," <http://definitions.uslegal.com/p/peremptory>.

³⁷ *Vienna Convention on the Law of Treaties, supra.*, Article 53.

³⁸ "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."

Vienna Convention on the Law of Treaties, Article 64.

³⁹ *Vienna Convention on the Law of Treaties*, Article 53.

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

⁴¹ *Ibid.*, citing A. Verdross, *Jus Dispositivum and Jus Cogens in International Law*, 60 AJIL (1966), p. 58.

⁴² *Ibid.*

⁴³ *Ibid.*, p. 14, citing *Case concerning the Barcelona Traction, Light and Power Company, Limited*, Second Phase, Judgment of 5 February 1970, ICJ Reports (1970), p. 3 at p. 32, and I. Brownlie, *Principles of Public International Law* (Fifth Edition, 1999), Glossary.

whereby one or a few rogue state can effectively negate any decision to designate a norm as preemptory. Thus a norm can be considered as *jus cogens* if it is accepted and recognized by the international 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). So, in this way, norms of *jus cogens* can be drawn from the traditional sources of international law—treaties, international custom, and the like.⁴⁴

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 preemptory norms.⁴⁵

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*."⁴⁶

Nieto-Navia suggests it is possible to classify norms which are not subject to derogation by treaties or otherwise. These are: norms which 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.⁴⁷

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 NTMs, missile warning, emergency communications and even perhaps precision navigation and timing 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. Preserving access to such systems by antagonists would therefore appear to be a preemptory 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. The Russian and the United States positions on limiting interference with NTMs have been set out in treaty and agreement. China, Canada, the United Kingdom, France, and other significant space-faring powers have made pronouncements condemning interference with such systems, and supporting the transparency efforts. So a norm that favors protection of NTMs is supported at least by global space faring 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 missile warning and emergency communication capabilities, that these should not be attacked or interfered with. These systems would help adversaries to understand, 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 preemptory norms proscribe attacks on space-based precision navigation and timing 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.

⁴⁴ *Ibid.*, pp. 10-11.

⁴⁵ *Ibid.*, p. 11.

⁴⁶ *Ibid.*, p. 12.

⁴⁷ *Ibid.*, pp. 12-13.

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 & 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. 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.

Treaties and customary law provide a strong imperative to limit space activities to non-aggressive "peaceful purposes"

Article III of the Outer Space Treaty 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*."⁴⁸ (Emphasis added)

Though crafted before the space era, a careful reading of the United Nations Charter shows its terms are fully consistent with and encourage peaceful space activities. The first purpose of the U.N. 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."⁴⁹ (emphasis added)

The United Nations and its 1945 charter arose out of the ashes of the League of Nations and failures of

⁴⁸ Article IV explicitly places the "peaceful purposes" restriction only on the moon and other bodies. As written, Article IV could suggest States may engage in non-peaceful activity in outer space as long as it does not occur on a celestial body. Indeed, some argue this is how the United States officially interprets this article.

⁴⁹ United Nations Charter, Article 1(1).

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.⁵⁰

The U.N. 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."⁵¹ 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."⁵² (Emphasis added)

The phrase "international peace and security" contained in Article 2(3) is echoed in the later agreed-to Outer Space Treaty. The repetition of the words "international peace and security" in the Outer Space Treaty links "peaceful purposes" back to norms of "peaceful means" enunciated in the U.N. Charter.⁵³

Some believe that under the U.N. Charter, war was outlawed.⁵⁴ 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 has replaced the ancient Augustinian "just war" formulation.⁵⁵ Still, despite its imperative for preserving international peace and security, the Charter does not ban all use of force. The document

⁵⁰ The 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.

⁵¹ United Nations Charter, Article 2(3).

⁵² United Nations Charter, Article 2(4).

⁵³ P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*," *supra.*, p.3.

⁵⁴ Norman Menachem Feder, "Reading the U.N. Charter Connotatively: Toward a New Definition of Armed Attack," 19 *NYU Journal of International Law & Policy* 395 (1987) 402, citing Schachter, "The Right of States to Use Armed Force," 82 *Michigan Law Review* 1620, 1620 (1984).

⁵⁵ "St. Augustine believes that a war was just when it was waged in order to redress a wrong or unjust enrichment."

Ibid., at footnote 43.

outlaws the aggressive use of force, and the aggressive use of force has become an international crime.⁵⁶

“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; the signatories didn’t want to leave an opening for unseemly argument by aggressors.⁵⁷ Even so, insight into the term’s meaning can be found in U.N. General Assembly Resolution 3314 (1974).⁵⁸ “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 United Nations.’(cit.om.) 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.”⁵⁹ (emphasis added)

Given the over-half century of rule making and statecraft just discussed, P.J. Blount argues the Outer Space Treaty’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. (cit.om.) 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. (cit.om.) 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 (cit.om.) and in the Outer Space Treaty (cit.om.) to its use in laws, policies, and official statements of numerous States dealing with their respective space programs. (cit.om.)⁶⁰

⁵⁶ *Ibid.*, p.3, citing United Nations Charter 1(1), and, generally, Antonio Cassese, *International Criminal Law* (2003), 110-125.

⁵⁷ “Indirect aggression”, however, has not found favor as an “act of aggression.”

⁵⁸ See Definition of Aggression, U.N. General Assembly Resolution. 3314, UN GAOR, 29th Sess., Supp. No. 31, UN Doc. A/9631 (1974).

