Armed Conflict on the Final Frontier: The Law of War in Space

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I. INTRODUCTION

> [T]he lawful bearing of arms–under a strict code of military justice and within a corpus of humanitarian law–has been accepted as a practical necessity.[1]
>
> John Keegan (1993)

Some may reasonably wonder, for purposes of analysis under the international law of war, whether there is any meaningful distinction between warfare prosecuted within airspace and warfare prosecuted within outer space. In both cases, the military assets above the earth's surface may support the combat occurring below, or may engage targets in the same combat environment. Given this, some may view armed conflict from and within outer space as simply a subset of air warfare. Others may see armed conflict in outer space as superior to air warfare–that is, air warfare as a subset of space warfare. Still others may view space conflict as a new category of combat that is sui generis. We can state the question more simply as follows: is the "aerospace" environment fundamentally one field of combat operations or two?

This article suggests that for purposes of analysis under the law of war, space combat will be sui generis–fundamentally different from combat in terrestrial airspace.[2] This approach raises at least three implications for the

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[1] JOHN KEEGAN, A HISTORY OF WARFARE 5 (1993).

[2] Professor Matte argues that "airspace" is a misnomer, and that the proper term is "air medium." He makes this distinction in arguing against "any kind of arbitrary demarcation between 'air space' and 'outer space.'" N.M. MATTE, AEROSPACE LAW: TELECOMMUNICATIONS SATELLITES 11 n.31 (1982). Professor Matte further observed that the two environments are "*at present* governed by two different legal regimes," *id.* (emphasis added), but that the more logical approach is to speak of an aerospace continuum. On this approach, "the rules and norms of aeronautical law, on the one hand, and of aerospace law, on the other hand, should be applied according to functional criteria, i.e., the type of activity being carried out." *Id.* This contrasts with the "traditional view" of crafting and applying law to the medium in which the activity is carried out, either air or space. Though insightfully recognizing the great difficulty of establishing a non-arbitrary boundary between air space and

analysis undertaken herein. First, space combat will not be analyzed as simply an extension of air combat; the two are fundamentally different types of combat suggesting different doctrinal tenets of power. While the military use of space has traditionally been viewed as a medium from which to support terrestrial warfare, including air warfare, space as a medium of warfare itself raises entirely different legal and operational issues.[3] Thus, freed from a strict air warfare paradigm, the effort to establish limits on space combat in its own right can draw principles of armed conflict from those applicable to land and sea warfare, as well as from those governing air warfare.

Second, one of the key differences of space warfare, at least for the near future, will be the spatial separation of human combatants from their weaponry. Whether kinetic energy or space-based laser weapons in low-earth orbit, or jamming satellites used to corrupt telecommunications signals in geosynchronous orbit, the warrior is distant from his instruments of war by between 100 and 22,500 miles. When seeking to apply the current laws of

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outer space, this view, if applied to armed conflict, would identify applicable norms limiting weaponry and methods of warfare based on a functional approach, rather than on where the combat occurs. The difficulty with this from a military point of view lies in the conceptual challenge of creating warfare policy, doctrine, and operating plans without a clear demarcation of the theater of operations. *See, e.g.*, W.B. Scott, *Pentagon Considers Space As New Area of Responsibility*, 146:12 AV. WK. & SPACE TECH., Mar. 24, 1997, at 54 [hereinafter Scott, *Space as New Area of Responsibility*].

[3] One author aptly terms the difference "significant." R.D. NEWBERRY, SPACE DOCTRINE FOR THE TWENTY-FIRST CENTURY 10 (1998) [hereinafter NEWBERRY]. The difference is helpfully illustrated by three representative schools of thought on the relationship between military activity and outer space: (1) space as a demilitarized sanctuary; (2) space as the high ground; and (3) space as a theater of operations. J.E. Justin, *Space: A Sanctuary, the High Ground, or a Military Theater?*, *in* INTERNATIONAL SECURITY DIMENSIONS OF SPACE (U. Ra'anan & R.L. Pfaltzgraff, Jr., eds., 1984) 102-09 [hereinafter Justin]. The first view recognizes a minimal role for the military use of space but not its weaponization. Two thoughtful, moderated accounts representing this view were recently provided by two USAF officers. One aims at "opening the debate" on the space sanctuary view. B.M. DeBlois, *Space Sanctuary: A Viable National Strategy* 12:4 AIRPOWER J. 41 (Winter 1998) [hereinafter DeBlois]. The other claims to present the "strongest possible argument for a space sanctuary today." D.W. ZIEGLER, SAFE HEAVENS: MILITARY STRATEGY AND SPACE SANCTUARY THOUGHT (1998) [hereinafter ZIEGLER]. The second of the three schools of thought, sees the role of military activity in space as principally supportive of terrestrial combat and could include the use of weapons from space. This view stresses the inseparability of the air and space media, and makes heavy use of the term "aerospace," a term coined in 1958 by USAF Chief of Staff General Thomas White. Justin at 107; *see also* D.N. SPIRES, BEYOND HORIZONS: A HALF CENTURY OF AIR FORCE SPACE LEADERSHIP 54 (rev'd ed., 1998) [hereinafter SPIRES]. The third view represents the most complete use of space for military purposes. This view sees space not merely as another medium in which to augment existing military roles, but as an emerging combat environment, or military mission, in its own right. The present author's analysis rests on the conclusion that international law does not prohibit the use of outer space as a complete military theater of operations per se. This assumes that any force used as part of military operations in space is compliant under the *jus ad bellum*. For a discussion of the *jus ad bellum*, *see infra* notes 132 through 140 and accompanying text.

war, it appears this phenomenon will require new ways of thinking about a legal regime that has as its purpose the amelioration of human suffering. Beyond simply targeting other combatants, terrestrial infrastructure, or weapons systems, space warfare as it is now most widely conceived contemplates the destruction of unmanned military assets in the air or space environment.[4] Given these factors, it seems that the minimization of human suffering, the chief goal of the laws of war, is already achieved to some extent for space as compared with the other combat environments. From this observation follows the conclusion that with respect to space warfare as it is currently conceived, the law of war will be more applicable to regulation of means and methods of war, than to the protection of human life.[5]

Third, the first implication notwithstanding, the legal analysis of issues unique to space combat, such as the legality of new means and methods of space warfare, cannot rely solely on analogy with legal relationships governing other combat environments. This is due in part to the relative infancy of space warfare and to the recency of its technology. To a certain extent, the international regulation of space combat will evolve only *subsequent* to State action making such combat an imminent possibility.[6] Because the law governs actual social relations and not theoretical abstractions, and because there have been no reported or anticipated cases of actual space combat, conclusions about legal restrictions on such combat must begin tentatively. This is not to abandon hope of outlining contours of the legal regulation of space combat under existing international norms; certain points do clearly emerge from the analysis. It is simply to acknowledge realistically the limitations of such an

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[4] The unmanned assets used in outer space are obvious–satellites and missiles. Unmanned assets used within airspace include unmanned aerial vehicles (UAVs), currently used for surveillance, as well as missiles either headed for or from space or used entirely within airspace. *See generally* JEFFREY N. RENEHAN, UNMANNED AERIAL VEHICLES AND WEAPONS OF MASS DESTRUCTION: A LETHAL COMBINATION? 5-13 (1997) (provides helpful discussion of UAVs and remotely piloted vehicle technologies).

[5] This is to say that as long as space warfare is prosecuted through unmanned missions against assets wholly within the space environment, that portion of the law of war traditionally known as "Hague Law" will govern space warfare more readily than that portion known as "Geneva Law." For a discussion of "Hague Law," *see infra* notes 188 through 207 and accompanying text. For a discussion of "Geneva Law," *see infra* notes 208 through 219 and accompanying text.

[6] Professor Schmitt has pointed out that on rare occasions, international law has sought to outlaw the deleterious effects of certain anticipated technologies. In this regard he cites the ban on blinding laser weapons, adopted before such weapons had ever been used in military operations. "Much more frequently, however, law has proven *reactive*. Indeed, in the twentieth century, codification efforts have followed major wars in almost lock-step fashion." Michael N. Schmitt, *Bellum Americanum: The U.S. View of Twenty-First-Century War and Its Possible Implications for the Law of Armed Conflict, in* 71 INTERNATIONAL LAW STUDIES, THE LAW OF ARMED CONFLICT: INTO THE NEXT MILLENIUM 389 (Michael N. Schmitt & Leslie C. Green, eds., 1998), *reprinted in* 19 MICH. J. INT'L L. 1051 (1998) [hereinafter Schmitt, *Bellum Americanum*].

inquiry at this time. States faced a similar dilemma in the days leading up to World War I with aerial combat. At that time, one could hardly establish firm legal principles in the absence of State practice.[7] As was the case in the 1910s with respect to air warfare, a great deal of original reflection on the implications of space combat is needed today.

This article will examine the intersection of two subsets of public international law as they bear on space warfare: the law of war and the law of outer space. The analysis will focus on the relevant legal issues from the perspective of the United States, currently the most active spacefaring nation on Earth. Because the American vision for space war is the most "developmentally mature,"[8] it is a virtual certainty that U.S. practice will dominate the development of international law limiting the means, methods, and extent of the use of force in space.

Part II presents a historical review of the development of military activity in space. It discusses reactions by the international community to new weapons such as V-2 rockets, cruise missiles, intercontinental ballistic missiles, and nuclear devices. It also examines the history of U.S. military satellite development. This part also presents aspects of existing and foreseeable technology for armed conflict within and from outer space.

Parts III-V consider international law applicable to space warfare. Part III analyzes international law pertaining to armed conflict and distinguishes between the *jus in bello* and the *jus ad bellum*. Further, Part III outlines the

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[7] As Geoffrey Best puts it, "there was no international law on aerial warfare before the turn of our century. The Hague Conferences [1899 and 1907] gingerly laid a few foundations. . . . but the terms used were soon discovered to be archaic, and vital questions had been begged." G. BEST, WAR AND LAW SINCE 1945 199 (1994). It will be difficult to avoid similar mistakes as States contemplate moving into uncharted legal territory once again. Any attempt to depict the future in plausible terms is fraught with many challenges. The following three challenges, taken from a fascinating Air Force study on future concepts, capabilities, and technologies in the year 2025, certainly apply to any attempt to envision a future law of war and the conditions necessitating it:

> First, one runs the risk of assuming that because we *can* do something, we *will*. In this case technology drives planning, not the reverse. Second, we straight-jacket the future with today's assumptions. That is, we focus on an array of problems and possibilities that are too narrow compared to the array we actually will encounter. A third problem is the reverse of the previous one. Here, we are too expansive and imagine far more than we or the world are in fact capable of accomplishing in the time frame under review.

J.W. Kelly, *Executive Summary, in* AIR FORCE 2025 6 (1996) [hereinafter AIR FORCE 2025].

[8] Schmitt, *Bellum Americanum*, *supra* note 6, at 390. Numerous commentators, including senior military officers, have widely termed Operation Desert Storm the first space war. *See, e.g.*, R. Saltus, *Air Force says it Might Have Won the War in 2 More Weeks*, BOSTON GLOBE, Apr. 5, 1991, at 10; C. Covoult, *DESERT STORM Reinforces Military Space Directions*, 134:14 AV. WK. & SPACE TECH., Apr. 8, 1991, at 42.

key principles derived from treaties and customary international law and clarifies that "law of war," "law of armed conflict," and "humanitarian law" are phrases that have come to be largely synonymous with each other. Part IV examines the five multilateral space treaties comprising the *corpus juris spatialis*, and highlights key passages of relevance to space warfare. Part V considers related authorities such as the Limited Nuclear Test Ban Treaty, Anti-Ballistic Missile Treaty, Antarctic Treaty, and the United Nations Convention on the Law of the Sea, as well as three United Nations General Assembly (U.N.G.A.) Resolutions. Though not regulating outer space activity per se, the treaties are relevant either because of inherent parallels they have to the regulation of outer space, or because they contain specific provisions limiting space activities.

Part VI applies the legal regime governing international armed conflicts to space warfare. Here, the article examines the bases on which the law of war applies to outer space. In doing so, the article suggests that the process by which the law of war was applied to the last new combat medium, air, serves as a model for the likely development of the international regulation of space warfare. Part VI discusses problems of definition within the *corpus juris spatialis* that challenge any effort to apply the law of war to space combat. It further outlines U.S. national and military space policy and highlights the role that State law of war manuals might play in the future development of restrictions on space warfare. Part VI then briefly considers information warfare, a phenomenon heavily reliant on space assets and one of growing concern to the U.S. military.

Part VI also addresses special problems arising from, among other things, the prospect of applying the law of war to space warfare. This Part will analyze the significant problem posed by space assets dedicated to uses of both a civilian and military nature. It will also examine the status of assets owned both by belligerent and neutral States, as well as assets owned by opposing belligerents. It will further consider legal problems raised by the military status of astronaut combatants in light of the status conferred on all astronauts under current space law, as well as the question of whether astronauts found in foreign territory must be returned to opposing belligerents in time of war.[9]

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[9] Though several interesting studies consider the possibility of warfare with extra-terrestrial forms of intelligent life, such consideration is far beyond the scope of this article. Such analyses also exceed the scope of international law proper. Nonetheless, these works often make useful observations about future space weaponry and the difficulty of scientific prediction. For example, one sober, scientifically-respectable work, considering the technological preconditions for successfully defending against alien attack, distinguishes this project from that of mere science fiction, and points out the importance of allowing authors free rein in speculating about future technologies.

> Suppose an observer of the Wright brothers' [sic] memorable first flight at Kitty Hawk had been given the assignment of foretelling what aviation

Part VI concludes by examining whether proposed rights of innocent passage through foreign airspace for the purpose of accessing outer space will factor in the future regulation of means and methods of space warfare.

II. THE MILITARY ASCENT TO SPACE

> We will engage terrestrial targets someday–ships, airplanes, land targets–from space. We will engage targets in space, from space. . . . [The] missions are already assigned, and we've written the concepts of operations.[10]
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> General Joseph W. Ashy, USAF (1996)

In most respects, the history of mankind's ascent to space is a history of the militarization[11] of outer space. A review of this history, along with a basic

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> would be like seventy or so years later. Had he envisaged the wide-bodied jet or the supersonic transport he would have been absolutely correct. He would also have been laughed to scorn by his contemporaries at the time. Had he merely enlarged the Wright brothers' [sic] frail biplane into some bigger, stronger thing with umpteen engines and several sets of wings, chances are he would have been considered a true visionary even though his projected creation might be more akin to a flying bird-cage.

J.W. MACVEY, SPACE WEAPONS SPACE WAR 80 (1979). *See also* D. LANGFORD, WAR IN 2080: THE FUTURE OF MILITARY TECHNOLOGY (1979) [hereinafter LANGFORD].

[10] W.B. Scott, *USSC Prepares for Future Combat Missions in Space*, 145:5 AV. WK. & SPACE TECH., Aug. 5, 1996, at 51. General Ashy served as the Commander, United States Space Command [hereinafter USSPACECOM], Air Force Space Command, and the North American Aerospace Defense Command from September 1994 to August 1996.

Providing another in a series of observations on the military "operationalization" of outer space, General Ashy later predicted that "the relatively high percentage of space force capabilities devoted to a supporting role will change to a 'supported' role. In other words, future military operations will be supported not only *from* space (as in the first stages of airplane use), but also within and to space." J.W. Ashy, *Space Operations and Organization: Some Thoughts About the Future*, 146:16 AV. WK. & SPACE TECH., Apr. 16, 1997, at 56.