⁵⁹ P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” *supra.*

⁶⁰ P.J. Blount, “Limitations on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” *supra.*, p. 2. The professor cites: *Declaration of Legal Principles Governing the Activities of States in the Exploration and Use*

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.⁶¹ Some argue the phrase means *any* military use of space violates the treaty.⁶² 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 United States seeks to preserve its hegemony in and dominance of the space domain. Nevertheless, the U.S. view is compelling, convincing, and clarifying—and 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.(cit.om.) In other words, space operations are considered peaceful, provided they are not “aggressive.”(cit.om.) Space may still be used as a medium of warfare: the treaty does not prohibit antisatellite (ASAT) weapons or even nuclear weapons that merely transit space. (cit.om.) Other weapons may be deployed in space so long as they are neither nuclear weapons nor weapons of mass destruction. (cit.om.) Furthermore, self-defensive acts in space are also permissible, provided they do not violate other treaty restrictions. (cit.om.)⁶³

As touched on above, the “United States employs a permissive interpretation of the Outer Space Treaty and the other rules regulating military activities in

of Outer Space, preamble, UN GA res. XVIII, preamble, UN Doc. A/RES/18/1962(1962). He also cites: “United States: US National Space Policy, NSPD 49 (2006)...Russian Federation: Government of Russian Federation Resolution of May 15, 1995 N 468 Moscow, available at http://unoosa.org/oosa/SpaceLaw/national/russian_federation/resolution_468_1995E.html...China: Statement by Hu Xiaodi to the UN First Committee, October 15, 2002, in General Assembly Records, 57th Session, 1st Committee, 12th Meeting, UN Doc. A/C.1/57/PV.12(Oct. 15, 2002)...”

⁶¹ *Ibid.*, p.2.

⁶² Capt. Adam E. Frey, “Defense of US Space Assets: A Legal Perspective,” *Air & Space Power Journal – Winter 2008* (December 1, 2008), <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/win08/frey.html>. See also Joan Johnson-Freese, “The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control,” *INSS Occasional Paper 30, Space Policy Series*, USAF Institute for National Security Studies (January 2000), p. 10.

⁶³ *Ibid.*

space."⁶⁴ The traditional U.S. interpretation, shared by most other space-faring countries, is "nonaggressive" military support activities are not inconsistent with the peaceful-use principle.⁶⁵ 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.⁶⁶

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 hyper and superpowers.⁶⁷ The intent of the Outer Space Treaty's framers and an interpretation of its terms allowing military activities in space can readily be ascertained by looking to the practices of major space faring powers. They continued to use space for military purposes following endorsement of the Treaty.

When U.S defense officials' writings mention the Outer Space Treaty, they typically insist U.S. policy

⁶⁴ Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, *supra.*, p. 42.

⁶⁵ *Ibid.*, citing Ivan Vlastic, "The Legal Aspects of Peaceful and Non-peaceful Uses of Outer Space," in *Peaceful and Non-peaceful Uses of Space*, ed. Bhupendra Jasani (New York: Taylor and Francis, 1991), 37–55.

⁶⁶ *Ibid.*, citing Christopher 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.

⁶⁷ According to Thomas C. Wingfield, "Legal Aspects of Offensive Information Operations in Space," March 23, 2000, p. 6, www.au.af.mil/au/awc/awcgate/dod-io-legal/wingfield.doc. "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."

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. Some suggest this posture ignores Article III's declaration that space activities must be performed in accord with international law, including the U.N. Charter's rules about the threat or use of force.⁶⁸ Nonetheless, and consistent with its views, the United States has steadily expanded the scope of its "peaceful" non-aggressive military space activities, often for the betterment of the global community and benefiting potential adversaries. GPS navigation and timing, space situation awareness, 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 United States behavior has emerged; indeed, all of the major space faring 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."⁶⁹ 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."⁷⁰

Treaties and customary law do not proscribe space warfare or preparation for such conflict

Despite the histrionics of the peace and disarmament community, the conduct of military space activities is an accepted practice and consistent with the Outer Space Treaty and other agreements. Plainly, the Outer Space Treaty, conventions and international agreements do not foreclose space warfare or preparation for such conflict. There are

⁶⁸ Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, *supra.*

⁶⁹ *Ibid.*, citing Elizabeth Waldrop, "Weaponization of Outer Space: U.S. National Policy," *High Frontier*, Winter 2005, 40–41.

⁷⁰ *Ibid.*, citing Elizabeth Waldrop, "Weaponization of Outer Space: U.S. National Policy," *High Frontier*, Winter 2005, 36–37.

caveats to this point, however. The Outer Space Treaty 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.⁷¹ Even so, the U.N. Charter and Outer Space Treaty 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 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.”⁷² Or, perhaps, the difference can be found in the politics or diplomacy of its use.

What is a “space weapon”? The devil is in the detail,⁷³ 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 & control? Should it encompass seemingly innocuous civil satellites or micoSats 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.

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

⁷¹ Article 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”; they cannot be used for military bases or weapons testing.

⁷² P.J. Blount, “Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*,” *supra.*, p.4.

⁷³ “...that small things in plans and schemes that are overlooked can cause serious problems later on.” “Idiom: Devil is in the detail”, *UsingEnglish.com*, <http://www.usingenglish.com/reference/idioms/devil+is+in+the+detail.html>, accessed 18 Jun 2009.

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 nonweapon 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.⁷⁴

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 (citation omitted) 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].⁷⁵

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. (cit.om.) 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

⁷⁴ Terry Everett, “Arguing for a Comprehensive Space Protection Strategy”, *supra.*, pp. 32-33.

⁷⁵ Michael Rance, Presentation to AIAA Space 2007, AIAA 2007-6061, p. 2, citing Michael Katz-Hyman and Michael Krepon, “Viewpoint: Space Weapons and Proliferation,” *Non Proliferation Review*, Vol. 12, No. 2 (July 2005): 323-341, pp. 325-326.

attacks in or from space would be consequential firsts in the history of warfare.⁷⁶

So the challenge of identifying space weapons in terms of just exactly where and under what conditions it exists 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."⁷⁷

Despite the challenges in the definition, no treaty bans conventional space weapon systems, so it can be concluded "nonnuclear ASAT weaponry is...legal."⁷⁸ Fortunately, 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.

Bruce Hurewitz 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*."⁷⁹ 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 thus far 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 United States 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.

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, presented as part of the Conference on Disarmament's discussion on the Prevention of an Arms Race in Outer Space (PAROS). These proponents suggest the progress of science and technology make it necessary to strengthen international principles relating to reducing potential threats. However, as conceded by Russians and Chinese, verification of a PAROS treaty would be extremely difficult. 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 United States 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

⁷⁶ Michael Katz-Hyman and Michael Krepon, *supra*.

⁷⁷ *Independent Working Group on Missile Defense, the Space Relationship, and the Twenty-First Century, 2007 Report*, Washington, D.C.: Institute for Foreign Policy Analysis, August 28, 2006, p. 73.