[11] The term "militarization," as applied to outer space, should not be confused with "weaponization." Though there are no authoritative international definitions of either term, the former refers to "the use of outer space by a significant number of military spacecraft." I.A. Vlasic, *Space Law and the Military Applications of Space Technology, in* PERSPECTIVES ON INTERNATIONAL LAW 386 n.6 (N. Jasentuliyana, ed., 1995) [hereinafter Vlasic, *Space Law and Military Applications*]. Such activity may be non-aggressive and scientific in nature, or aggressive and hostile. It may or may not involve the use of weapons, though the contrasting term weaponization is meant to suggest that by itself, the term militarization as applied to space does not necessarily include the presence of weapons. The term weaponization "refers to the placing in outer space for any length of time any device designed to attack man-made targets in outer space and/or in the terrestrial environment." *Id.* Though not necessarily so, the term implies the maintenance and use of such weapons by military forces. Thus, though conceptually distinct, weaponization should generally be conceived as a form of militarization.

familiarization of current and potential implements of space warfare, provides the requisite context from which the analysis herein can proceed to legal considerations related to the weaponization of space. Among other things, an understanding of technical space developments provides insight into the way international legal norms have developed. As discussed more fully in Part III, while the means by which States may lawfully attack each other's assets and personnel within space remains partially proscribed, the law has condoned the non-aggressive military use of space for decades.

A. Origins and Evolution of Space Militarization

1. Missiles and Rockets

Space warfare, as any other use of outer space, requires access to the space environment. That access requires the use of missiles and rockets, later termed "boosters" in view of their utility as launch vehicles for spacecraft. As for most other segments of space technology, rockets[12] were first developed for use by military forces. Matte notes the likelihood that "as early as 3000 B.C. the Chinese had developed rockets for, among other things, use in warfare."[13] It would be almost 5000 years however before rockets became a major instrument of warfare.

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[12] Rockets can be distinguished from missiles essentially in that the latter possess superior navigational technology, making them more accurate for striking targets. Otherwise, the following definition of rocket could apply to both: "A vehicle that can operate outside Earth's atmosphere, because it carries its own oxidizer, as well as fuel." JOHN M. COLLINS, MILITARY SPACE FORCES: THE NEXT 50 YEARS 159-60 (1989) [hereinafter COLLINS, MILITARY SPACE FORCES].

[13] N.M. MATTE, SPACE ACTIVITIES AND EMERGING INTERNATIONAL LAW 13 (1984) [hereinafter MATTE, SPACE ACTIVITIES]. Matte further observes that "[m]ilitary use has given the greatest impetus to modern rocket technology." *Id.* Durch and Wilkening trace the rocket's history as follows:

> The military rocket is a device whose pedigree is obscure. Though many credit the Chinese with their first use in the thirteenth century, there is some indication that the formulae for the propellants used in those rockets may have come to China from Europe. On the other hand, the Mongol expansion of the middle thirteenth century may have transported Chinese technology westward. That same expansion brought rocketry to India, where it was encountered by the British as early as 1750. Indian war rockets were used primarily to spook cavalry (in effect, as early jamming devices), and at that they were apparently effective.

W.J. Durch & D.A. Wilkening, *Steps Into Space, in* NATIONAL INTERESTS AND THE MILITARY USE OF SPACE 17 (W.J. Durch, ed., 1984) [hereinafter Durch & Wilkening].

It was German ingenuity that first applied rocket technology to large-scale military combat use.[14] At the Peenemunde experimental site on the Baltic coast, Germany constructed the famous V-2 ("Vergeltungswaffe Zwei") rocket.[15] Making its first flight in October of 1942,[16] the rocket stood over 13 1/2 meters high, weighed 15,300 kg, had a range of 322 km,[17] and was propelled by an engine producing more than 800,000 horsepower.[18] The rocket used a turbo fuel pump generating pressure at 300 pounds per square inch while pumping 50 gallons (189.5 liters) of fuel per second.[19] For guidance and control, the most difficult technical feat, the rocket relied on gyros that only partially compensated for wind and other destabilizing factors in flight. Nonetheless, the V-2 represented a fearsome weapon to which there was no known defense. It also ushered in one of the most significant revolutions in military weaponry.[20]

Following the war, under "Operation Paperclip" the leading German rocket scientists were captured for further work in the U.S. With their expertise, the U.S. began reconstructing the essence of V-2 technology for the development of more advanced rockets. This work, together with experience gained from the 1930s and 1940s studies and experiments at the California Institute of Technology under Dr. Theodore Von Kármán, contributed to Project MX-774–later to become the Atlas missile, a research and development

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[14] David Spires points out that following World War I, Germany was interested in bombardment rockets for its army that was "sorely constrained by the Versailles Treaty." SPIRES, *supra* note 3, at 5. Although the Treaty of Versailles effectively disarmed Germany by forbidding the development of heavy artillery and poison gas, it did not constrain all potential weapons such as the rocket. In 1919, few thought of it as practical weapon of war. Durch & Wilkening, *supra* note 13 at 17. Following the Nazi rise to power in the early 1930s the Treaty was repudiated outright. However, the research into military rocketry continued as the merits of the potential weaponry became clearer.

[15] In popular parlance, the "V" stood for "vengeance" and the "2" represented the second rocket-type fielded by the German army. The first model, the much smaller V-1, was produced by the German Luftwaffe as an aerodynamic pulse-jet "cruise" missile. Although the big rocket was known to technical specialists as the A-4, V-2 is the more common designation that is familiar to most observers of the German rocket program (the "Wehrmacht" program). The V-2's three predecessor models began in 1933 with the A-1 and ended in 1936 with the A-3. German scientist von Braun would later describe the A-1 as taking 1 1/2 years to build and 1/2 second to blow up. T.A. HEPPENHEIMER, COUNTDOWN: A HISTORY OF SPACE FLIGHT 15 (1997) [hereinafter HEPPENHEIMER].

[16] *Id.* at 4

[17] SPIRES, *supra* note 3, at 5.

[18] HEPPENHEIMER, *supra* note 15, at 22.

[19] *Id.* at 23. For this purpose, the German scientists used modified firefighter's pumps which also required simple construction, fast action, very high flow rate, and constant delivery pressure.

[20] Indeed, Wernher von Braun termed its capture by the U.S. "one of the greatest technical prizes in history." W. VON BRAUN & F. ORDWAY III, HISTORY OF ROCKETRY AND SPACE TRAVEL 117 (3rd ed., 1975) [hereinafter VON BRAUN & ORDWAY].

effort aimed at creating a 5,000 mile range intercontinental ballistic missile.[21] General Henry Arnold, chief of the U.S. Army Air Corps just prior to its establishment as the U.S. Air Force in 1947, predicted that such a weapon "is ideally suited to deliver atomic explosives, because effective defense against it would prove extremely difficult."[22] Little did General Arnold know that such defenses would continue to prove extremely difficult through 2000 and beyond.[23]

In the U.S., missile research and development competed directly for precious funding with long range bombers. "As with satellite proposals, initial postwar interest in long-range guided missiles soon succumbed to an Air Force policy that relied on strategic bombers carrying air-breathing missiles."[24] Nonetheless, missile advocates kept sufficient interest engaged to fund development of the Redstone, Jupiter, and Juno missile programs at the U.S. Army's Redstone Arsenal.[25] In addition to various sounding rocket[26] and cruise missile programs,[27] and the Thor Intermediate Range Ballistic Missile

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[21] I M.J. MUOLO, SPACE HANDBOOK: A WAR FIGHTER'S GUIDE TO SPACE 3 (1993) at 3 [hereinafter MUOLO]. Although the U.S. cancelled the project in 1947, it was reinstated in 1951 and has "changed little in over 40 years. . . . Significant advances in its capability and adaptability are reasons the Atlas has become the 'DC-3' of space launch vehicles." *Id.* at 126-27.

[22] Quoted in SPIRES, *supra* note 3, at 10.

[23] For a discussion of missile defense and the legal regime regulating it, see *infra* notes 447–463 and accompanying text.

[24] SPIRES, *supra* note 3, at 17. Until the early 1950s, the early missile advocates were forced into a form of circular reasoning:

> missiles seemed too challenging technologically, but no funds could be spent on solving the technological dilemmas; so the problems would go unresolved and the missile would remain 'impossible.' To questions about the logic of budgeting for missile programs, the answer always seemed to be the dogmatic response: 'the time is not right' for an expanded program.

Id. at 21.

[25] At least four factors account for the change in attitude by the U.S.: first, news that the Soviets had successfully detonated an atomic bomb in August 1949; second, communism's triumph in China; third, reports of Soviet advances in missile technology; and fourth, the outbreak of the Korean war in June 1950. *Id.* at 22, 23.

[26] Examples include the WAC Corporal, Aerobee, and Viking. Of these, the WAC Corporal became "the first man-made object to enter extra-terrestrial space" having been launched as a second stage from a V-2 to a height of 250 miles. *Id.* (quoting F. Malina's paper "Origins and First Decade of the Jet Propulsion Laboratory" at 60).

[27] Early cruise missiles included the Snark, the first intercontinental cruise missile, and the Navaho. The latter traveled to its target under "ramjet" power, achieving speeds in excess of Mach 3. Ramjet technology utilizes a process of "ram" compression at supersonic speeds in order to avoid the need for jet turbines. The U.S. has used ramjet technology since the 1940s for its Navaho missiles. SPIRES, *supra* note 3, at 21. In addition, the U.S. has used the technology since 1959 for its A-11 and A-12 (later SR-71) reconnaissance aircraft. W.E.

(IRBM), improvements to the original V-2 design soon led to the first operational U.S. Intercontinental Ballistic Missile (ICBM)–the Atlas.[28] Within a few years, the U.S. fielded the even larger and more sophisticated Titan missile,[29] evolved versions of which are still widely in use today both as ICBMs and commercial space boosters.[30]

Following World War II, the Soviet Union captured its share of German scientists as well. Using the V-2 as its point of departure, the U.S.S.R. did more than simply build copies of the weapon, it put the rocket back into

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Burrows, *The Oxcart Cometh, And Goeth at Mach 3.2*, 13:6 AIR & SPACE, Feb./Mar. 1999, at 68.

In the years following WWII, the threat of nuclear exchange made the small, slow cruise missiles ineffective as an intercontinental delivery system as compared to ballistic missiles.

> The ICBM's can travel thousands of miles along arcs that take them hundreds of miles out into space; their trajectories, once determined during the interval that the motors are in operation, are thence affected only by gravitational forces and by air resistance during their exit from and re-entry into the atmosphere.

VON BRAUN & ORDWAY, *supra* note 20, at 121. Cruise missiles could not compete with this capability for intercontinental application.

[28] The Atlas contained significant performance enhancements that allowed for it to leave earth's atmosphere and then send an independent warhead back to earth. These included housing its liquid fuel within the rocket's skin, and making the warhead separable from the rocket so the latter could avoid the design features requiring survivability upon reentry.

[29] The Titan was originally conceived as a backup program to the Atlas. The two programs were developed simultaneously in order to save time in countering the increasing perception of Soviet missile superiority. In 1953, Assistant Secretary of the Air Force for Research and Development, Trevor Gardner, became the champion of ICBM development in the U.S. having "made it his mission in public life to convince the government that the nation must pursue a crash program to develop an operational Air Force ICBM or face nuclear disaster." SPIRES, *supra* note 3, at 31. Gardner's technological evangelism proved so successful, that by the fall of 1955, President Eisenhower designated the Atlas ICBM the "highest national priority" weapons system. *Id.* at 35. Management for the crash missile program fell to Gardner protégé Brigadier General Bernard Schriever, a man who "used his intelligence, patience, and superb negotiating skills with military, government and private industry leaders to become an effective advocate for missile and space systems causes." *Id.* at 33.

[30] The complete family of Titan missiles includes several versions: I (1959); II (1962); Gemini (1965); IIIA (1964); IIIB (1966); IIIC (1965); IIID (1971); IIIE (1974); 34B (1975); 34D (1982); IISLV (1988); III (1989); IV (1989). P. CLARK, JANE'S SPACE DIRECTORY, 1997-1998 277 (13th ed., 1997) [hereinafter JANE'S]. In addition to the Atlas and Titan missiles, the Department of Defense uses a variety of other missile systems, principally as spacelifters rather than weapons systems, including the SCOUT, Pegasus, Delta, and Space Transportation System ("Space Shuttle"). MUOLO, *supra* note 21, at 121-34. Additional missiles developed since World War II for weapons use include the Polaris and Poseidon (both sea-launched), Pershing, and the Minuteman.

production within the Soviet zone of occupation in Germany.[31] Unlike the U.S., the Soviet Union did not have a huge fleet of long-range bombers, thus the prospect of ICBM development did not have the same bureaucratic obstacles from a competing weapons platform. What it did have were relatively primitive atomic weapons that were bulky and required tremendous lift to propel them across an intercontinental range. They proceeded to create just such heavy-lift launch vehicles.[32] The first Soviet ICBM, bearing the designation "SS-6," was launched in August 1957, a full fifteen months before the first Atlas launch. It was an SS-6 that carried the world's first artificial satellite, Sputnik I, into orbit on October 4, 1957.[33]

2. Nuclear Devices

Following the advent of rocketry, creating a weapon of ultimate destructive capability was just a matter of time for the leading scientific minds. The conventional explosives used by the V-2 rockets simply mimicked the effects attainable by means of air-dropped bombs. These contained the equivalent of one ton of TNT. By contrast, the earliest nuclear weapons contained the equivalent of 20,000 tons (20 kilotons).[34] Later versions would deliver the equivalent of 15,000,000 tons (15 megatons) of TNT and more.[35]

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[31] HEPPENHEIMER, *supra* note 15, at 60. Though the U.S. got to Germany first, the Soviets were first to Peenemunde. By the time the Soviets got there, most of the documents and personnel had been removed by the Germans. Nonetheless, there was enough left for the Soviets to use productively, including middle and lower-level staffers familiar with the V-2 rocket research and development. Though the codename "Operation Paperclip" for the U.S. roundup of German scientists, documents, and hardware was revealed after the war, as was the British "Operation Backtrack," the Soviet codename was never made public. M. STOIKO, SOVIET ROCKETRY: PAST, PRESENT, AND FUTURE 71 (Holt, Rinehart & Winston, 1970).

[32] The implications from this early Soviet resolve were enormous. As von Braun later observed, "[t]he decision [to proceed with the ICBM before the U.S.] not only gave [the Soviets] a significant edge in ballistic missile technology for years, but was also a great factor in their leadership in space exploration." VON BRAUN & ORDWAY, *supra* note 27, at 140.

[33] The first U.S. satellite, Explorer 1, was launched atop a Juno 1 on Jan. 31, 1958. *See id.* at 160.

[34] LANGFORD, *supra* note 9, at 45. The first large-production nuclear weapon utilized a chain-reaction process known as fission, by which the mass of a uranium or plutonium atom is converted to energy. Langford notes that as between uranium and plutonium, the latter is easier to use for fission weaponry. *Id.* at 47. The nuclear weapon dropped on Hiroshima on Aug. 6, 1945 ("Little Boy") was a uranium bomb that was remotely detonated at a height of 570 meters over the city. "Detonation height determined how large an area would be damaged. . . . A bomb detonated too high would expend its energy blasting thin air; a bomb detonated too low would expend its energy excavating a crater. It was better to be low than high." R. RHODES, THE MAKING OF THE ATOMIC BOMB 631 (1986) [hereinafter RHODES]. On Aug. 9, 1945, a plutonium bomb ("Fat Man") was dropped on Nagasaki with an estimated 22 kiloton yield.

[35] LANGFORD, *supra* note 34, at 49. It bears noting that nuclear weapons are those characterized by the unique interaction of particles within an element's nucleus. Whereas the

Putting the matter plainly, U.S. President Truman would write in his personal diary, "we 'think' we have found a way to cause a disintegration of the atom."[36]

These early devices weighed five tons and required a rocket of several hundred tons to carry one weapon to Moscow–too heavy to be practically effective.[37] However, with the advance of the ICBM came the advance of the nuclear device. It soon became small enough to launch inside the nose-cone of a rocket.[38] Thus, the lightening speed of the rocket was mated to the overwhelming power of the nuclear weapon. And given its desirability for military advantage, it also proliferated.