⁷⁸ Joan Johnson-Freese, "The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control", *supra*, p. 10, citing Bruce A. Hurwitz, *The Legality of Space Militarization* (North-Holland, 1986), p. 127.

⁷⁹ Joan Johnson-Freese, "The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control", *supra*, p. 11, citing Bruce A. Hurwitz, *The Legality of Space Militarization, supra*, p. 128.

dispose of threats posed by ground based systems.⁸⁰

Despite its own issues associated with complying with space-related treaty obligations, especially with its 2007 ASAT 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."⁸¹ 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.

For years, the United States has acknowledged the diplomatic posturing relating to space weaponization (no matter the political party in office), 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 new U.S. administration and its domestic allies now 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.

Despite the difficulties, the United States 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

⁸⁰ See generally Government space arms control proposals, Secure World Foundation, http://www.secureworldfoundation.org/index.php?id=151&page=Governmental_Proposals, accessed 11 June 2009.

⁸¹ Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, *supra.*, 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," March 12, 1998, www.nti.org/db/china/engdocs/lich0398.htm; Fu Zhigang, "A Chinese View of StarWars," *The Spokesman* 72 (c. 2000): 17–18; and "Statement by Ambassador Hu Xiaodi for Disarmament Affairs of China at the Plenary of the Conference on Disarmament," June 7, 2001, <http://www.nti.org/db/china/engdocs/cd060701.htm>.

power and used its bully pulpit to influence the global space-fairing community. The United States 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.⁸²

The use of force against space or other legitimate military targets is allowed only in self-defense against an armed attack or in accord with authorization of the United Nations to maintain 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 U.N. Charter.⁸³ 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 in 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 (domestic) or international law, and existed well before the advent of the U.N. 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 U.N. Charter gives the U.N. 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.⁸⁴

⁸² See *Fact Sheet on Presidential Directive on National Space Policy, February 11, 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."

⁸³ P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis*," *supra.*, p.3.

⁸⁴ Jia Huang, "New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space", *Journal of Politics and Law*, Vol. 2, No.1, pp. 39-43, p. 40.

In *Nicaragua v. U.S. (1986)*⁸⁵, the International Court of Justice (ICJ) offered insight into the meaning of the Article 51 right of self defense against *armed attack*.⁸⁶ 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 United States was assisting in their counter-revolution against the Soviet-sponsored Marxist regime. The United States 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 millenniums. 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 U.N. Charter, (2) enforcement actions under Chapter 7 of the U.N. Charter, or (3) possibly through application of pre-U.N. anticipatory defense rules of necessity & proportionality.⁸⁷ The 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 United States' sole justification for its actions in *Nicaragua v. U.S.* was

⁸⁵ *Military and Paramilitary Activities In and Against Nicaragua (Nicaragua v. United States)* [1986] I.C.J. Rep. 14.

⁸⁶ As was its right, the United States did not agree to subject itself to jurisdiction by the ICJ, which then proceeded based its finding of fact based on the presentations made by the Sandinistas. The United States 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.

⁸⁷ The US and a few other countries assert this third principle of anticipatory defense from time to time; they are the rules from *The Caroline Affair* discussed later. In *Nicaragua v. US*, the ICJ held that the U.N. Charter did not supersede custom, but exists alongside it. See *Nicaragua v. United States 1986 I.C.J. 14. para. 183*. 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 Major 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*, Spring 2004, Vol. 55, pp. 87-125, p. 114.

collective self-defense under Article 51. However, the court found none of the states involved the purported collective self-defense reported to the U.N. that they were subject to armed attacks. In addition, nobody reportedly asked the United States to help, nor did the U.S. report an attack to the U.N. 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.⁸⁸ The United Nations' 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. So, according to the Court, 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.⁸⁹ 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.

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

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 system 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

⁸⁸ The court also held there is no such thing as a right of "collective" armed response to acts which do not constitute an "armed attack."

⁸⁹ In order to justify the U.S.'s actions, the ICJ had to find an armed attack by Nicaragua against Honduras or Costa Rica. The U.S. had difficulty establishing this, because it didn't argue its case.

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 haven't 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 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. (cit.om.)⁹⁰

To hold *intentional* dazzling, electromagnetic or information operation activities that target, seek to damage, and actually disable, destroy, degrade or interfere with space systems are not “armed attacks” would render the word “attack” meaningless in the space or any other modern context. This, in turn, would invite serious and destabilizing mischief such as we have already seen with recent events in Estonia and Georgia where Russian hackers reportedly overwhelmed national internet/information technology systems with sophisticated denial-of-service and other attacks.

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 United Nations as when it was founded in 1945 San Francisco. In our modern world, a state secures and defends its territory, political independence, and elements of national power (diplomatic, information, military, economic) with space and space-enabled information systems. They provide the state a myriad of essential services –

⁹⁰ Jia Huang, “New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space”, *supra*, p. 40, citing DoD General Counsel, *An Assessment of International Legal Issues in Information Operations* (May 1999), p. 27.

communications, warning, intelligence, weather, precision navigation and timing (PNT), 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 Outer Space Treaty and found elsewhere within customary law and treaty would be just empty words and mean little.

With *Nicaragua vs. U.S.*, some now celebrate prospects *armed attack* has been defined narrowly, but that view is not universally cheered. “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.”⁹¹

Defining intentional and damaging electromagnetic and information operations as armed attacks is 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 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, rather than establishing a mutual benefit, by declaring that “freedom of action in space is as important to the United States as air power and sea power.”⁹² The

⁹¹ See Gregory E. Maggs, “The Campaign to Restrict the Right to Respond to Terrorist Attacks in Self-Defense Under Article 51 of the U.N. Charter and What the United States Can Do About It,” *Regent Journal of International Law* 4:149 (2006) 155-167.

⁹² Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, *supra.*, p. 43.

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 United States to operate in and acquire data from space.” The policy also emphasizes the United States is prepared to take unilateral action to dissuade, deter, defeat, and, if necessary, deny space-related activities hostile to its interests.⁹³

The alternate *restrictive* view asserts the Charter allows only 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 (cit.om.) and is consistent with a number of resolutions passed by the Security Council. (cit.om.) Proponents of this view see Article 51 as a partner to Article 2(3), which requires peaceful settlement of disputes (cit.om.), and Article 2(4), which outlaws the use of force. (cit.om.) They consider “the permission in Article 51 [to be] exceptional in the context of the Charter and exclusive of any customary right of self-defense.” (cit.om.)

This restrictive approach addresses the fear that expansive interpretations of Article 51 create a loophole through various countries could rationalize military adventurism. (cit.om.)⁹⁴

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. Space-faring states defend their political independence within the confines of the U.N. 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.⁹⁵

⁹³ Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, *supra.*, p. 43, citing the US National Space Policy. See *Fact Sheet on US National Space Policy*, National Security Presidential Directive No. 49, 31 August 2006.

⁹⁴ Norman Menachem Feder, “Reading the U.N. Charter Connotatively: Toward a New Definition of Armed Attack,” *supra.*, p. 404, citing UN Charter Articles 2(3) and 2(4), I. Brownlie, *International Law and the Use of Force by States* 273 (1963), and Schachter, *In Defense of International Rules on the Use of Force*, 53 *Chicago Law Review* 113, 117-118. (1986).

⁹⁵ “...since territorial sovereignty has been banned from outer space (cit.om.) and, with it, territorial jurisdiction, the overriding jurisdiction in outer space is quasi-territorial jurisdiction. (cit.om.). Bin Cheng, “The Commercial Development of Space: The Need for New Treaties”, *supra.*, p. 30.

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.”⁹⁶ 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 U.N. Charter. Unfortunately, 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 doesn't appear to be a happy medium which actually preserves and protects the space faring 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 consequences.⁹⁷

Kinetic, electromagnetic, and cyber attacks intentionally targeting, damaging, and interfering with satellites and their supporting terrestrial systems and property 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 U.N. 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 still requires an analysis be performed to conclude whether an actual attack has taken place. As will be discussed later in this paper's discussion of the *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

⁹⁶ Norman Menachem Feder, “Reading the U.N. Charter Connotatively: Toward a New Definition of Armed Attack,” *supra.*, citing Waldcock, “The Regulation of the Use of Force by Individual States in International Law,” 81 *Recueil Des Cours* (1952) 455, at 455-56.

⁹⁷ “The 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.

physical environment, varied energetic and kinetic events affecting space systems occur on a recurring basis; what's more, 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 but perhaps more difficult. 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 3 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 can not carry out investigations in a foreign country at will and this kind of investigation may be considered as spy so it can't 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 can't 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.⁹⁸

The right of anticipatory self-defense may lawfully be employed in defense of space systems, subject to significant policy and engineering realities.

Some states maintain that within the right of self-defense is a right to prevent an armed attack from

⁹⁸ Jia Huang, "New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space", *supra.*

occurring by using anticipatory self-defense.⁹⁹ "Professor Dinstein humorously prefers to term self-defense in this type of situation as 'miraculously early' rather than anticipatory."¹⁰⁰ The United States is one such country. *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.¹⁰¹ The

⁹⁹ Some argue the drafters of the U.N. 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. See Ian Brownlie, *Principles of International Law* 734 (7th ed. 2008), note 108.

¹⁰⁰ Norman Menachem Feder, "Reading the U.N. Charter Connotatively: Toward a New Definition of Armed Attack," *supra.*, p. 413, citing Dinstein, A Survey of Self-Defense in International Law, in 1 A TREATISE ON INTERNATIONAL CRIMINAL LAW 273 (C. Bassiouri and V. Nanda, eds, 1973) at 277.

¹⁰¹ *The Caroline Affair* arose out of a series of events beginning in 1837 that strained relations between the United States and Britain. A group of Canadian rebels, led by William Lyon Mackenzie, seeking a more democratic Canada, had been forced to flee to the United States after leading the failed Upper Canada Rebellion in Upper Canada (now Ontario). They took refuge on Navy Island on the Canadian side of the Niagara River, which separates the two countries (between Ontario and New York) and declared themselves the Republic of Canada. American sympathizers supplied the rebels with money, provisions, and arms via the steamboat SS *Caroline*.

On December 29, Canadian loyalist Colonel Sir Allan MacNab and Captain Andrew Drew of the Royal Navy commanding a party of militia, crossed the international boundary and seized the *Caroline*, towed her into the current, set her afire, and cast her adrift over Niagara Falls, after killing one black American named Amos Durfee in the process. The attackers invoked the principle of "anticipatory self defense" to justify their actions.

Public opinion across the United States was outraged against the British actions. Illustrations in the US press showed the burning ship going over the falls with men falling headlong into the chasm. It was reported that dozens of Americans were killed as they were trapped on board; in fact the ship had been abandoned before being set adrift. Durfee's body was exhibited in front of a military recruiting tavern in Buffalo, New York. In reality, the ship did not immediately go over the falls. She grounded and later broke up and the pieces went over the falls later on.

President Martin Van Buren protested strongly to London, but was ignored. On May 29, 1838, American forces retaliated by burning a British steamer SS *Sir Robert Peel* while it was in US waters.

The tensions were ultimately settled by the 1842 *Webster-Ashburton Treaty* with an expression of regret on the part of Britain that there had not been an immediate explanation and apology for the occurrence. President Martin Van Buren also

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. The time lag associated with detecting and analyzing an event, and ascertaining the source and potential for damage, could be rather lengthy. Complicating this problem, U.S. space situational awareness assets are woefully underfunded and overtaxed though they have been described repeatedly by DoD and 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, if not interesting. "It's a capability that Congress is unwilling to give the military out of fear that the Russians could mistake a ballistic missile launched at Osama bin Laden" for a nuke heading their way."¹⁰² 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 & 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.¹⁰³ Would 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."¹⁰⁴

The right to conduct conflict and warfare activities involving space systems is constrained by the Law of Armed Conflict (LOAC)

"States may use force to defend themselves or to defend others; however, there are accepted limitations to this exception..."¹⁰⁵ Before using force, one must evaluate not only space law but also assess use of force and LOAC humanitarian law considerations.¹⁰⁶ The LOAC is a body of international law that sets boundaries on the use of

sent General Winfield Scott to prevent further American incursions into Canada.