> Between 1945 and 1992, the United States went on to manufacture a total of 70,000 nuclear weapons, some 10,500 of which are still in service. The Soviet Union produced 55,000, of which 15,000 are currently active. Britain reportedly made 834 nuclear warheads, France 1,110 and China 600. According to various reports of unknown reliability, Israel may have made 200, India twenty, Pakistan between four and seven. South Africa admitted it had produced six devices before giving up its programme; North Korea may have one or two.[39]

It was not until 1957 that the first nuclear detonations occurred in space.[40] Not only did this development become a catalyst for passage of a

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fission chain-reaction begins with the acquisition of a stray neutron particle which then spreads from nucleus to nucleus, the fusion reaction requires the fusing of two nuclei. Because of the natural magnetic repulsion of hydrogen nuclei, the two must be forcibly fused to begin the fusion reaction. This is accomplished by heating the nuclei to such a degree that their resulting speed yields collisions of sufficient force to achieve the fusion. Thus the term "thermonuclear" weapons. The triggering element used to generate the tremendous heat needed for fusion is a fission reaction. Once the fusion begins, it creates its own chain-reaction. By surrounding the entire explosive core with U-238, scientists discovered that the neutrons lost in the fusion reaction could be used to fuel a second fission reaction. Thus, the nuclear weapons most widely stockpiled make use of a fission-fusion-fission process. *Id.* at 49. The first thermonuclear device, carrying an explosive force of 10 megatons of TNT was detonated at the Eniwetok atoll in 1952 (also spelled Enewetak). In 1954, a 15 megaton device was detonated at the Bikini atoll. *Id.*

[36] RHODES, *supra* note 34, at 690

[37] HEPPENHEIMER, *supra* note 15, at 47. By contrast, the V-2 weighed a mere 14 tons.

[38] One Minuteman III ICBM is armed with the equivalent of 84 first-generation nuclear weapons. Rhodes, *supra* note 36, at photograph 106 (caption).

[39] D. SHUKMAN, TOMORROW'S WAR: THE THREAT OF HIGH-TECHNOLOGY WEAPONS 25 (1996) [hereinafter SHUKMAN].

[40] A Tass news agency announcement of Aug. 27, 1957 which reported the successful test of the Soviet ICBM also included reference to "a series of explosions of nuclear and thermonuclear (hydrogen) weapons ... set off at great altitudes." M.S. MCDOUGAL, ET AL., LAW AND PUBLIC ORDER IN SPACE 389 n.7 (1963) [hereinafter MCDOUGAL, ET AL.]. Between Aug. 27, 1957 and Sept. 7, 1958, the U.S. exploded three atomic bombs over the South Atlantic at a reported altitude of between 200 and 300 miles. During the summer of 1962 in the Pacific at similar altitudes, the U.S. exploded weapons "in the hydrogen bomb range." *Id.*

treaty limiting nuclear weapons testing (Limited Nuclear Test Ban Treaty),[41] but it brought a plea from the Soviet Union that such tests not endanger the safety of Soviet cosmonauts. The U.S. responded to the Soviet concern with the assurance "that no activities were contemplated which could have harmful effects upon the Soviet spacemen."[42] Following passage of the Limited Nuclear Test Ban Treaty in 1963, such detonations in space were no longer lawful and simple verification measures made them easily detected.[43]

3. Satellites

In many ways, the evolution of satellite technology follows the evolution of missile technology. Without the latter, the former had no way of reaching outer space. Thus, the early battles for funding of satellite technology in the DOD and in Congress often pitted satellite and missile research against conventional weaponry.[44] Once funding for ICBMs came through however, it was soon realized that rockets more powerful than an ICBM might succeed in launching satellites.[45]

Though early scientists speculated on the possibility of artificial satellites in earth orbit, Project Rand, under the Douglas aircraft company,[46] demonstrated the feasibility of such a feat in its report of May 2, 1946. Report number SM-11827, "Preliminary Design of an Experimental World-Circling Spaceship," not only provided 236 pages and eight appendices of detailed technical theory, but it spawned numerous subsequent reports on the feasibility of satellite design, launch, and reentry. In simple terms, the report declared that "[i]f a vehicle can be accelerated to a speed of about 17,000 m.p.h. and aimed properly, it will revolve on a great circle path above the Earth's

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In a Nov. 3, 1958 report to the U.S. President, three possible military uses of a high-altitude nuclear detonation were identified: "The high energy radiation including particles from the explosion produces effects on space; the whirling high energy electrons generate radio noise; and the delayed radiation from the fission products can affect radio transmission." P.B. STARES, THE MILITARIZATION OF SPACE: U.S. POLICY, 1945-1984 108 (1985) [hereinafter STARES, THE MILITARIZATION OF SPACE].

[41] *See infra* notes 436–446 and accompanying text.

[42] MCDOUGAL, ET AL., *supra* note 40, at 45. The Soviet note and U.S. reply are reprinted in N.Y. TIMES, Aug. 12, 1962, at 22.

[43] The U.S. "Vela Hotel" series of satellites were launched in 1963 and 1964 to scan above the horizon and detect nuclear tests in space. They were, in the view of one military space historian, "one of the most successful Air Force space projects." CURTIS PEEBLES, HIGH FRONTIER: THE U.S. AIR FORCE AND THE MILITARY SPACE PROGRAM 41 (1997) [hereinafter PEEBLES, HIGH FRONTIER].

[44] SPIRES, *supra* note 3, at 35. In time, "the relationship between satellites and missiles had become better understood as rockets with sufficient thrust soon would be able to launch the heavier satellites. ..."

[45] HEPPENHEIMER, *supra* note 15, at 90.

[46] Project Rand later became the Rand Corporation, a federally funded research and development corporation serving as the primary technical consultant to the U.S. Air Force.

atmosphere as a new satellite. The centrifugal force will just balance the pull of gravity."[47] The report subsequently predicted that "[t]he achievement of a satellite craft by the United States would inflame the imagination of mankind, and would probably produce repercussions in the world comparable to the explosion of the atomic bomb."[48]

The earliest military satellite program focused on a reconnaissance mission. In time, the mission for reconnaissance satellites in the U.S. would be shared between the military and the intelligence establishment. Systems such as the venerable Corona series were launched in early 1959 amid great secrecy and were controlled by the U.S. Central Intelligence Agency.[49] Though the focus of public U.S. military space activity remained in the Department of Defense, it was determined that reconnaissance missions from space could not be publicized.

Indeed, the Corona program was so sensitive that it was given the code-name "Discoverer" to establish a cover. The launches were said to contain "a scientific project that conducted biomedical research and other experiments in space."[50] As Corona began collecting Soviet imagery during the Eisenhower administration, the DOD established the Office of Missile and Satellite Systems with oversight for all national reconnaissance activities, later to become the National Reconnaissance Office (NRO). President Eisenhower's successor, perpetuated these basic organizational changes, including safeguarding the very existence of the NRO as a State secret.[51] Indeed, under

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[47] RAND CORPORATION, PRELIMINARY DESIGN OF AN EXPERIMENTAL WORLD-CIRCLING SPACESHIP (1998) (from the abstact; Report Number SM-11827, May 2, 1946).

[48] *Id.* at 2.

[49] Launched as a stop-gap measure for strategic reconnaissance between the termination of U-2 high altitude reconnaissance aircraft and the WS-117L system, the Corona system remained operational from its first flight on Feb. 28, 1959 through June 1972. The Air Force was nominally deemed a joint venture partner of the Corona program, which required mid-air recovery of film imagery taken by the orbiting camera. For a thorough account of the recently-declassified Corona program, see CURTIS PEEBLES, THE CORONA PROJECT: AMERICA'S FIRST SPY SATELLITES (1997) [hereinafter PEEBLES, THE CORONA PROJECT]. The WS-117L program, standing for "Weapon System 117L," led to development of the first military satellite, the Advanced Reconnaissance System. The system used an electro-optical television-type imaging system for its reconnaissance capability. The Air Force established the requirement for such a system on Nov. 27, 1954, followed by a formal General Operational Requirement in March 1955 which called for a system providing an image resolution of no larger than 20 feet. SPIRES, *supra* note 3, at 36-37

[50] PEEBLES, HIGH FRONTIER, *supra* note 43, at 13.

[51] The National Reconnaissance Office was considered so secret

> that even in classified documents outside the special security controls established for satellite photos and data, the words 'National Reconnaissance Office' and 'National Reconnaissance Program' were not to be used. Instead, the phrase 'Matters under the purview of DOD TS 5105.23' would be given. (This was the directive which established the NRO.) It would be

the Kennedy administration "the U.S. government no longer acknowledged that satellites were used for reconnaissance–a policy that remained in effect until 1978."[52]

Despite its continuing protection of national security matters, the NRO has recently revealed some of its methods and assets, including a $1.5 billion state-of-the-art Lacrosse imaging satellite.[53] The fifteen ton, school bus-sized satellite was developed in 1986 to track the movement of Warsaw Pact weaponry. Producing images to resolutions of 1 meter, the system uses radar technology to obtain images through clouds, foliage, or darkness.[54] As of 1997, the NRO maintained two Lacrosse satellites on-orbit with two more planned. In addition to these, the NRO maintains the HK-11 ("Keyhole") satellite system which, using optical sensors, is reported to produce resolutions of six to twelve inches (15 to 30 cm).[55]

Reconnaissance was not the only military mission for early satellites. Almost simultaneously with WS-117L, and indeed as an outgrowth of it, the U.S. military was developing a missile warning system to monitor the launch of Soviet ICBMs. The first such program, MIDAS ("missile detection and alarm system"), was troubled with false alarms and overall system unreliability virtually from its operational beginning in 1960.[56] Despite some successful test detections, the system was replaced in the early 1970s by geosynchronous

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thirty-two years before the initials 'NRO' were spoken in public by a U.S. government official.

PEEBLES, THE CORONA PROJECT, *supra* note 49, at 96.

[52] PEEBLES, HIGH FRONTIER, *supra* note 43, at 14.

[53] Upon release of videotape depicting the satellite, AVIATION WEEK & SPACE TECHNOLOGY declared that it used "the most advanced technology employed by any U.S. military or civilian unmanned spacecraft." C. Couvalt, *Secret Relay, Lacrosse NRO Spacecraft Revealed*, 148:12 AV. WK. & SPACE TECH., Mar. 23, 1997, at 27.

[54] *Id.* With its solar array and still-secret radar antenna, the satellite is actually much larger than a bus.

[55] *Id.* at 28. For obvious reasons, the capability of military technology exceeds that which is commercially available. This continues to challenge military research and development however with ever-increasing improvements to commercial remote sensing capability. In April 1999, the Space Imaging Corporation aspired to exceed Russia's Spin-2 capability of two meters. The Ikonos 1 satellite boasted digital black and white images to resolutions of one meter. M. Mecham, *Commercial Imaging to Enter 1-Meter Era*, 150:17 AV. WK. & SPACE TECH., Apr. 26, 1999, at 84. After launch on Apr. 27, 1999, the satellite was lost when an electrical malfunction prevented the satellite from separating from its booster. *Athena/Ikonos Loss Caused by Open Circuit*, 150:24 AV. WK. & SPACE TECH., June 14, 1999, at 82; C. Covault, *Reviews Advance As New Satellite Fails*, 150:21 AV. WK. & SPACE TECH., May 24, 1999, at 61. The subsequent launch of a successor satellite on Sept. 3, 1999 now makes one meter resolution from space available to any purchaser.

[56] MIDAS was originally designated "Subsystem G" in the WS-117L program before becoming its own separate system. PEEBLES, HIGH FRONTIER, *supra* note 43, at 33. Previously, there were U.S. systems used to track space objects, however none were focused on the distinctive heat signature left by an ICBM or IRBM.

satellites of the Defense Support Program (DSP) which proved to be "highly successful," offering the President notice of a missile attack within moments of launch.[57] Using an advanced infrared telescope mounted to the spacecraft's front end, the DSP telescope remained focused on earth ready to generate an electronic signal upon detection of a missile launch. Its use continues today.[58]

Beyond these, other significant satellite systems were developed to carry military communications,[59] to provide weather intelligence,[60] and to aid

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[57] *Id.* at 38. In 1991, DSP satellites alerted coalition forces to the launch of Iraqi Scud missiles–the first use of U.S. missile warning satellites in combat. *Id.* at 39.

[58] Currently in development is the Space Based Infrared System (SBIRS) which will incorporate the current DSP system. The SBIRS will include much more than an early warning capability. Its operational requirements call for four mission areas: missile warning, missile defense, technical intelligence, and battlespace characterization. Federation of American Scientists, *Space Based Infrared System*, Federation of American Scientists, http://www.fas.org/spp/military/program/warning/sbir.htm (last visited June 28, 2000) (on file with the *Air Force Law Review*). The program originally entailed development of four satellites in GEO and two more in highly elliptical orbits (SBIRS-High), and a constellation of 24 additional satellites in low-earth orbit (SBIRS-Low). The U.S. Air Force recently cancelled a demonstrator project for the SBIRS-Low program citing costs and delays in the SBIRS-High program, which is now scheduled for launch in 2004. Launch of the SBIRS-Low system is set for 2006. R. Wall, *USAF Cancels SBIRS-Low Satellite Demonstrations*, 150:6 AV. WK. & SPACE TECH., Feb. 8, 1999, at 66; R. Wall, *Pentagon Delays SBIRS Launch*, 150:3 AV. WK. & SPACE TECH., Jan. 18, 1999, at 26.

[59] Though the early emphasis for military satellites was on scientific exploration and reconnaissance, interest in a space-based telecommunications network for the military began at least as early as Arthur C. Clarke's 1945 proposal to position three satellites in equidistant geosynchronous orbit (22,500 miles) for near-global communications coverage. Because Clarke first proposed use of the GEO for communications satellites, it is also sometime referred to as the Clarke orbit. G.H. REYNOLDS & R.P. MERGES, OUTER SPACE: PROBLEMS OF LAW AND POLICY 15 (2nd ed., 1997) [hereinafter REYNOLDS & MERGES]. The first communications satellite, Project Score, was launched on Dec. 18, 1958 and carried a tape-recorded Christmas message from President Eisenhower. PEEBLES, HIGH FRONTIER, *supra* note 43, at 44. A subsequent effort, dubbed Project West Ford, relied upon the release of 400 million copper dipoles of 0.7 inch length at an altitude of 2000 miles. The "needles" were to form a 25 to 30 mile wide ring around the earth off of which communications signals could be reflected. After a successful test, the military terminated the program in the face of vigorous scientific and environmental protests. *Id.* at 45. *See also* DELBERT R. TERRILL, JR., THE AIR FORCE ROLE IN DEVELOPING INTERNATIONAL LAW 63-66 (1999). Other systems were used in the 1960s until the Interim Defense Communications Satellite Program (IDCSP), later renamed the Defense Satellite Communications System (DSCS) became operational in 1967. These were followed by second and third generation satellites (DSCS II and DSCS III) providing strategic communications from fixed military installations. These systems have been updated by the MILSTAR system, "a totally secure, jam free system; its terminals can be carried in a suitcase and set up in two and one-half minutes." Donald J. Kutyna, *Indispensable: Space Systems in the Persian Gulf War*, *in* THE U.S. AIR FORCE IN SPACE 1945 TO THE TWENTY-FIRST CENTURY 103, 117 (R. Cargill Hall & Jacob Neufeld, eds., 1995). For mobile (tactical) communications, the DOD has used systems such as the Lincoln Experimental Satellite (LES), the Tactical Communications Satellite (TACSAT I), and the Navy's Fleet Satellite Communications System (FLTSATCOM). PEEBLES, HIGH FRONTIER, *supra* note 43, at 47-50. For a discussion of the legal issues raised by military use of the former International Mobile

navigation. Though assets supporting all three missions are indispensable to combat operations, the U.S. space-based navigation system has now become perhaps the best-known of all military space assets outside military circles. Developed in the 1970s, and declared fully operational on July 17, 1995,[61] the Global Positioning System (GPS) relies on twenty-four operational satellites (with an additional three spares in orbit) in medium-earth orbits in six orbital planes.[62] The basic concept is simple though ingenious:

> [The constellation of satellites flies] in twelve-hour orbits at an altitude of 12,543 miles. Each of them carries an atomic clock for precise determination of time, while ground-based tracking permits each one to know its position with similar accuracy. A ground receiver then accepts signals from the spacecraft in view, learning their positions as well as the exact times when the signals were transmitted. The receiver has its own internal clock, which is not very accurate, but the data from space allows it to synchronize this clock with those of the satellites. The receiver then calculates the length of time each signal has been in transit, traveling at the speed of light. This translates into an accurate determination of distance to each satellite. Through triangulation, the receiver then determines its own location.[63]

The system showed its great value during the 1991 Persian Gulf War by providing for combatants answers to the age-old questions "where am I" and "where am I going," to an accuracy of less than thirty feet.[64] It was also

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Satellite Organization's INMARSAT system, see *infra* Part VI, § E.1. The growth of military dependence on commercial communications systems will only increase the legal and operational issues during times of armed conflict. By 1999, approximately 60% of U.S. military satellite communications traveled over commercial systems. W.B. Scott, *Space Chief Warns of Threats to U.S. Commercial Satellites*, 150:15 AV. WK. & SPACE TECH., Apr. 12, 1999, at 51 [hereinafter Scott, *Threats to U.S. Satellites*].