See generally, "Caroline affair", *Wikipedia: The Free Encyclopedia*, http://en.wikipedia.org/wiki/Caroline_affair, accessed 19 Jun 2009.

¹⁰² Dwayne Day, "Space policy 101: military space 2009," *supra*.

¹⁰³ See Louis-Philippe Rouillard, "The Caroline Case : Anticipatory Self-Defence in Contemporary International Law," *Miskolc Journal of International Law*, Vol. 1. (2004) No. 2, pp. 104-120 at 117.

¹⁰⁴ P.J. Blount, "Limitations on Space Weapons: Incorporating the Law of War into the Corpus Juris Spatialis," *supra*, p. 4

¹⁰⁵ *Ibid*.

¹⁰⁶ *Ibid*, p. 1.

force during armed conflicts through application of fundamental principles or rules.¹⁰⁷ It is euphemistically called the "law of war." Its principles and rules combine elements of treaty, customary international and municipal (domestic) 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 then air. Important components of space systems are terrestrially based. So the LOAC targeting considerations for targeting and also defending terrestrial components are better understood and established. Even so, not all rules are directly translatable into 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 & control, and user components.

(1) **Necessity:** 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."¹⁰⁸ (Emphasis added)

¹⁰⁷ 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." *DoD Law of War Program*, DoD Directive 5100.77, para. 5.3.1, December 9, 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." *Implementation of the "DoD Law of War Program"*, CJCSI 5810.01, para. 5.a, 27 August 1999. Under the US military's Standing Rules of Engagement (SROE), "US 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."

¹⁰⁸ Capt. Adam E. Frey, "Defense of US Space Assets: A Legal Perspective," *supra*. According to Frey, at fn 31: "The principle has four subelements: the user of force must be capable of regulating it; force must be necessary to achieve, as

Military necessity requires combat forces engage in only those acts necessary to accomplish a legitimate military objective. "The United States 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 be imperatively demanded by the necessities of war.' (cit.om.) 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.' (cit.om.)"¹⁰⁹

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 make an effective contribution to military action and whose total or partial destruction, capture, or neutralization at the time offers a definite military advantage."¹¹⁰ 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.

(2) **Distinction or Discrimination:** 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

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."

¹⁰⁹ *Ibid.*, citing "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>.

¹¹⁰ *Ibid.*, citing "Protocol Additional to the Geneva Conventions," Articles 51-54.

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.”¹¹¹ Civilians and *civilian property* are prohibited targets.¹¹²

Distinction also requires *defenders* to separate military objects from civilian objects to the maximum extent feasible.¹¹³ So if system are claimed to be civilian in nature, it needs to be separated from military systems. This is difficult and complex to achieve with some space-borne systems—communications, precision navigation and timing (PNT), weather or classically constituted imagery systems have dual civilian and military applications. For example, the global precision navigation and timing resource, GPS, is operated by the US Air Force, and it produces vital effects for the civil and commercial communities. Important weather satellites relied on by the US 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 & control center for the Defense Meteorological Satellite Program (DMSP). The U.S. obtains large portions of its satellite communications 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 if they were disabled in some fashion.

Under Additional Protocol I, limits are imposed on attacks on civilian objects¹¹⁴ and attacks that cause “widespread, long-term and severe damage” to the

¹¹¹ *Ibid.*, citing “Protocol Additional to the Geneva Conventions,” Article 52(2).

¹¹² *Ibid.*, citing “Protocol Additional to the Geneva Conventions,” Articles 51-54.

¹¹³ Thus, it would be inappropriate to locate a hospital or POW camp next to an ammunition factory, or, for example, in a space context, a civil space habitat for spacecraft personnel located next to an adjoining space weapon or military system.

¹¹⁴ P.J. Blount, “Limitations on Space Weapons: Incorporating the Law of War into the Corpus Juris Spatialis,” *supra.*, p. 5, citing Additional Protocol I, Article 52.

environment.¹¹⁵ 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, so 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, which will remain on orbit for hundreds of years, presenting long-term threats to imagery, environmental, and communication systems requiring classic sun-synchronous orbits. Such results must be avoided in the future.

Given the prevalent global understanding of the problems of space debris, and their physics, a space-faring 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 then 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.”¹¹⁶ 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 and riddle space with debris. 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

¹¹⁵ *Ibid.*, citing Additional Protocol I, Article 55. Additional Protocol I restrictions’ apply to land, sea, and air combat and these limitations are echoed elsewhere in other treaties and in customary international law.

¹¹⁶ *Ibid.*, citing Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), art. 51(4) 1125 U.N.T.S. 3.

unsecured naval mines:¹¹⁷ “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 non military objectives. (cit.om.) 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. (cit.om.) A weapon in space that misses its target and continues to poses a threat due to its capabilities might also be illegal (e.g. a warhead being used as an ASAT that misses its mark).”¹¹⁸

Another distinction concern 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.

(3) **Proportionality:** 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.¹¹⁹ This

¹¹⁷ “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.” *Ibid.*

¹¹⁸ *Ibid.*, p.7.

¹¹⁹ Capt. Adam E. Frey, “Defense of US Space Assets: A Legal Perspective,” *supra.*, citing Major Robert 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 United States’ preferred method of determining whether a target is a permissible one. The United States has declined to sign certain treaties, or portions thereof, that prohibit certain targets without any balancing test.”

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 I, 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.”¹²⁰

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.”¹²¹ 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 innocent.¹²² Hence, attacking and destroying vital PNT systems, such as GPS, if extensively relied upon by the global society at large, may be held illegal.¹²³

¹²⁰ *Ibid.*, citing “Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol 1), 8 June 1977.” Article 51(5)(b), ICRC International Humanitarian Law Database, <http://www.icrc.org/ihl.nsf/FULL/470>.

¹²¹ *Ibid.*, citing J. Ricou Heaton, “Civilians at War: Rexamining the Status of Civilians Accompanying the Armed Forces,” *Air Force Law Review* 57 (2005): 182-183.

¹²² *Ibid.*

The 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. Yôrām Dinstein, *The Conduct of Hostilities under the Law of International Armed Conflict*, Cambridge University Press, 2004, pp. 83-86

¹²³ The U.S. GPS system is a free global utility but the U.S. reserves the right to control and jam its signal. Current U.S. policy is to distribute the system’s PNT signal without

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 Outer Space Treaty 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."¹²⁴ Such weapons also present significant distinction/discrimination challenges. As noted, the space and defense communities learned of these issues during the 1960s Starfish Prime upper atmospheric nuclear weapons experiments. So the use of nuclear weapons in space (aside from transit of a nuclear warhead which most concede can be legally executed in certain conflicts) should, 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." (cit.om.) However, the court states that a State may use a nuclear weapon when the "very survival of a State would be at stake." (cit.om.) 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-defence" use a nuclear weapon in space. (cit.om.)¹²⁵

Under what circumstances could employment of a nuclear weapon in space 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

degradation. Russia, China, India, and Europe have deployed, or plan to deploy, their own space-borne PNT systems, arguing in part a need based on distrust of U.S. motives and lack of inclusion. In reality, their moves are all about job creation, and opportunities for fees.

¹²⁴ P.J. Blount, "Limitations on Space Weapons: Incorporating the Law of War into the Corpus Juris Spatialis," *supra.*, p. 7-8, citing Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, Oct. 10, 1963, Art 1, 480 U.N.T.S. 43.

¹²⁵ *Ibid.*, p. 8.

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 military operations by adversaries? Probably not. Approving that argument would create an exception that would swallow whole arms-control and peacekeeping aspects and limitations imposed by the Outer Space and Limited Test Ban treaties, the U.N. Charter, and other bilateral agreements.

(4) **Humanity:** Importantly, a state must do "everything feasible to verify that the objectives to be attacked are military objectives."¹²⁶ However, operations in this context requires use of the panoply of space capabilities—satellite imagery, satellite navigation 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. 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."¹²⁷

(5) **Chivalry:** War must be waged in accordance with widely accepted formalities, and avoid unlawful treachery. These principles impose an obligation to reduce non-combatant 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

¹²⁶ *Ibid.*, citing Additional Protocol I, at Article 57(2)(a)(i).

¹²⁷ *Ibid.*, p. 6.

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 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:

In addition, 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. (cit.om.)¹²⁸

The curious matter of Huskisson's critique of the Case Concerning Oil Platforms – the law on the use of force and LOAC's immediacy, necessity and proportionality requirements may be difficult to satisfy

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 International Court of Justice objected to such extra-territorial self-defense measures in its November 6, 2003 ruling in the *Case Concerning Oil Platforms*,¹²⁹ 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.¹³⁰

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 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 US 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 United States 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 United Nations Charter, and as understood in customary law on the use of force."¹³¹ 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.¹³²

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 US 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 Charter and under customary international law.¹³³ Darren Huskisson has written a scathing critique of the ICJ *Oil Platforms* decision and its potential importance.¹³⁴ He opines the case presents substantial implications for space conflict issues,

¹²⁸ Major Elizabeth Seebode Waldrop, "Integration of military and civilian space assets: legal and national security implications", *Air Force Law Review*, Spring 2004, 157-231, 227, citing DoD General Counsel, *An Assessment of International Legal Issues in Information Operations* (May 1999).

¹²⁹ *Case Concerning Oil Platforms (Iran vs. U.S.)* [2003] I.C.J. 161.

¹³⁰ Darren Huskisson, "Protecting the Space Network and the Future of Self-Defense," *Astropolitics*, 5:123-143, Taylor & Francis Group, LLC, 2007, p. 124.

¹³¹ *Case Concerning Oil Platforms, supra*, at 191.

¹³² *Ibid.*

¹³³ The 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.

¹³⁴ See Darren Huskisson, "Protecting the Space Network and the Future of Self-Defense," *supra*.

arguing in pertinent part:

A Space Tanker 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. (cit.om.) 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 Tanker 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?

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,¹³⁵ perhaps telegraphing displeasure with the 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, and its reasoning is not as simplistic as Huskisson would have us believe. Fortunately, careful analysis shows the ruling does not impose new or unreasonable burdens on those such as US (and allied) who seek to defend their space systems.

The *Oil Platforms* Court was clearly troubled the U.S. had reflagged U.S. and non-U.S. owned vessels and inserted itself square into the controversy and shooting war between Iran and Iraq and between

¹³⁵ Incredibly, the 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. See *Case Concerning Oil Platforms, supra.*

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 United States. The ICJ was also 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*, 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 Outer Space Treaty which provides space faring powers retain jurisdiction and control rights 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 operation¹³⁶; that could be a subject for a future modification of the Convention or a treaty affecting the use of force and LOAC. Pending such changes, perfecting self-defense rights for transferred systems could be achieved by invoking the rights with an Article 51 submission to the U.N. 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

¹³⁶ *Convention on the Registration of Objects Launched into Outer Space*, opened for signature Jan. 14, 1975, 28 U.S.T. 2389, T.I.A.S. No. 8480, 1023 U.N.T.S. 15 (entered into force Sept. 15, 1979), also known as the "Registration Convention", at Art. II.

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 non-combatants. However, Huskisson dismisses these evidentiary requirements of ascertaining the hostile actor as unreasonably difficult to achieve given the current state of space situational awareness capabilities. In complaining, however, he correctly spots the U.S. space situational awareness challenge; its capabilities are best equipped to provide a forensic understanding of recent events than give real-time feedback on ongoing events, nor predict future ones. Huskisson wrongly infers the evidentiary requirement should be partly ignored or accommodated because it could be overly difficult to satisfy.

Current space situational awareness 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 *Oil Platform 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, 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.

In performing attacks on space systems, a nation must comply with the obligations of the Liability Convention, Limited Test Band Treaty, Environment Modification Treaty, and other treaties governing the protection of National Technical Means (NTMs) and other 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.¹³⁷

Liability Convention. The 1972 Liability Convention 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

¹³⁷ *Vienna Convention on the Law of Treaties, supra.*, Article 60, para. 1: "A material breach of a bilateral treaty by one of the parties entitles the other to invoke the breach as a ground for terminating the treaty or suspending its operation in whole or in part." Thus, if a party has materially violated or breached its treaty obligations, the other parties may invoke this breach as grounds for temporarily suspending their obligations to that party under the treaty. A material breach may also be invoked as grounds for permanently terminating the treaty itself.