[60] NASA's Tiros I satellite, launched on Apr. 1, 1960, created a revolution in weather forecasting. However, it could not satisfy military needs for coverage, readout locations, or timeliness. Scott, *Threats to U.S. Satellites*, *supra* note 59 at 52. DOD developed a series of satellites in the 1960s placed in 450 mile polar orbits that became the Defense Meteorological Satellite Program (DMSP). During the Vietnam war, cloud cover imagery from DMSP satellites became the basis of target selection and mission planning. *Id.* at 53. The program's existence was not publicly revealed until 1973. The DMSP has undergone numerous upgrades since its inception, to include sensors detecting temperature, atmospheric moisture, soil moisture, sea state, and ice cover. The DMSP has supported all major U.S. military operations since the Vietnam War. *Id.* at 55.

[61] *Id.* at 59.

[62] *Id.* at 57. *See also* Air Force News Service, U.S. Discontinues Selective Availability of GPS to Public, May 2, 2000 (on file with author).

[63] HEPPENHEIMER, *supra* note 15, at 348-49.

[64] W.J. BOYNE, BEYOND THE WILD BLUE: A HISTORY OF THE U.S. AIR FORCE 274 (1998). Because the U.S. made use of the system available to commercial and civil users shortly after the destruction of Korean Airlines Flight 007 by the Soviet Union in 1983, it opened a possible security risk from a military point of view. One nightmare scenario for security analysts is the specter of a "poor man's cruise missile" in the hands of hostile States or terrorists – that is, an

used to guide munitions launched from air, sea, and land-based weapons to their targets providing three-dimensional position and velocity data. This constantly-improving targeting capability will likely be a significant law of war contribution made by GPS. As discussed more fully in the next chapter, the ability to target accurately implies the legal duty to do so. The better GPS accuracy becomes, the higher the burden it will place on its users to distinguish legitimate from illegitimate targets, and to minimize collateral damage. Thus, it will no doubt "change the face of future warfare."[65] Operating on only sixteen satellites in the 1991 war,[66] the system nonetheless proved itself highly useful and will be indispensable to space missions for future conflicts well into the twenty-first century.[67]

B. Present and Potential Technologies Available for Space Combat

To date, there has not been a single reported case of force used in outer space by one nation against another.[68] Nonetheless, given the increasing global reliance on space systems, and increasing militarization of space, its weaponization and evolution into a distinct theater of military operations seems likely. Though technologies applicable for space combat will include a

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old weapon suddenly made extremely accurate by use of GPS. SHUKMAN, *supra* note 39, at 166. As a result, the U.S. initially degraded the accuracy of the primary signal, establishing the difference between a "coarse acquisition code" and the encrypted "precise code," to protect the military advantage the system offers its military and that of its allies. Recent developments associated with the U.S. military's Joint Direct Attack Munition (JDAM) put the required military position accuracy of the system at 3 meters. With growing reliance on the system by foreign and domestic non-military users as well, the potential liability to the U.S. has increased proportionately. B.D. Nordwall, *World Pressure Grows for Regional GPS Augmentations*, 147:22 AV. WK. & SPACE TECH., Dec. 1, 1997, at 66. As of May 1, 2000, President Clinton directed that the DOD provide the undegraded signal for public use. In discontinuing "selective availability," the President stated that future threats could be dealt with by applying selective availability on a regional basis as needed. Air Force News Service, U.S. Discontinues Selective Availability of GPS to Public, May 2, 2000 (on file with author). For a thorough analysis of potential U.S. liability both under domestic and international law, see Jeffrey A. Rockwell, Liability of the United States Arising Out of the Civilian Use of the Global Positioning System (1996) (unpublished LL.M. thesis, McGill University) (on file with author, and the Nahum Gelber Law Library, McGill University).

[65] SHUKMAN, *supra* note 39, at 163 (from a classified Pentagon assessment of the performance of GPS in the Gulf War).

[66] *Id.* at 163.

[67] In Operation Allied Force, the NATO allies made heavy use of GPS for navigation and precision-guided targeting. C. Covault, *Recon, GPS Operations Critical to NATO Strikes*, 150:17 AV. WK. & SPACE TECH., Apr. 26, 1999, at 35. However, heavy military reliance on GPS is a double-edged sword because the system is still extremely vulnerable to jamming. Interference by electronic jamming, or even destruction of part of the system by anti-satellite weaponry, might cripple a military force having abandoned its skills in other forms of navigation. SHUKMAN, *supra* note 39, at 164-65.

[68] Vlasic, *Space Law and Military Applications*, *supra* note 11, at 397, 398.

wide variety of military instrumentalities, the development of space weapons is the most obvious choice. Such weapons can be grouped according to a variety of criteria.[69] They can be grouped by missions intended such as "anti-satellite" and "missile defense," or by method of pursuit such as "boost phase intercept" and "direct ascent."[70] Depending on its characteristics, a space weapon could fit within several different categories at once. One of the most logical means of identification focuses on the weapon's means of destruction as its distinguishing feature. Most probable future space weaponry can be described using this method of identification, including those representative samples discussed in the six categories below.

1. Electromagnetic and Radiation Weapons

Perhaps the quintessential electromagnetic and radiation weapon is the nuclear bomb. Recognizing this, the first anti-satellite (ASAT) weapon system made operational by the U.S. involved a nuclear detonation in space.[71] Though the history and basic functioning of nuclear weapons have been noted previously, it is appropriate to consider briefly their effect as a weapon when detonated in outer space. Given the near-vacuum conditions of space, the range of a nuclear blast in terms of spreading radiation and heat is greatly diminished. In the absence of atmosphere, radioactive fallout cannot occur.[72] Further, the shock waves, violent winds, and intense heat generated by a

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[69] For a discussion of the problem of defining "space weapon," see notes 558–565 and accompanying text.

[70] An example of the latter is the U.S. ASAT Air-Launched Miniature Vehicle (ALMV). First tested against a functioning satellite on Sept. 13, 1985, the ASAT "kill vehicle" was launched aboard a missile from an F-15 for ascent to the target satellite and destruction by impact. "The warhead, or Miniature Vehicle (MV), is an extremely complex and sophisticated device consisting of eight cryogenically cooled infrared telescopes, a laser gyro, and sixty-four small computer-controlled rockets used for final course adjustments before colliding with the target. All this is packed into a 12-by-13 inch casing. After being guided to and released near the target, the Miniature Vehicle homes in on the heat emitted by the satellite and rams into it with sufficient force to destroy it." PAUL B. STARES, SPACE AND NATIONAL SECURITY 99 (1987) [hereinafter STARES, SPACE AND NATIONAL SECURITY]. *See also* C. Covault, *Antisatellite Weapon Design Advances*, 112:24 AV. WK. & SPACE TECH., June 16, 1980, at 243. In terms of destructive classification, the ALMV is a kinetic energy weapon.

[71] Though the previous SAINT ("satellite interceptor") system had been developed, it was never fielded. The latter system, known simply as Program 437, utilized a nuclear warhead launched atop a Thor IRBM from Johnson Island in the South Pacific. With a yield of 1 megaton, the warhead had a kill radius of 5 miles. The U.S. declared the system fully operational on June 10, 1964, and it remained in service or available for speedy redeployment until it was terminated on Apr. 1, 1975. *See* PEEBLES, HIGH FRONTIER, *supra* note 43, at 62-65.

[72] COLLINS, MILITARY SPACE FORCES, *supra* note 12, at 28.

nuclear blast within the atmosphere do not occur in space.[73] As a result, the collateral damage from the effects of heat and blast is fairly easy to confine.[74] Though the local effects in space from such a detonation can be very destructive, the most significant military effect of nuclear blasts in space relates to the creation of an electromagnetic pulse (EMP) in near-earth space where the outer space vacuum contacts the atmosphere.[75]

An EMP is created when "a cascade of gamma rays from any nuclear explosion in space collides with the upper atmosphere."[76] As these gamma rays race nearly instantaneously downward toward the top of earth's atmosphere, resultant charge imbalances create an electrical current that peaks 100 times faster than lightning, and is largely unrelated to the size of the detonation for any yield over a few hundred kilotons.[77] Similar to a lightning strike, the EMP lasts only for a millionth of a second but holds potential for devastation of sensitive circuitry. Unshielded electronics within several hundred miles of the epicenter may be disabled as every unshielded element in its path acts as a conductor. The higher the burst, the larger the area affected in the air and land beneath. A burst at a height of 300 miles (483 km) would affect the entire continental U.S.[78] "Poorly protected satellites and solar power systems in orbit are particularly vulnerable, because risk radii extend hundreds (sometimes thousands) of miles farther in space than in absorbent air."[79]

In addition to the effects of an EMP, "beta particles and gamma rays respectively cause intensive and extensive alterations in the ionosphere."[80] These weaken both radio and radar waves. This can result in high frequency blackouts over broad areas, followed by periods of impaired radio and radar performance.[81] Thus, the disruptive capabilities of a nuclear blast in space hold distinct military advantages.[82] Nonetheless, in addition to legal hurdles, Peebles notes that when first considered for its strategic value, the stationing of

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[73] In a vacuum, winds do not blow and shock waves cannot develop where no medium such as air, water, or earth resists compression. As for heat, the fireballs normally associated with nuclear blasts in the air do not occur above 65 miles (approximately 100 km). *Id.* at 29.

[74] By contrast, collateral damage from initial nuclear radiation "regardless of type, is indiscriminate, ... [and] would be difficult to predict and expensive to control." *Id.* at 31.

[75] Such an event was portrayed in the James Bond Hollywood production *Goldeneye.*

[76] COLLINS, MILITARY SPACE FORCES, *supra* note 12, at 29.

[77] *Id.* at 31.

[78] *Id.* at 30.

[79] *Id.*

[80] *Id.* The ionosphere exists from 30 to 500 miles (approximately 48 to 805 km) above the earth's surface. *Id.* at 9.

[81] During a detonation at 48 miles (77 km) altitude on Aug. 1, 1958 over Johnson Island, the U.S. observed the degradation of high frequency radio traffic throughout a region several thousand miles in diameter for a period of approximately six hours. *Id.* at 29.

[82] Indeed the Soviet Union used an array of 64 nuclear tipped anti-ballistic missiles around Moscow as a small-area missile defense system. Code named "Galosh," the system undoubtedly could be converted into an ASAT system. STARES, SPACE AND NATIONAL SECURITY, *supra* note 70, at 96.

a nuclear weapon in space "made no technical or military sense" for at least four reasons, at least some of which are applicable today:

> First, an orbiting weapon required elaborate spacecraft systems, such as retro-rockets to deorbit it, others to guide it, and still others to arm it. Second, all of these integrated systems would have to perform reliably while on orbit for many months if not years, or the bomb became useless. . . . Third, if used in retaliation, such weapons could not be delivered at a moments [sic] notice, but would have to wait at least an orbit or two until the Earth turned beneath it and the intended target [came] into view. Finally, and perhaps most tellingly, if such a weapon were used for a first strike and a partial malfunction occurred as the nuclear bomb moved along its orbit, it might just as easily fall on Buenos Aires as on Washington D.C., or, worse yet, on Moscow.[83]

For these and other reasons, and despite the unquestioned devastating effects for any nation relying on sophisticated electronic infrastructure, a nuclear-triggered EMP attack on the U.S. is deemed unlikely. The Chairman of President Clinton's recent Commission on Critical Infrastructure labeled it "the most remote part of the threat spectrum."[84]

Non-nuclear electromagnetic weapons have also been proposed. A study for the U.S. Air Force analyzing the future of air and space power recently reported that "[t]he technology of high RF [radio frequency] power and large antennas is about to greatly expand."[85] The report concludes that when combined, these innovations will allow for the projection of extremely high power densities, including electromagnetic radiation, over extremely long distances to land, air, and space-based targets.[86] As an example, the report suggests that such a weapon in the geosynchronous orbit could create a six mile footprint on a battlefield which would "blank out" all radar receivers and would damage all unprotected communication sets within that area. The tremendous power envisioned would also allow injection of signals into even heavily shielded communications networks, allowing for "information warfare to be waged at will."[87]

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[83] PEEBLES, HIGH FRONTIER, *supra* note 43, at 59.

[84] J.C. Anselmo, *U.S. Seen More Vulnerable to Electromagnetic Attack*, 147:4 AV. WK. & SPACE TECH., July 28, 1997, at 67.

[85] Ivan Bekey, *Force Projection from Space, in* (unnumbered Space Applications Volume) NEW WORLD VISTAS: AIR AND SPACE POWER FOR THE 21ST CENTURY, at 83, 84 (1995) [hereinafter Bekey].

[86] *Id.*

[87] *Id.* at 85. With respect to information warfare, the report gives a number of examples: network viruses, disinformation, memory erasures, and false signals. For a brief discussion of information warfare and its relation to space combat, *see infra* Part VI, § D.

2. *Kinetic Energy and Hypervelocity Weapons*

Kinetic energy weapons, of which hypervelocity weapons are a subtype, are historically the most common forms of space weaponry. As suggested above, given the tremendous speeds at which objects travel in orbit, on the order of 4.7 miles per second in low-earth orbit, just about anything properly aimed could become a weapon even without the use of an explosive warhead. This is true because such an object's speed, including those of very small masses, gives it tremendous kinetic energy for impact.[88] One U.S. kinetic energy weapon, originally tested as a missile interceptor, could equally serve as an ASAT. Known as the Homing Overlay Experiment (HOE), the weapon, once boosted into space, unfurls a 4.5 meter radial "net" that is wrapped tightly behind the nose sensor. The net increases the lethal radius of the homing and kill vehicle. Successful testing in 1983 and 1984 showed the weapon capable of homing in and destroying a dummy warhead in space using a long-wavelength infrared sensor.[89]

A program currently under development in the U.S. is simply called the "KE ASAT" (kinetic energy ASAT). The system envisions using a large Mylar "shroud" to impact the target object.[90] Though it will disable its target object by force of impact as will many other kinetic energy ASATs, this system is unique in that the shroud is intended to minimize the creation of a large quantity of resulting space debris normally associated with kinetic energy weapon impacts.[91]

The railgun is another type of kinetic energy weapon that accelerates a projectile toward selected targets at hypervelocity speeds. Because the railgun will use electromagnetic forces to accelerate its projectiles, it is an "electromagnetic" weapon of sorts. However, it is distinct from the electromagnetic weaponry discussed above in that the final method of destruction is a kinetic impact rather than an electromagnetic force itself. Testing in the U.S. has resulted in the electromagnetic acceleration of tantalum discs to speeds of eleven kilometers per second.[92] Though not yet developed as a weapon, such railguns could be stationed in outer space.

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[88] For example, a 4,000 pound automobile would have to travel almost 270 miles per hour to equal the kinetic energy of a one-pound projectile traveling at 4.7 miles per second. DAVID E. LUPTON, ON SPACE WARFARE: A SPACE POWER DOCTRINE 22 (1988).

[89] B. Jasani, *Space Weapons and International Security–An Overview*, *in* SPACE WEAPONS AND INTERNATIONAL SECURITY 22 (B. Jasani, ed., 1987) [hereinafter Jasani, *Space Weapons*].

[90] Federation of American Scientists, *Kinetic Energy Anti-Satellite*, Federation of American Scientists, http://www.fas.org/spp/military/program/asat/ke_asat.htm (last visited June 29, 2000) (on file with the *Air Force Law Review*).

[91] *Id.*

[92] *Id.*

An additional space-based kinetic energy weapon has been proposed but not yet developed. Though not an ASAT, the weapon has been conceived for use against terrestrial targets. It would capitalize on the tremendous speed of long rods made of depleted uranium orbiting in space. Remotely commanded to reenter the atmosphere at hypersonic speeds, the rods could be precision-guided to targets in the air or on the surface of the earth. Their special shape and materials would allow for survival on reentry into the atmosphere with little prospect for collateral damage on impact. The ability to call down such objects from space at hypervelocity speeds would allow them to penetrate hundreds of feet into the earth. Strategically, it would also offer the attacker the "ultimate stealth" and maximum surprise.[93]

A final example in the kinetic energy category is the Gun Launch to Space (GLTS) project. The project envisions a large artillery-type structure capable of launching projectiles hundreds of miles. The most notable example of rudimentary technology on which the GLTS might be based is the Iraqi "supergun," employing a barrel 172 feet long and capable of propelling 114 pound projectiles to distances of 465 miles.[94] Although principally conceived as a system for boosting operational payloads to orbit, the GLTS project has numerous potential applications, including service as an ASAT.[95]

3. Laser Weapons

"Laser" is an acronym for Light Amplification by Stimulated Emission of Radiation and is a device that produces a narrow beam of radiation by means of a physical emission. The light constituting the laser beam can be produced by a variety of chemical means. Key components of such a weapon include both the laser itself and the beam control subsystems which aim the beam. Once created, the beam used in the proposed weapon's laser is so concentrated that it can be projected for extremely long distances with very little loss of energy. Study on laser weapons, including those capable of disabling satellites, began in the early 1960s,[96] and received increased attention as part of the Strategic Defense Initiative. Despite tremendous technical problems, mostly still unresolved, lasers could radically change warfare if ever fielded.[97]

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[93] Bekey, *supra* note 86, at 83.

[94] M. Potter, *Gun Launch to Space: International Policy and Legal Considerations*, *in* PROCEEDINGS OF THE THIRTY-FOURTH COLLOQUIUM ON THE LAW OF OUTER SPACE 305 (1992).

[95] *Id.* at 306.

[96] STARES, THE MILITARIZATION OF SPACE, *supra* note 40, at 111.

[97] During the height of research on the Strategic Defense Initiative many scientists openly questioned that a missile defense project involving space-based lasers could ever work. The Union of Concerned Scientists declared that an effective defense of the U.S. against a Soviet missile defense was unattainable. A report from the Congressional Office of Technology

At present, the U.S. is developing space, air, and ground-based lasers for possible use as weapons against enemy missiles and satellites. One of the two principal U.S. ground-based lasers is the Mid-Infrared Advanced Chemical Laser (MIRACL).[98] As the name suggests, the laser beam is generated by chemical reactions, produced by deuterium fluoride, resulting in a focused beam that is fourteen cm square.[99] It is the largest laser developed in the U.S., undergoing numerous tests since 1985 when it destroyed a stationary ICBM on the ground. In the late 1980s, the Congress prohibited DOD from using the laser against space objects.[100] The prohibition expired in 1995, however, and Congress failed to renew the ban. On Oct. 17, 1997, the MIRACL "illuminated" a satellite in orbit constituting the first-ever U.S. use of a laser against a satellite.[101] Though it did not destroy the object, the move was widely seen as a potential first step toward development of a laser ASAT capability.[102] No further tests against space objects are scheduled.

Assessment claimed the likelihood that such a system could protect the U.S. from Soviet missile attack "so remote that it should not serve as the basis for public expectations or national policy." L.B. TAYLOR, JR., SPACE: BATTLEGROUND OF THE FUTURE? 24 (rev. ed., 1988) (quoting Edward Edelson, *Space Weapons: The Science Behind the Big Debate*, POPULAR SCIENCE (July 1994)) [hereinafter TAYLOR]. Partly because of the tremendous technical difficulties, the program began to refocus on earth-based lasers.

[98] The other ground-based program is a free-electron laser designed to reflect its high-energy beam off orbiting space mirrors for redirection back to ground targets.

[99] Federation of American Scientists, *Mid-Infrared Advanced Chemical Laser*, Federation of American Scientists, http://www.fas.org/spp/military/program/asat/miracl.htm (last visited June 29, 2000) (on file with the *Air Force Law Review*). The beam is created via chemical reaction.

> Just downstream from the combustor, deuterium and helium are injected into the exhaust. Deuterium combines with the excited fluorine to give excited deuterium fluoride molecules, while the helium stabilizes the reaction and controls the temperature. The laser's resonator mirrors are wrapped around the excited exhaust gas and optical energy is extracted. The cavity is actively cooled and can be run until the fuel supply is exhausted. The laser's output power can be varied over a wide range by altering the fuel flow rates and mixture.

Id.

[100] Sami Fournier, *U.S. Test-Fires 'MIRACL' at Satellite Reigniting ASAT Weapons Debate*, (Oct. 1997) Arms Control Association, http://www.armscontrol.org/ACT/oct97/miracloct.htm (on file with the *Air Force Law Review*) [hereinafter Fournier].

[101] M.A. Dornheim, *Laser Engages Satellite, With Questionable Results*, 147:17 AV. WK. & SPACE TECH., Oct. 27, 1997, at 27. The test was not intended to destroy the satellite but merely examine what various MIRACL power levels could do to the target satellite's sensors. An official reported that the anticipated data gathering from the satellite was unsuccessful.

[102] Following the test, the Russian Foreign Ministry issued a statement saying that the laser "may become a step toward creating an anti satellite potential." Fournier, *supra* note 100. Even before the test, several U.S. lawmakers sent President Clinton a letter stating "[w]e are

The airborne laser (ABL) program under development calls for a much smaller laser system housed within a modified 747 aircraft. The weapon was conceived as a defense against missile threats but if the program continues to prove as successful as its latest tests (tracking ballistic missiles, overcoming atmospheric distortion), U.S. Air Force officials are weighing expanding its role to reconnaissance, cruise missile defense, and suppression of enemy air defenses.[103] The laser, still under development, will use an oxygen-iodine combustion process to produce the intense light. The first airborne test firing of the laser against a missile is scheduled for 2002.[104] Although the ABL has not been envisioned for an ASAT role, its anticipated 250 mile range would make it capable of reaching missiles and satellites in low orbits.

Space-based laser systems (SBLs) that target other space objects have the dual advantage of being less vulnerable to attack and avoiding the distorting effects of earth's atmosphere. The laser currently envisioned for the SBL system uses a hydrogen fluoride chemical reaction to create its light beam. Unlike the MIRACL and ABL systems, it must be developed to operate in the low pressure environment of space. The prototype Alpha laser was successfully tested in 1991 under conditions simulating the space environment. Results from the test showed that megawatt power levels similar to the MIRACL but optimized for space can be built and operated.[105] However, as with all three laser weapons programs several technical challenge remain for SBLs, including keeping the satellites loaded with a sufficient quantity of chemicals necessary to fuel the laser.[106] Current estimates call for space-based laser testing to begin sometime between 2005 and 2008.[107]

4. Particle Beam Weapons

The first proposed use of particle beam weapons for satellite defense occurred in 1965.[108] Even more technically challenging than lasers, both particle beam and laser weapons constitute "directed energy" weapons–that is,

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deeply troubled that a test of a ground based laser system with such obvious ASAT warfare capabilities would proceed ahead of any debate or deliberate policy development." *Id.*

[103] D.A. Fulghum, *Airborne Laser Aimed At New Defense Roles*, 149:14 AV. WK. & SPACE TECH., Oct. 5, 1998, at 111; D.A. Fulghum, *Airborne Laser Tested, Weighed for New Missions*, 147:17 AV. WK. & SPACE TECH., Oct. 27, 1997, at 26. The ABL program manager, Colonel Michael Booen, stated that "[t]his [laser's success] is going to break the door down for directed energy weapons." *Id.*

[104] W. Matthews, *Laser Faces 'Challenges,' Report Says*, A.F. TIMES, Jan. 19, 1998, at 24.

[105] Federation of American Scientists, *Space Based Laser*, Federation of American Scientists, http://www.fas.org/spp/starwars/program/sbl.htm (last visited June 29, 2000) (on file with the *Air Force Law Review*).

[106] J.R. Asker, *Washington Outlook*, 150:21 AV. WK. & SPACE TECH., May 24, 1999, at 27.

[107] M.A. Dornheim, *Pentagon Mulls Space Laser Test*, 148:12 AV. WK. & SPACE TECH., Mar. 23, 1998, at 32.

[108] STARES, THE MILITARIZATION OF SPACE, *supra* note 40, at 111.

weapons which destroy their targets by delivering energy at or near the speed of light (approximately Mach 1,000,000). This would be a considerable advantage during time-urgent military engagements.[109] In theory, a particle beam weapon could mimic the effects achieved by an electron accelerator by transferring energy to its target at nearly the speed of light. In so doing, it would transfer thermal energy similar to the action of a lightning bolt.[110] Unlike the short attack of a nuclear (or other) blast-triggered EMP, a particle beam weapon could keep its destructive beam focused on the target for longer periods of time.

Particle beam weapons differ from lasers in several respects. The former do not heat the surface of their targets as lasers do. Thus, the particle beam weapon does not weaken the structure of its target, but eats through the skin and damages its internal mechanisms.[111] Because it does not rely on light energy, the particle beam weapon would not be affected by cloud cover or a reflective coating as would a laser. However, despite their theoretical advantages, such weapons are exceedingly difficult to produce because of the high-energy current and repetition rates required.[112]

5. Explosive Proximity Weapons

The category of space weapons characterized by an explosion in proximity to its target is perhaps the most self-evident form of space weaponry. This type of weapon simply steers close to its target and blows it up by detonation in the target's vicinity. The best example is the Soviet ASAT system, first tested in the late 1960s and fielded in the 1970s.[113] The explosive kill vehicle is rocket launched to coincide with the period during which the earth's rotation will put the weapon into the same orbital plane as the target satellite. Once the ASAT achieves orbit, ground controllers maneuver the object for one to two revolutions of the earth until it is close enough to the

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[109] Another theorized advantage of directed energy (DE) weapons will be the range of employment options offered. These could fill the gap between diplomacy and bombs by allowing for an escalating scale of destructive from minor disruption to the target to total destruction. *See* W.B. Scott, *'Beam' Weapons Edging Into Arsenal*, 151:1 AV. WK. & SPACE TECH. July 5, 1999, at 53.

[110] TAYLOR, *supra* note 97, at 33. Because of its great speed and capacity for repeat firing, Taylor suggests that particle beams "would do to the ballistic missile virtually what the machine gun did to the infantry charge." *Id.* at 34.

[111] *Id.* at 33.

[112] *Id.* at'35.

[113] Some conceive this ASAT as a kinetic energy weapon. "The Soviet ASAT system could be categorized as a rocket-propelled KEW [kinetic energy weapon]." Jasani, *Space Weapons*, *supra* note 89, at 19. However, as its title suggest, a kinetic energy weapon derives its value as a weapon not from an explosive capacity, if any, but its kinetic energy. The design of the Soviet System relies heavily on its explosive charge; the ASAT need not even physically impact its target vehicle.

target for its own guidance system to activate. "When in range an explosive charge aboard the interceptor is detonated, sending a cloud of shrapnel at high speed to destroy the target."[114] Repeated testing has shown the system to be marginally effective.[115] Recent reports of Russian work on an EMP ASAT may prove more effective.[116]

Though not yet developed, "space mines" are another type of proximity weapon that tracks down its target and detonates on impact or other trigger event. Commentators suggest that the detonators for such mines could be activated by command from earth, which could be triggered by, for example, reaction to heat or mechanical action.[117] Although similar to kinetic energy weapons, the space mine's method of destruction is not the force of impact but the detonation.

6. 'Soft Kill' Weapons

A final category includes those weapons designed to disable their space-based targets, usually satellites, rather than destroy them. Though never fielded, at least three types of systems in this category have been considered, all of which rely on rendezvous with the target satellite.[118] First, weapons that spray paint onto the optics, solar arrays, or radiators of the target would disrupt power supplies or mission execution. Second, a target satellite could be nudged or tipped out of its current orbit in order to exhaust its control fuel. Third, electronic jamming could disrupt a satellite's proper functioning or shut it down altogether. In each case, unless detected before the "attack," disabling missions such as these could be undertaken covertly and the true source never be detected or proven. Because the results of these "soft kills" often mimic routine failures, detection would prove difficult.[119]

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[114] STARES, SPACE AND NATIONAL SECURITY, *supra* note 70, at 87. The average wait before launch can occur in order to attack a specific satellite is six hours. *Id.* at 88.
[115] *Id.* at 86.
[116] Reportedly, the Russians resumed ASAT testing in April of 1999 with a design that will utilize an EMP. As reported, the Pentagon considers this a "serious development" given that satellites are the "Achilles' heel of the U.S. military's high-technology force used for sending orders to forces around the world as well as communicating with troops and organizing logistics." B. Gertz & R. Scarborough, *Russian ASAT*, WASH. TIMES, June 18, 1999, at 9.
[117] A.A. Kokoshin, et al., *Measures for Counteracting Space Strike Weapons*, *in* SPACE WEAPONS AND INTERNATIONAL SECURITY 92 (B. Jasani, ed., 1987).
[118] See Bekey, *supra* note 86, at 87.
[119] *Id.*

III. THE LAW OF WAR[120]

> [The law of armed conflict] is no longer a body of law designed to ensure a fair fight between two opponents; . . .Today, the law of armed conflict is designed primarily to minimize suffering and prevent unnecessary destruction. This being so, belligerents are held to the standards to which they are capable of rising.[121]
>
> Lieutenant Colonel Michael N. Schmitt, USAF (1998)

Scholars have advanced numerous reasons for maintaining an international law of armed conflict.[122] At first glance, the creation of rules for war–apparently the ultimate breakdown in order–seems ironic at best.[123] And

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[120] This article uses the phrases "law of war," "law of armed conflict," and "humanitarian law" as being essentially synonymous. Historically, "law of war" has been used, although "law of armed conflict" is more accurate given that such law applies in cases of conflict not amounting to war. "Law of war" will generally be used in order to highlight the connection between the relevant treaty regimes, rooted in the first five decades of the twentieth century, and current State practice. Some scholars articulate distinctions among the three phrases noting for example that humanitarian law is that subset of the law of war that concerns itself specifically with the reduction of human suffering. However, because the reduction of suffering is ultimately the goal of *all* restrictions on the means and methods of warfare, such distinctions seem overly technical. Others, such as the International Court of Justice (ICJ), prefer the term "international humanitarian law" which it describes as the synthesis of "Hague Law," governing means and methods of warfare, and "Geneva Law," governing the protection of the victims of war. *See* The Legality of the Threat or Use of Nuclear Weapons, 1996 I.C.J. 1, at 27 [hereinafter ICJ Advisory Opinion on Nuclear Weapons]. This definitional framework is ultimately helpful as it attempts to contain the full range of law governing the use of force in combat to a single category of international law. However, use of terms like "humanitarian" when applied to limits on war's means and methods risks merely equating the law of war with human rights law. On the dangers associated with doing so, *see infra* notes 176 and 220. On the connection between human rights law and the law of war, *see* Howard Levie, *Violations of Human Rights in Time of War As War Crimes*, *in* 70 INTERNATIONAL LAW STUDIES, LEVIE ON THE LAW OF WAR 373 (Michael N. Schmitt & Leslie C. Green, eds., 1998); Rene Provost, *Reciprocity in Human Rights and Humanitarian Law*, 1994 BRIT. Y.B. INT'L L. 383 (1995).