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. (cit.om.) Second, although the convention imposes a "fault" standard for damages, it does not define how much care should be exercised during a launch. (cit.om.) 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 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. (cit.om.)... [T]he mere fact of a collision does not automatically put the state that created the debris at fault.(cit.om.)¹³⁸ Finally, there is no established system for processing claims or for interpreting or enforcing the convention's terms. (cit.om.) The convention's litigation mechanisms have never been used, so their effectiveness remains unknown. (cit.om.)¹³⁹

Similar to the Liability Convention, the Outer Space Treaty 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 Outer Space Treaty may provide "an appropriate response" if a state interferes with another's space activities. It is based on

¹³⁸ This issue, however, has been forced to the forefront by 10 Feb 2009 collision between the Iridium 33 and Cosmos 2251 communications satellites over northern Siberia. "The impact between the Iridium Satellite LLC-owned satellite and the 16-year-old defunct Russian military satellite occurred at a closing speed of well over 15,000 mph, 490 miles above the face of the Earth. The collision occurred at roughly 780 kilometers (485 miles), 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." "When Satellites Collide: Iridium 33 Strikes Defunct Russian Sat in Unprecedented Accident," *GPS World*, 12 Feb 2009.

¹³⁹ Adam Frey, "Defense of US Space Assets: A Legal Perspective," *supra*.

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. (cit.om.) 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."(cit.om.)¹⁴⁰ 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. (cit.om.) However, the treaty provides no right of appeal if two states cannot resolve these issues themselves.¹⁴¹

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.

Limited Test Ban Treaty. The 1963 *Treaty banning Nuclear Weapon Test in the Atmosphere, in Outer Space, and Under Water*, also known as the *Limited Test Ban Treaty* (LTBT) prohibits "any nuclear weapon test explosion, or any other nuclear explosion" (emphasis added) in the atmosphere, underwater, or in outer space. The Outer Space Treaty does not specifically prohibit testing weapons

¹⁴⁰ Interestingly, while it appears the Chinese didn't offer to engage in such discussions, it appears from news reports of the incident the United States knew the ASAT test was pending. "The events show that the 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 United States knew about its space launching activities." Michael R. Gordon and David S. Cloud, "U.S. Knew of China's Missile Test, but Kept Silent," *The New York Times*, 23 Apr 2007,

http://www.nytimes.com/2007/04/23/washington/23satellite.html?_r=2&hp=&pagewanted=print&oref=slogin, accessed 21 Jun 2009. Apparently he US did not request consultation even though the Outer Space Treaty states this was its right. "Had the United States been willing to discuss the military use of space with the Chinese in Geneva, that might have been enough to dissuade them from going through with it," said Jeffrey G. Lewis, an arms control expert at the New America Foundation. *Ibid*.

¹⁴¹ Adam Frey, "Defense of US Space Assets: A Legal Perspective," *supra*.

in outer space itself (as opposed to on celestial bodies); instead it proscribes the stationing of nuclear weapons on orbit. With the LTBT, testing and subsequent use of nuclear weapons in response to attacks on space systems would 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.

National Technical Means (NTMs). A series of bilateral agreements between the US 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 are space (e.g., photo-reconnaissance satellites) and terrestrial assets (e.g., land-based radars, radar & intelligence systems on ships and aircraft, etc.) that verify arms control treaty compliance. Since they provide transparency, these systems are thought to help reduce the risk of nuclear war. The earliest of these provisions was contained in the 1972 Anti-Ballistic Missile (ABM) Treaty between the Soviet Union and the United States.¹⁴²

While the United States 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. As we have discussed, given the importance of space-borne 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 a peremptory norm the treaties attempt to perfect.

Environmental Modification Convention. The 1977 *Environmental Modification Convention* 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."¹⁴³ "Widespread" is defined as "encompassing an area on the scale of several hundred square kilometers"; "long-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."¹⁴⁴

The Environmental Modification Treaty focuses on proscribing employing military weapons, tactics and techniques that deliberately change natural processes. The Environmental Modification Convention in 1992 limited its purposes to military conflict.¹⁴⁵

¹⁴³ *Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques*, signed May 18, 1977, Entered into force, October 5, 1978, Article I(1).

¹⁴⁴ See Understandings Regarding the Convention, *Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques*, signed May 18, 1977, entered into force, October 5, 1978, Relating to Article I. US attempts at environmental modification during the Southeast Asia conflicts were opposed by dissidents in Congress. As a result, in 1973 the US Senate passed a resolution urging President Nixon to initiate negotiations leading to a multilateral treaty. In 1974 US-USSR bilateral negotiations began. In 1975, the USSR and the US submitted separate but identical texts of a draft convention to the UN. The draft was then finalized in the Conference of the Committee of Disarmament (CCD) and adopted by the UN General Assembly on 10 December 1976. The Environmental Modification Convention opened for signature in May 1977 and entered into force 5 October 1978.

¹⁴⁵ The US 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."

US 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 US 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."

¹⁴² See *Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems*, 23 U.S.T. 3435 (entered into force 3 October 1972, but no longer in effect as of 13 June 2002 due to US withdrawal)].

Would the use of nuclear weapons in space violate the Environmental Modification Treaty? 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 Treaty are violated. A state that creates debris intentionally in order to ruin the environment for use by its adversary would violate the Environment Modification Treaty. What should be concluded if a party protests the effects and damage were "unintended?" Some suggest a state that creates debris while targeting specific adversary targets would not violate the Treaty, but that act would instead only constitute a violation of the Additional Protocol 1. However, as to the space environment, the science and danger of space debris is now very much acknowledged, notwithstanding denials and protests of any potential offending state. So perhaps the requisite hostile intent and deliberate manipulation elements could be deduced from the willful and wanton disregard for the damage that occur 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.

Risk reduction treaties and agreements.

Agreements such as the 1971 *Accidental Measures Agreement*¹⁴⁶ (updated in 2004), the 1988 *Ballistic Missile Launch Notification Agreement*¹⁴⁷, and the 1990 *Dangerous Military Activities Agreement*¹⁴⁸ address dangerous laser use and dangerous interference with nuclear weapons command and control systems, and so potentially limit possible space warfare activities. 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

¹⁴⁶ *Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the United States of America and the Union of Soviet Socialist Republics*, September 30, 1971.