[121] Schmitt, *Bellum Americanum*, *supra* note 6, at 412.

[122] Reasons commonly include: diminishing suffering, diminishing the moral depravation of the soldiers, lessening the dangers that threaten the survival of our civilization, lessening the dangers that threaten the survival of mankind, favorably impacting the peacetime creation of doctrines and weapons, and furthering the cause of disarmament to the extent specific weapons are prohibited. B.V.A. Röling, *The Significance of the Laws of War*, *in* CURRENT PROBLEMS IN INTERNATIONAL LAW: ESSAYS ON U.N. LAW AND ON THE LAW OF ARMED CONFLICT 133 (A. Cassese, ed., 1975). To these six might be added a seventh and eighth – increased chances for the restoration of peace following armed hostilities, and, somewhat paradoxically, increased military efficiency by requiring the focused application of force.

[123] For some, "ironic" is the gentle way of putting it. Some authors express outright cynicism that the project of regulating warfare can ever succeed. Others provide examples leading to a

yet although war is a breakdown with respect to peaceful dispute resolution, it becomes the *ultimate* breakdown only if allowed by its participants. War need not lead to anarchy or violent chaos, even though it necessarily entails injury, killing, and death.[124] Numerous historical examples of military discipline displayed in combat show that the participants in war can recognize order or, at the very least, a chain of command.

It is tautological to assert that effective warfare requires application of efficient, ordered methods. Indeed when that form of order represented by the law of war breaks down, the military effects can be disastrous. Colonel Charles Dunlap quotes Richard Overy on the effects of Germany's disregard for the laws of war in its conflict against the Soviets on the Eastern front.

> [Such] criminalization of warfare produced a growing indiscipline and demoralization among German forces themselves. The German army shot fifteen thousand of their own number, the equivalence [sic] of a whole division. . . . Desertion or refusal to obey orders increased as the war went on, and the law of the jungle seeped into the military structure itself.[125]

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measured skepticism over various aspects of the law of war. This skepticism can take the form either that military forces and their civilian leaders cannot be trusted to follow the law when war begins, or that the law simply does not regulate consistently. An example of the former relates to action at the First Hague Peace Conference to phrase principles of warfare restrictively subject to exceptions, rather than permissively subject to restrictions. As Hays Parks notes, "[t]his is a manifestation of the fundamental distrust international lawyers have for things military, and a reluctance to permit battlefield commanders any latitude in situations that require a judgment call." W. Hays Parks, *Air War and the Law of War* 32:1 A.F. L. REV. 1, 14 n.54 (1990) [hereinafter Parks]. Regarding the latter form of skepticism, Doswald-Beck claims that the law's prohibition of certain forms of bullets without an unambiguous prohibition of nuclear weapons "creates skepticism regarding the seriousness of any of the law of war." L. Doswald-Beck, *Implementation of International Humanitarian Law in Future Wars, in* 71 INTERNATIONAL LAW STUDIES THE LAW OF ARMED CONFLICT: INTO THE NEXT MILLENNIUM, 39 at 43 (Michael N. Schmitt & Leslie C. Green, eds., 1998).

[124] Those viewing war as necessarily barbaric, for reasons of strategy or otherwise, react coolly to the whole notion of rules, or moderation in war. Thus, British Vice Admiral Sir John Fisher declared at the 1899 Hague Peace Conference that humanizing war was tantamount to humanizing hell. His suspicion at the law of war flowed from his view of the very nature of war:

> [w]hat you call my truculence is all for peace. If you rub it in, both at home and abroad, that you are ready for instant war with every unit of your strength in the first line, and intend to be first in, and hit your enemy in the belly, and kick him when he is down, and boil your prisoners in oil (if you take any!), and torture his women and children, then people will keep clear of you.

Parks, *supra* note 123, at 13 n.50.

[125] Charles Dunlap, *A Virtuous Warrior in a Savage World*, 8 A.F. ACAD. J. LEGAL STUD. 71, 89 (1997-1998) (quoting Richard Overy, WHY THE ALLIES WON 302-05 (1995)).

Many factors contributed to the Nazi defeat, but the German way of war on the Eastern front failed at least in part because it became "disorderly." Thus, advocacy for an efficient, effective military force can itself become an argument for the laws of war, which will have the effect of reinforcing military discipline.[126]

Whatever the reasons, warfare has attended the human race since the beginning of recorded history. In reflecting on the phenomenon, theorists and scholars have described the nature of warfare in a variety of ways. Some see it as the logical and brutal extension of politics;[127] others view warfare as principally about deception and avoidance of the enemy's physical strengths.[128] However one conceives warfare, all agree that armed combat is an event in which the battlefield reality is much worse that its mere description

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[126] Such an argument assumes a certain form of warfare that values and benefits from order. Theoretically, guerilla or terrorist tactics could eschew the type of "order" discussed here. But even these methods of warfare assume a certain level of coordination, planning, and thus order.

[127] Carl von Clausewitz famously wrote that,

> war is not merely an act of policy but a true political instrument, a continuation of political intercourse, carried on with other means. What remains peculiar to war is simply the peculiar nature of its means. . . . The political object is the goal, war is the means of reaching it, and means can never be considered in isolation from their purpose.

CARL VON CLAUSEWITZ, ON WAR, 87 (M. Howard, & P. Paret, trans. & eds., 1976) [hereinafter CLAUSEWITZ]. Elsewhere, Clausewitz describes how ugly those "other means" really are:

> If one side uses force without compunction, undeterred by the bloodshed it involves, while the other side refrains, the first will gain the upper hand. That side will force the other to follow suit; each will drive its opponent toward extremes, and the only limiting factors are the counterpoises inherent in war. . . . It would be futile–even wrong–to try and shut one's eyes to what war really is from sheer distress at its brutality.

Id. at 75-76.

[128] Thus ancient Chinese strategist Sun Tzu "did not conceive the object of military action to be the annihilation of the enemy's army, the destruction of his cities, and the wastage of his countryside. 'Weapons are ominous tools to be used only when there is no alternative.'" Samuel B. Griffith, *Introduction* to SUN TZU, THE ART OF WAR, 1, 40 (S.B. Griffith, trans., 1963). The dichotomy between the approaches of Clausewitz and of Sun Tzu led B.H. Liddell Hart to write

> Civilization might have been spared much of the damage suffered in the world wars of this century if the influence of Clausewitz's monumental tome *On War*, which moulded European military thought in the era preceding the First World War, had been blended with and balanced by a knowledge of Sun Tzu's exposition on 'The Art of War.'

B.H. Liddell Hart, *Forward* to SUN TZU, THE ART OF WAR v (S.B. Griffith, trans., 1963).

might suggest.[129] Because of this, the principled warrior is the last to desire war; when given the discretion, he reserves it as a last resort. Nonetheless, warfare has been a permanent fixture of the human race. As one source puts it, "[a]ccording to estimates based on the period from 3600 B.C. until 1960, mankind has known only 292 years of universal peace, and in the remaining 5268 years has faced 14,513 armed conflicts taking 1240 million human lives."[130] These statistics highlight the fact that for the sake of preserving

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[129] One need only view two recent Hollywood productions, *Saving Private Ryan* and *The Thin Red Line*, to experience the horrors of war beyond the written word. In both cases, the films vividly portray the existential horrors of warfare (violent death, mutilation, betrayal, savagery, terror) through realistic reenactment. Yet even the film medium, powerful as it is, cannot reproduce the feelings experienced in war either by the combatant or the noncombatant. Beyond this, *Saving Private Ryan*, in particular, included reenactment of several violations of the law of war. In one case toward the end of the film, a young American soldier is shown killing a German soldier who had his hands in the air and had surrendered his weapon and intent to resist, thus entitling himself to protection as a prisoner of war. Though the 1949 Geneva Convention (III) Relative to the Treatment of Prisoners of War had not yet come into existence at the time of this depiction, the 1907 regulations annexed to the Hague Convention (IV) on land warfare had. These regulations, which governed military conduct during WWII, unambiguously required humane treatment for prisoners of war. The young American is portrayed as being the underdog having impotently witnessed another German lawfully, though agonizingly, killing an American compatriot just moments before. Perhaps the most troubling aspect of this scene is the unfortunate effect it likely has on most American audiences. Rather than producing feelings of distaste at having witnessed a war crime, the screenplay appears designed to elicit a sense of euphoria that the younger, weaker American finally got the enemy. To the extent that the popular media manipulates public opinion in ways such as this, respect for the law of war is not engendered, but diminished. This is not to disparage this particular movie. The Secretary of Defense rightly honored director Steven Spielberg on Aug. 11, 1999 at a ceremony during which the Secretary awarded him the DOD Distinguished Civilian Public Service Award for successfully honoring the memory of a past generation that made the ultimate sacrifice in a just cause. The example is simply intended to highlight dangers that may exist for the law of war in the popular mind coming out of even magnificent works such as *Saving Private Ryan*.

[130] E.J. Osmanczyk, *War, in* THE ENCYCLOPEDIA OF THE UNITED NATIONS AND INTERNATIONAL RELATIONS, 1018 (2nd ed., 1990). Horrible as it is, Malanczuk notes that war has not always been perceived as it is today.

> It is hard to realize that during the eighteenth and nineteenth centuries most people (except for a few pacifists) regarded war in much the same way as they regarded a hard winter – uncomfortable, certainly, but part of the settled order of things, and providing excellent opportunities for exhilarating sport; even the wounded soldier did not regard war as wrong, any more than the skier with a broken leg regards skiing as wrong.

PETER MALANCZUK, AKEHURST'S MODERN INTRODUCTION TO INTERNATIONAL LAW 308 (7th ed., 1997) [hereinafter MALANCZUK, INTRODUCTION TO INTERNATIONAL LAW].

human life and international public order, one must accept, however cynically,[131] both the importance and relevance of the laws of war.

A. Jus in Bello vs. Jus ad Bellum

When speaking of the various international norms limiting the prosecution of war, scholars have historically distinguished between the *jus in bello*, or, the laws regulating the conduct of States once armed conflict between them has begun,[132] and the *jus ad bellum* consisting of the law governing resort to armed conflict. The former law applies to conflicts that the belligerents themselves may not regard as "wars."[133] The latter law is of

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[131] Despite some vigorous dissent, the law of war has influenced the conduct of armed forces in many ways. As examples to the contrary, consider Cicero's oft-quoted maxim *inter arma silent leges* (lit. "in war the law is silent"), and professor Fenwick's pessimistic candor, "it is futile to attempt to revive [the laws of war]. . . . Let's face the facts. War has got beyond the control of law. . . . The sooner every man, woman and child old enough to think realizes that he will be a party to the next war, the better." C.G. Fenwick, 43 PROC. AM. SOC'Y INT'L L. 110 (1949) (transcript of oral response to W. Downey, Jr., *Revision of the Rules of Warfare*). Roberts and Guelff cite several international norms that have been observed principally because of the law of war including, humane treatment of prisoners, a state's entitlement to neutral status, illegitimacy of certain targets, and that persons not active in the conflict should be spared from the consequences of the fighting to the extent possible. Adam Roberts & Richard Guelff, *Introduction* to DOCUMENTS ON THE LAWS OF WAR, 1, 14 (Adam Roberts & Richard Guelff, eds., 1989) [hereinafter Roberts & Guelff].

[132] Because the law of war is a matter of public international law, and regulates the conduct of States relative to each other, it does not ordinarily regulate purely internal, civil wars. Nonetheless, certain regional agreements relate to internal conflicts. Further, Roberts and Guelff note that,

> customary international law provided that the laws of war might become applicable to a non-international conflict through the doctrine of 'recognition of belligerency' . . . [by which] the government of a state in which an insurrection existed could recognize the belligerency of the insurgent faction, and the laws of war would thereby become applicable.

Roberts & Guelff, *supra* note 131, at 12. The authors further note that the doctrine of recognition of belligerency has fallen into decline, and that the surer basis for application of certain fundamental humanitarian provisions in non-international conflicts is Common Article 3 of the four 1949 Geneva Conventions. *Id.* at 13. Finally, while the 1977 Geneva Protocol II is intended to expand the provisions of Common Article 3, it too applies only during the existence of an "armed conflict."

[133] "[T]oday humanitarian law is applicable in any international armed conflict, even if the parties to that conflict have not declared war and do not recognize that they are in a formal state of war." Christopher Greenwood, *Historical Development and Legal Basis*, *in* THE HANDBOOK OF HUMANITARIAN LAW IN ARMED CONFLICT 1, 10 (Dieter Fleck, ed., 1995). As Greenwood uses the term, "international humanitarian law" is synonymous with the older phrase "law of war" (with the exception of the law of neutrality), the former including all rules designed to regulate the treatment of the individual–civilian or military, wounded or active–as well as rules governing the means and methods of warfare. *Id.* at 9.

relatively recent origin and is expressed most authoritatively in Article 2(4), and Chapter VII of the United Nations Charter.[134] Based on this distinction, Michael Walzer points out that the truly lawful war must satisfy requirements under both legal regimes: "War is always judged twice, first with reference to the reasons states have for fighting, secondly with reference to the means they adopt."[135] This two-part analysis leads another publicist to distinguish between a war's "*just cause* and [its] *just means*."[136]

Some authors conceive a conceptual framework in which the law of war concerns itself principally with the *jus in bello*. Thus, Kalshoven writes "[t]he laws of war, or *jus in bello*, are those rules and principles of international law which . . . govern the conduct of war."[137] This is both the majority view and the better view. By contrast, others prefer to speak of the law of war as comprising *both* aspects. "The term 'laws of war' can have different meanings and refers to both the rules governing resort to armed conflict (*ius ad bellum*) and the rules governing the actual conduct of armed conflict (*ius in bello*)."[138] Because the term *jus ad bellum* more properly coincides with phrases such as "the right of self-defense" and "resort to the use of force," it should therefore be distinguished from "laws *of* war." Equating the *jus in bello* with the phrase "laws of war" is not only a matter of historical convention,[139] but of logical application of law to war. Simply put, the *jus ad bellum* is to be regarded as separate from the law of war because of the

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[134] *See infra*, Part III, § C.4.

[135] MICHAEL WALZER, JUST AND UNJUST WARS: A MORAL ARGUMENT WITH HISTORICAL ILLUSTRATIONS 21 (2d. ed., 1977).

[136] THOMAS FRANCK, FAIRNESS IN INTERNATIONAL LAW AND INSTITUTIONS 246 (1995). Though Franck frames the distinction in moral categories (i.e. "just"), the context makes clear he is asserting that the early development of international *legal* norms mirrored those of the "just war" tradition–an ethical as well as a legal theory of warfare. Franck claims that this tradition held sway in Western societies as both a legal and ethical theory until the 1648 Peace of Westphalia ushered in an international order based on "a balance of power among sovereign nations [rather than] the ideal of a unified empire under God and right reason. This Westphalian system remained in place until the outbreak of war in 1914. Positivism largely banished notions of just war from the realm of law to the outer marches of moral philosophy." *Id.* at 252.

[137] Fritz Kalshoven, *Laws of War, in* 4 ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 316 (Bernhardt, ed., 1982).

[138] MALANCZUK, INTRODUCTION TO INTERNATIONAL LAW, *supra* note 130, at 306.

[139] Arguably, prior to 1928 and execution of the Treaty of Paris (Kellogg-Briand Pact) which purported to outlaw warfare as a legitimate means of dispute resolution, there was no such thing as a *jus ad bellum*. While there were ethical principles relating to conditions for a "just war" and for self-defense, nothing approached the level of international *law*. Even the Treaty of Versailles, which took initial steps toward conditioning the use of force (e.g. Article 16 which made acts of war against any member of the League of Nations acts of war against all members), did not explicitly ban war itself. Treaty of Versailles, art. 16, (1919 Supp.) 13 AM. J. INT'L L. 2.

"cardinal principle that *jus in bello* applies in cases of armed conflict whether the conflict is lawful or unlawful in its inception under *jus ad bellum.*"[140]

B. Customary Principles within the Law of War

Given the misery left by warfare through the centuries, warring nations have developed customary practices seeking to ameliorate its devastating effects. As the customs of war have evolved into the customs *and laws* of war, the dominant objective underlying the law as it relates to military force has remained constant and can be summed up in one word: restraint.[141] This was perhaps best summarized for the fist time in an international instrument by Article 22 of the Second Convention adopted by the 1899 Hague Peace Conference: "The right of belligerents to adopt means of injuring the enemy is not unlimited."[142] As discussed below, the dominant concepts distilled from the vast body of customary international law amount to very few; military

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[140] Roberts & Guelff, *supra* note 131, at 1.

[141] This is subject to the clarification that while the law of war as a body of legal principles does work to *limit* the means and methods of warfare, those principles recognize that in the world of fact (versus legal principle) acts of combat exist and may even appear to be *allowed* by reference to the relevant legal principle. Some may view this reference to legal principles as *authorization*, as for example in this reference to the principle of military necessity: "I did X, an otherwise prohibited act, because it was militarily necessary." For a discussion of military necessity, *see infra*, Part III, § B.1. But to view the law of war as *authorizing* or *enabling* behavior, misses a fundamental principle of international law. Professor Schmitt, author of the foregoing military necessity example, puts it best: "To exist as a principle of law, military necessity must have independent legal valence. That can, by definition, only occur when it is characterized as a limitation, for, as a general rule, all that is not prohibited in international law is permitted." Michael N. Schmitt, *Book Review: Law on the Battlefield* 8 A.F. ACAD. J. L. STUD. 255, 257 (1997-1998) (reviewing A.P.V. ROGERS, LAW ON THE BATTLEFIELD (1996)) [hereinafter Schmitt, *Book Review*]. This analysis applies to all principles and tenets of the law of war–thus all are restrictions on behavior. As for the general proposition in international law that all that is not forbidden is permitted, the International Court of Justice recently quoted from two previous cases, as it recounted the position of several States leading up to its advisory opinion on the threat or use of Nuclear Weapons. *See* ICJ Advisory Opinion on Nuclear Weapons, *supra* note 120 (referencing the *Steamship Lotus* and *Nicaragua* cases). In the *Steamship Lotus* case, the Permanent Court of International Justice (P.C.I.J.) stated that "restrictions upon the independence of States cannot . . . be presumed" and that international law leaves to States "a wide measure of discretion which is only limited in certain cases by prohibitive rules." P.C.I.J. (ser. A) No. 10, at 18-19. Then more recently, the International Court of Justice stated that "in international law there are no rules, other than such rules as may be accepted by the State concerned, by treaty or otherwise, whereby the level of armaments of a sovereign state can be limited." Military and Paramilitary Activities (Nicar. v. U.S.) 1986 I.C.J. 4, 135. Though the latter language specifically addressed armaments, it rests on the rationale from the *Steamship Lotus* case–unless prohibited, an action is allowed.

[142] Convention (II) with Respect to the Laws and Customs of War on Land, July 29, 1899, (1907 Supp.) 1 AM. J. INT'L L. 129.

necessity, discrimination, proportionality, and humanity.[143] These principles, recognized in subsequent treaty law, limit the means and methods available to belligerents for conducting armed conflicts, and thus each demands restraint of the belligerent State.[144] Because there are no treaties establishing specific *jus in bello* principles for space combat, these customary principles provide the most authoritative source, subject to the specific principles of space law discussed in Chapters Four and Five, on which the analysis of a *jus in bello* for space must proceed.

1. Military Necessity

Military necessity expresses the idea that for an attack to be lawful belligerents must be able to show the connection between the attack, and the suppression of the enemy's military capability. De Mulinen points out that military necessity pertains to those measures: "(a) not forbidden by the law of war; and (b) required to secure the overpowering of the enemy."[145] Implied in the restriction this principle imposes is the requirement that attackers have identified the prospective target in advance of attack as one that is militarily legitimate. Put otherwise, the attacker must be convinced that attacking the target will contribute to the victory of his military undertaking. As the quote at the head of this chapter suggests, the more capable a belligerent is in properly identifying these militarily necessary targets, the more responsibility it has in doing so.

Taken to its logical extreme, the principle of necessity could be used to justify the very sorts of activity the laws of war prohibit.[146] Any argument

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[143] These four principles are generally viewed as summarizing the customary law of war, though this enumeration is not accepted universally. Thus, Hays Parks describes the concept of proportionality as subordinate to, and an expression of, discrimination. He argues that discrimination is attended today with some confusion "because of the attempted injection of the concept of *proportionality* into the law of war." Parks, *supra* note 123, at 5 n.18. By contrast, Professor Schmitt subordinates distinction to proportionality, and recognizes chivalry as a forth distinct customary principle. *See* Michael N. Schmitt, *Green War: An Assessment of the Environmental Law of International Armed Conflict* 22:1 YALE J. INT'L L. 1, 52 (1997) [hereinafter Schmitt, *Green War*]. Whatever the formulation however, each approach includes the relevant prescriptive norms as developed in customary law, while giving special emphasis to some but not others.

[144] As the subsequent analysis shows, the law demands such restraint whether the operation in question is offensive or defensive in nature.

[145] FREDERIC DE MULINEN, HANDBOOK ON THE LAW OF WAR FOR ARMED FORCES 82-83 (Int'l Committee of the Red Cross 1987) [hereinafter DE MULINEN]. Perhaps subpart (b) of this formulation is the more important as subpart (a), simply invoking that which is not forbidden by the law of war, could apply to *any* principle of the law of war and says nothing unique about the restrictions imposed by military necessity.

[146] Such was the case in nineteenth century Germany as expressed through the doctrine of Kriegsraison. This concept, an interpretation of the traditional notion of military necessity, asserted that military necessity "could justify any measures – even in violation of the laws of

taking the principle to this extreme commits two legal errors. First, it fundamentally misinterprets the principle by failing to recognize the sovereign freedom States have in the absence of legal prohibition.[147] Legally speaking, a State does not need concepts like military necessity to justify its behavior in war provided such behavior is otherwise compliant with applicable *jus in bello* restrictions. As Schmitt emphasizes, "[m]ilitary necessity operates within this paradigm to prohibit acts that are not militarily necessary; it is a principle of limitation, not authorization. In its legal sense, military necessity justifies nothing."[148] Second, as with all of the customary principles underlying the law of war, but especially military necessity, the concept must be balanced against the others. The U.S. Air Force stresses this point in its manual on the law of war:

> The law of armed conflict has been shaped with a recognition of the concept of "military necessity." Hence "necessity" cannot be claimed as a defense to violations of absolute prohibitions included in the law of armed conflict, for example, killing of prisoners of war. More importantly, various military doctrines, such as accuracy of targeting, concentration of effort, maximization of military advantage, conservation of resources, avoidance of excessive collateral damage, and economy of force are not only fully consistent with compliance with the law of armed conflict but reinforce its observance.[149]

2. Discrimination

Discrimination,[150] as the term suggests, stresses diligence in "the selection of methods, of weaponry and of targets . . . it includes the idea of the immunity of non-combatants and those *hors de combat*, that is, the sick, wounded, and shipwrecked, but it is not only about that: it can also refer to geographical and other limitations."[151] This description incorporates several

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war – when the necessities of the situation purportedly justified it." Air Force Pamphlet 110-31, The Conduct of Armed Conflict and Air Operations ¶ 1-3(a)(1) (Nov. 19, 1976) (reissue pending as AFPAM 51-710) [hereinafter AFP 110-31]. Abuse of the principle continued into the twentieth century as Carnahan notes: "The modern denigration of military necessity goes back at least to the Nuremberg trials after World War II, where some defendants argued that military necessity justified their atrocities against civilian populations." He continues that "military necessity is widely regarded today as an insidious doctrine invoked to justify almost any outrage. As a result, the principle has not been allowed to play the creative role that it is capable of playing." Bruce M. Carnahan, *Lincoln, Lieber and the Laws of War: The Origins and Limits of the Principle of Military Necessity* 92 AM. J. INT'L L. 213, 230 (1998) [hereinafter Carnahan, *Lincoln, Lieber and the Laws of War*].

[147] For a discussion addressing this error, *see supra* note 141.

[148] Schmitt, *Green War*, *supra* note 143, at 54.

[149] AFP 110-31, *supra* note 146, at ¶ 1-6(b).

[150] Also termed "distinction."

[151] Roberts & Guelff, *supra* note 131, at 5.

concepts, one of the most significant being the distinction between combatants and non-combatants. In general, the law of war prohibits attack of any person deemed a "non-combatant." This means that the lawfulness of the use of force against individuals under the *jus in bello* presupposes attack of those qualifying as combatants. Recognized at least since the nineteenth century,[152] the law of war establishes the category "combatants" in order to specify those who may be attacked, but also to create a measure of protection for those so categorized.[153] The 1907 Regulations annexed to the Hague Convention (IV) Respecting the Laws and Customs of War on Land stated the general criteria for recognizing combatants: (a) commanded by a person responsible for his subordinates; (b) have a fixed distinctive emblem recognizable at a distance; (c) carry arms openly; and (d) conduct operations in accord with the laws and customs of war.[154]

The care required by the principle of discrimination to distinguish between combatants and non-combatants rests on an even more fundamental principle: military objective.[155] This principle requires that a belligerent's armed attacks be limited to targets that are military in nature and the destruction of which advances the attacker's tactical, operational, or strategic position. Such targets would certainly include combatants in action, as well as inanimate objects deemed necessary for the opponent's prosecution of the conflict. Thus, Article 48 of the 1977 Protocol I to the 1949 Geneva Conventions provides the clearest statement of the customary principle, and assumes in its "basic rule" concerning the general protection of civilians populations that belligerents will recognize military objectives. "In order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian

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[152] Professor Green, quoting from a treatise dating to 1802, states that "[i]t is only with the writers of the nineteenth century that either a clear definition or the rights of soldiers or the first usage of the term 'combatants' is found." LESLIE C. GREEN, THE CONTEMPORARY LAW OF ARMED CONFLICT 101 (1993) [hereinafter GREEN].

[153] Thus, the law protects those combatants who are captured, wounded, sick, or shipwrecked. The combatant category also does not include every member of the military force, for example chaplains and medical personnel.

[154] Annex to the Convention, Regulations Respecting the Laws and Customs of War on Land, Oct. 18, 1907, art. 1, (1908 Supp.) 2 AM. J. INT'L L. 90 (entered into force Jan. 26, 1910) [hereinafter Hague Convention (IV) Annex]. Those military members who should ordinarily fit this category but do not for failure to comply with one of its terms, such as soldiers not wearing a uniform or concealing their weapons, become "unlawful combatants" and risk loss of protections afforded to lawful combatants.

[155] Admiral Robertson notes the fundamental character of the principle of discrimination, and thus of military objective, by reference to the International Court of Justice Advisory Opinion on Nuclear Weapons. There the court opined that military objective is one of the two "cardinal principles" of the law of armed conflict (the other being the prohibition on the use of weapons causing unnecessary suffering to combatants). H.B. Robertson, *The Principle of the Military Objective in the Law of Armed Conflict*, 8 A.F. ACAD. J. LEGAL STUD. 35 (1997-1998) (citing ICJ Advisory Opinion on Nuclear Weapons, *supra* note 120, at 28) [hereinafter Robertson].

population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives."[156] Subsequently, Protocol I defines "military objective" (relating to objects versus noncombatants) as being "limited 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."[157]

The obligation created by the principle of distinction attends both the attacker and the defender.[158] Further, because the principle requires attackers to exercise due care in the selection, engagement, and destruction of targets, it imposes a duty commensurate with the belligerent's ability to discriminate. Given the lack of precision afforded by gravity-driven projectiles dropped from hot air balloons, the outright prohibitions on such methods of war in 1899 and 1907 make sense in light of the principle of discrimination.[159] However, the increasing capability of modern weaponry not only provides increased tactical options, but potentially increased obligation as well. To the extent that a laser-guided bomb can be used to effectuate an attack that properly distinguishes legitimate from illegitimate targets, but a conventional gravity bomb cannot, the attacker may be obligated to either forego the attack or use the less common, more costly precision munition.[160] Of course, relevant to this targeting and weaponeering analysis would be the attacker's overall campaign plan. The possibility certainly exists that use of precision munitions early in a

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[156] Protocol Additional to the Geneva Conventions of Aug. 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), Dec. 12, 1977, art. 48, 1125 U.N.T.S. 3. (entered into force Dec. 7, 1978) [hereinafter Protocol I].

[157] *Id.*, art. 52(2). Though not adopted universally as a treaty rule, Admiral Robertson notes that Protocol I's provisions on military objective from Articles 48 and 52 are widely incorporated into military manuals and are "recognized as a norm of customary international law." Robertson, *supra* note 155, at 44.

[158] For further discussion of this point, *see infra* note 196.

[159] *See* Declaration (XIV) Prohibiting the Discharge of Projectiles and Explosives from Balloons, Oct. 18, 1907, 36 Stat. 2439; Declaration (IV, 1) To Prohibit for the Term of Five Years the Launching of Projectiles and Explosives from Balloons, and Other Methods of a Similar Nature, July 29, 1899, 32 Stat. 1839.

[160] Schmitt's observation bears repeating.

> [The law of armed conflict] is no longer a body of law designed to ensure a fair fight between two opponents . . . . Today, the law of armed conflict is designed primarily to minimize suffering and prevent unnecessary destruction. This being so, belligerents are held to the standards to which they are capable of rising.

Schmitt, *Bellum Americanum*, *supra* note 6, at 412. Schmitt's implication is that technological advancement comes at some cost with respect to the law of war; the more effectively weapons can avoid unnecessary destruction, the less ability belligerents legally have in allowing for the possibility of such destruction.

campaign might produce less overall value under the proportionality analysis than had the use been reserved for a later target in the campaign.