¹⁴⁷ *Ballistic Missile Launch Notification Agreement*, 31 May 1988.

¹⁴⁸ *Agreement between the Government of the United States of American and the Government of the Union of Soviet Socialist Republics on the Prevention of Dangerous Military Activities*, signed June 12, 1989.

the topic of 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 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 *Accidentals 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 or if an early warning system detects an unidentified object, or if there is any other unexplained event involving possible detonation of nukes.

Importantly, the *Accidental Measures Agreement* also 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 ICBM or SLBM 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 United States to prosecute space-related military/conflict-related activities.

Other treaties and agreements limiting space-related self-defense activities.

Although not traditional space "arms control" agreements the United States is also a 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 US space or other activities in exchange for the US 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 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.

A New ABM Treaty? Citing a changed global environment, the United States withdrew from the ABM Treaty in 2002. Some opposition to this move was expressed by operatives in the Democrat party apparatus that has now regained control of the U.S. executive and legislative branches of government. Assuming a new ABM Treaty is negotiated on 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 antisatellite purposes.¹⁴⁹

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."¹⁵⁰ In short, while the old 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."

This issue caused political debates in the 1980s, when debates involving the old Strategic Defense Initiative (SDI) were fought over ASAT technologies, options, opportunities, and related programs. U.S. ASAT technology development efforts have continued on and off for decades. Peace and disarmament advocates now attack US 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.

What does all this mean? 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

¹⁴⁹ Joan Johnson-Freese, "The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control", *supra.*, p. 16.

¹⁵⁰ *Ibid.*, p. 11, citing Bruce A. Hurwitz, *The Legality of Space Militarization* (North-Holland, 1986), p. 135.

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 option is reflexively favored perhaps by those who seem to have learned their lessons for space combat from the stuff of science fiction—*Star Trek*, *Star Wars*, *Battlestar Galactica*, *The Last Starfighter*, *Buck Rogers*—or by strutting wannabe space warriors—believers in the inevitability of space combat. A sad state of affairs—driven by the lack of a compelling space identity and a desire for respect on par with the pilot/warfighter élan, and by those who argue within the profession of arms for a warrior ethos. Then again, competitors and adversaries have noted the asymmetric advantages space capabilities provide the United States and its allies. They can easily see the tremendous leverage they can obtain by disrupting them. Given these pressures, space presents an unfortunate but feasible arena for conflict activities.

Good policy, law and resulting strategy formulation for defense of space systems requires more sophistication than just preening for a fictionalized space shoot-out. Fortunately, all is not lost and there is hope. 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. The author has personally observed high-octane young officers selected for military astronaut duties at the height of the initial *Star Wars* hysteria evolve into seasoned and wise senior-officer stewards of the U.S. space enterprise fully conscious of risks to space systems and global space activities.

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 the space domain remains a peaceful environment envisioned by the treaties. By doing this, the United States will maintain not only an ultimate strategic high ground but also a moral one.

We know that under treaty and customary law, the United States (as well as members of the United Nations and signatories to the Outer Space Treaty) 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 United States should or can do in preparation for or in response to an attack. Rather, as some contend, they pretty much only 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 United Nations 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

If engaged in space-based warfare, a nation must comply with the legal obligations set out in the Outer Space Treaty, Liability Convention, Limited Test Ban Treaty, Environment Modification Convention, and other treaties. Certain satellite systems and their supporting ground-based, and command and control systems should not be lawfully attacked; this includes components of NTMs. 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. Unfortunately, as we have seen with developments in North Korea, developing nations 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. So 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 US space systems as a legitimate target that the U.S. has the means and resolve to respond if it so chooses."¹⁵¹ Preparing for the lawful use of U.S. and allied retaliatory measures can hopefully encourage or, if necessary, compel offender reconsideration of its course of action and compliance to international morays or legal obligations if engagement cannot succeed.

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 United States "...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..."¹⁵² Presently the U.S. is the only globally space-enabled power, so adversary space components probably should not be engaged tit-for-tat.¹⁵³ Such would only be a pyrrhic act. This may change as other nations gain the wherewithal, experience, and

¹⁵¹ See John B. Sheldon, "Space Power and Deterrence: Are We Serious?," *Marshall Institute Policy Outlook*, Nov 2008, p. 3-4.

¹⁵² *Ibid.*

¹⁵³ Joint Publication 3-14 (January 6, 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 US national interests." See also, the 2006 US National Space Policy which states: "...the United States will...deny, if necessary, adversaries the use of space capabilities hostile to US national interests." See *Fact Sheet on US National Space Policy, National Security Presidential Directive No. 49, 31 Aug 2006*, pp. 1-2.

access to space capabilities and fully exploit them for military purposes.

Non-aggressive weaponization of space is legal as is also 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 (read: ICBM). 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, would appear to be lawful under current treaty and customary law.

In the event of war, the United States and its allies may defend components of their space systems that are subject to physical, jamming and cyber attack since such attacks should 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 United States 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 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 & control capabilities under rules relating to self-defense, and, if necessary, reprisal.¹⁵⁴

¹⁵⁴ Reprisals 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 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

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 perhaps during launch. Jammers could also be located, degraded and destroyed; e.g., GPS jammers were engaged and destroyed during Operation Iraqi Freedom by, the U.S Air Force likes to brag, by GPS-aided Joint Direct Attack Munitions (JDAMs, also described as "smart bombs"). Spacelift facilities could also be engaged to disable adversary launch capabilities.

The United States 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 United States 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 United States 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."¹⁵⁵ Given the potential for resulting debris, taking action to destroy or damage adversary space systems "may violate the duty to avoid the harmful contamination

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 United States, as Commander in Chief, may authorize US forces to take such an action.

¹⁵⁵ Capt. Adam E. Frey, "Defense of US Space Assets: A Legal Perspective," *supra*..

of space”¹⁵⁶ except in the most pressing circumstance.

Concluding Thoughts

The United States 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 in 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 space-faring nations and the rest of the world. Space capabilities are at risk to a myriad of threats, but continued efforts to improve international treaties, customary law, best practices, policy and overarching global behaviors will secure our high frontier.

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