3. Proportionality

The customary rule of proportionality, more difficult to articulate than necessity or discrimination, requires that the use of military force be proportional to the legitimate military objective in view. This represents more than simply the principle of war advocating only such force as is necessary to attain the objective; it actually requires a balancing of anticipated military advantage against anticipated damage caused.[161] It essentially prohibits the use of military force that creates collateral damage to civilians or property, not otherwise legitimate targets, that is disproportionate to the military value of the objective.[162] As Roberts and Guelff point out, this doctrine can refer to two different situations: first, the proportionality of a belligerent response to a grievance (in this sense proportionality provides a link between the *jus ad bellum* and *jus in bello*); and second, "proportionality in relation to the adversary's military actions or to the anticipated military value of one's own actions, including proportionality in reprisals."[163]

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[161] In this way, proportionality differs from the principle "economy of force." Schmitt, *Green War*, *supra* note 143, at 55 n.267.

[162] This principle not only governs the use of force during the ongoing operations of armed conflict, but during an act of self-defense under Article 51 of the Charter of the United Nations as well. *See infra* note 262. Thus, it is a "rule well established in customary international law" that in exercising its right to self-defense, a State may only use "measures which are proportional to the armed attack and necessary to respond to it." Military and Paramilitary Activities (Nicar. v. U.S.), 1986 I.C.J. 4, 94. The U.S. took the position that the lawfulness of an act of self-defense depends in part on the necessity and the proportionality of the measures taken. *Id.* at 103.

[163] Roberts & Guelff, *supra* note 131, at 5. The concept of reprisals has proven controversial in international law. In 1977, Protocol I to the Geneva Conventions sought to eliminate a form of reprisal taken against civilians or the civilian population. Professor Green explains that reprisals are "otherwise illegal measures taken in response to prior illegal measures of the adverse party and which are intended to cause the adverse party to cease its illegal activities and comply with the law. They are not measures taken simply by way of retaliation." GREEN, *supra* note 152, at 331, 332. Abraham Sofaer points out that the U.S. decision not to ratify the Geneva Protocol I came, in part, because it narrowed the right of reprisal. He further states that this factor was of concern to the U.S. Joint Chiefs of Staff, and that it "would hamper the ability of the United States to respond to an enemy's intentional disregard of the limitations established in the Geneva Conventions of 1949 or Protocol I." Abraham Sofaer, *Agora: The U.S. Decision Not to Ratify Protocol I to the Geneva Conventions on the Protection of War Victims*, 82 AM. J. INT'L L. 784, 785 (1988). Interestingly, Parks attributes the failure of the diplomatic conference to produce fundamental agreement among the delegations to the "cultural and philosophical differences that were substantially greater than they had been [at the Hague in 1907 and Geneva in 1949]." He further points out that many delegations were led by international lawyers lacking subject-matter expertise; "no delegation had a military officer of the stature of a Mahan, Fisher, or Rodgers." Parks, *supra* note 123, at 76.

In the former sense of proportionality posed by Roberts and Guelff, the massive coalition military operation in the 1991 Persian Gulf War would have been disproportionate to an unlawful border incursion and then an immediate retreat by the Iraqis. Though unlawful, such incursion could be remedied with far less force. In the latter sense of proportionality, in response to the opponent's military actions, the destruction of a hydroelectric dam in order to eliminate a sniper perched on top would constitute an attack disproportionate to the legitimate objective of eliminating the threat posed by the sniper. Though the dam may be its own legitimate objective under certain circumstances, it is not made legitimate simply as a means of achieving the destruction of a far less significant target.

Because of the difficulty of applying the principle of proportionality to specific contexts in modern warfare, scholars and practitioners have devised tests to assist those engaging in target selection and military operations planning. One useful formulation for aerial combat has been advanced by Colonel Gómez of the Spanish Air Force: "an aerial attack expected to cause civilian casualties would be acceptable should it have the same degree of approval as a similar action taking place over a part of the country's own territory under enemy occupation, in which case the civilian casualties would be compatriots."[164] This formulation essentially asks the military planner to put himself in the position of the enemy. Such an approach could be modified to apply the principle of proportionality to space warfare. Gómez aptly attributes the difficulty in applying the principle of proportionality to the subjectivity involved in the application, and thus terms the principle the "Achilles heel of the law of war."[165]

4. Humanity

Finally, the concept of humanity incorporates several concepts, including that which is still called "chivalry."[166] In practice, this principle may

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[164] F.J.S. Gómez, *The Law of Air Warfare* 323 INT. REV. RED CROSS 347, 354 (1998) [hereinafter Gómez].

[165] *Id.*

[166] In some formulations, chivalry receives attention as a separate customary principle. As it has developed in the law of war, chivalry distinguishes between acts of deception that undermine the goodwill of the enemy, and those that do not. Thus, acts of perfidy are always prohibited. As enumerated in Article 37 of Protocol I to the Geneva Conventions, these prohibited acts include feigning an intent to negotiate under a flag of truce or of a surrender, feigning an incapacitation by wounds or sickness, feigning civilian or non-combatant status (such as marking of combat aircraft with the international symbols affording protection as medical aircraft), and feigning protected status by the use of signs, emblems, or uniforms of the United Nations or of neutral States. By contrast, the law does not prohibit "ruses," such as the use of camouflage, decoys, mock operations, and misinformation, which deceive the opponent yet do not betray his confidence in measures requiring his goodwill and which are intended to ameliorate the effects of war. Protocol I, *supra* note 156, art. 37.

not pose the urgency it once did in limiting armed conflict because of the way the other principles have matured taking it into account. This is particularly true of necessity and proportionality, as Colonel Schmitt observes: "to the extent suffering is useless it is militarily unnecessary and, because it offers no direct and concrete military advantage, disproportionate."[167]

Nonetheless, the principle of humanity accounts for several efforts at outlawing means and methods of warfare deemed to cause unnecessary suffering. International law does not restrict belligerents from wounding or killing opposing forces so that they will not fight back. It follows from this that once a combatant is rendered *hors de combat* ("out of combat"), he is no longer a legitimate target for further attack. Thus, while it is legitimate to wound a combatant so as to render him *hors de combat*, means and methods of warfare having the effect of exacerbating wounds that would render a combatant *hors de combat*, are deemed "unnecessary." The principle has been applied over the centuries to weapons from antiquity, and those developed more recently that have been addressed through treaty instruments. These include poisoned weapons,[168] barbed weapons, small-caliber incendiary or explosive bullets,[169] expanding bullets,[170] glass and other nondetectable fragments,[171] and most recently, blinding lasers.[172] In theory, prohibition of all

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[167] Schmitt, *Bellum Americanum*, *supra* note 6, at 409.

[168] As Carnahan notes, "[t]he ban on poisoned weapons is one of the oldest continuing prohibitions in the law of war." Burrus M. Carnahan, *Unnecessary Suffering, The Red Cross and Tactical Laser Weapons* 18 LOY. L.A. INT'L & COMP. L.J. 705, 714 (1996) [hereinafter Carnahan, *Unnecessary Suffering*]. It predates any attempts at codification by centuries.

[169] Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grams Weight, Dec. 11, 1868, (1907 Supplement) 1 AM. J. INT'L L. 95.

[170] These munitions have soft or hollow points so as to flatten on impact. Also called "dum-dum" bullets after the munitions factory near Calcutta India where first developed, they are outlawed for over 30 States Parties to a Hague Declaration of 1899. Hague Declaration (IV, 3) Concerning Expanding Bullets, July 29, 1899, (1907 supp.) 1 AM. J. INT'L L. 155. The declaration explicitly applied to bullets "which expand or flatten easily in the human body, such as bullets with a hard envelope which does not entirely cover the core or is pierced with incisions." *Id.* Though not a party to the Declaration, the United States has acknowledged that it will abide by the terms of the agreement. Carnahan, *Unnecessary Suffering*, *supra* note 168, at 720.

[171] Protocol [to the Convention on Conventional Weapons] on Non-Detectable Fragments (Protocol I), Apr. 10, 1981, 1342 U.N.T.S. 7 (entered into force Dec. 2, 1983). This Protocol to the 1980 Convention on Conventional Weapons prohibits the use of "any weapon the primary effect of which is to injure by fragments which in the human body escape detection by X-rays." *Id.*

[172] Protocol [to the Convention on Conventional Weapons] on Blinding Laser Weapons (Protocol IV), Oct. 13, 1995, 35 I.L.M. 1218 (1996) (entered into force July 30, 1998) [hereinafter Protocol on Blinding Lasers]. The International Committee of the Red Cross (ICRC) takes the prohibition of Protocol IV a step further in its 1995 pamphlet *Blinding Weapons*, and declares all "blinding as a method of warfare" to be a violation of international humanitarian law. Carnahan, distinguishing the ICRC's denunciation of poison gas in 1925, notes that this "striking policy departure" marks the first time in history that the ICRC has

of these weapons limits space war to the extent that any of them might be delivered against human beings from or within outer space.

As the principle of military necessity must be balanced by humanitarian concerns, some legal commentators note that humanitarian concerns must be balanced against legitimate military needs as well. The *jus in bello* principles presuppose that their application occurs in the midst of armed conflict–that is "*in bello*"–and that in some cases States will accurately assert a legal right to militarily subdue the other.[173] This forces the law to assume a pragmatic posture with respect to the goal that warfare remain humane. Thus, Professor Green rightly observes,

> [s]ince the law of armed conflict rests upon a judicious balance between military operational needs and humanitarianism, and since the purpose of

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"publicly denounced a specific method of warfare as a violation of international law." Carnahan, *Unnecessary Suffering*, *supra* note 168, at 705. Carnahan concludes that by declaring the

> undefined concept of 'blinding as a method of warfare' unlawful and making exaggerated claims for the destructiveness of lasers, the ICRC has helped to lay the basis for false war crime charges against any soldier captured with a portable laser. The ICRC may have compromised its own ability to prevent abuse of prisoners of war subjected to such charges.

Id. at 731. Although itself bordering on exaggeration, at least one important reminder can be taken from this conclusion–a very possible consequence of crusading against a means of warfare in the interest of soldiers may make the very soldiers in view more vulnerable. A final observation regarding this protocol lasers relates to its prospective nature vis-à-vis the weapons at issue. This is one of the only attempts in the law of war to prohibit the use of a weapons system before it has been deployed in combat, or even fielded for training purposes prior to combat.

[173] For example, under Article 51 of the United Nations Charter, States have the "inherent right" to use armed force in self-defense. *See* discussion *infra* notes 262 and 267. This raises two fundamental issues. First, because the right is inherent, and has been recognized by customary international law long prior to the appearance of the United Nations Charter, the right existed *before* the law prohibited warfare as an instrument of national policy. This right has been widely recognized at least since the Caroline incident of 1837. *See* D.J. HARRIS, CASES AND MATERIALS ON INTERNATIONAL LAW 894 (5th ed., 1998) [hereinafter HARRIS]. Second, because the United Nations Charter speaks of this prerogative toward self defense as a "right," it appears to be an explicit *authorization* to act in certain circumstances. Taken as an authorization, and coupled with the *jus in bello*, the reasonable implication of this understanding of Article 51 is that States not only have the right to self defense, but have the right to use armed force in self defense, and have the right to attack militarily necessary targets in proportionate, "humane" ways as long as such attacks are otherwise predicated on compliance with the *jus ad bellum*. Though this understanding borders on repudiation of the principle articulated in the *Steamship Lotus* case, that is, States may act as they please unless prohibited by law, by suggesting that with respect to self defense the law plays an *authorizing* rather than merely prohibitive role, it is better seen as merely a limited exception to the *Lotus* rule rather than a direct challenge to it. For a discussion of the *Steamship Lotus* case, *see supra* note 141.

> the Geneva Law is the preservation of humanitarianism accompanied by respect for civilians and the long-term interests of the parties to the conflict by reducing the possibility of sentiments of *revanchisme*, application of humanitarian principles does not override the needs of practical realism. Idealism and a belief in humanitarianism must not result in an automatic rejection of military needs or careless accusations of war crimes or crimes against humanity. However, the assessment of military needs must always be made in good faith.[174]

This is not to say that military necessity ever provides an authorization to act (as the following example might incorrectly suggest: "the employment of military force was authorized because doing so was militarily necessary"), but simply to say that each of the customary law of war principles represent an important *limitation* on means and methods of warfare while simultaneously recognizing that warfare nonetheless persists in human experience. This fact affects the content that the law invests into the term "humanity." This fact further pragmatically presupposes that unless the law somehow accommodates itself to such realities as the continued existence of war, States will ignore it. One can recognize the existence of such accommodation by observing the simple fact that unfettered humanitarianism does not characterize the law of war. If it did, then not only would such "law" never have achieved the force of law in the first place,[175] but the *jus in bello* would prohibit all means and methods of war for the simple reason that any one of them are apt to produce suffering to some extent. Pure humanitarianism would prohibit all suffering of any kind, as the law of war plainly does not.[176] The principles therefore

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[174] GREEN, *supra* note 152, at 333.

[175] Given the development of international law in this century, it is highly doubtful States would ever completely restrict themselves from resort to the use of force under any circumstances – the ultimate extension of pure humanity.

[176] It is for this reason that there is some danger of confusion in referring to the law of armed conflict as humanitarian law. To the extent that the latter title evokes images of human rights law, the term humanitarian, and the legal content it suggests, could be transposed improperly from the one subset of public international law to the other. This would fail to accord the term its rightful and more limited place as it functions within the law of armed conflict. Put simply, humanitarian as used in human rights law does not necessarily mean "humanitarian" as used in the law of armed conflict. This does not mean the two bodies of law are strictly distinct. *See, e.g.*, Levie and Provost cites at *supra* note 120. It also does not at all mean that humanity in the law of war is a narrow principle of customary international law. As Schmitt observes, as applied to protection of the environment in armed conflict, humanity assumes an extra-anthropocentric quality. In this way it can be seen as a broader concept than "humanitarian" as used in human rights law, and includes prohibition of "activities that are not so much inhumane as *inhuman*. They are acts we intuitively recognize as inherently wrongful regardless of the context in which they occur. In a sense, they are violative of the 'dictates of public conscience.'" Schmitt, *Green War*, *supra* note 143, at 61.

require constant balancing and readjustment. Each acts as a limit on permissible military activity so that no one principle obliterates the other.[177]

C. TREATY LAW

Without doubt, the easiest means of determining international law is by reference to the explicit will of States as expressed in treaties. Though of minimal value for ascertaining specific principles applicable to space warfare, the relevant treaties do provide the general foundation from which a space law of war will emerge. And, the four general principles of the law of war outlined above, reinforced within this treaty law, will apply to armed conflict in any combat environment.[178]

A discussion of relevant treaty law restraining armed conflict would not be complete without reference to several historical antecedents. The diplomatic conferences producing the Hague and Geneva Conventions, and their progeny, followed several modest attempts to codify the *jus in bello*. One such attempt, reflected in the Lieber Code of 1863, so called for its author, Columbia University professor Francis Lieber, governed the prosecution of war for the Union Army during the American Civil War. Promulgated by President Lincoln as General Order Number 100, the Lieber Code's 157 articles set forth standards for the prosecution of the war and treatment of Confederate troops.[179]

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[177] Schmitt articulates a sequential analysis in determining whether a military course of conduct comports with the law.

> 1. Means: Do the methods or means selected to execute the attack violate the principles of distinction, humanity, or any specific prohibition of the law of armed conflict? 2. Target: Is the target a military objective? If so, is attack on this type of target specifically forbidden? If not, is the destruction of the target militarily necessary? 3. Result: Does the concrete and direct military advantage anticipated outweigh the collateral damage and incidental injury likely to result?

Schmitt, *Book Review*, *supra* note 141, at 276 n.24. This approach helpfully clarifies that each principle acts as a filter to weed out impermissible military acts while at the same time recognizing that these principles are not authorizations to act, but limitations on acts which might otherwise be lawful.

[178] It should be remembered that the two basic treaty regimes represented by the Hague Conventions and the Geneva Conventions, do not purport to be the exhaustive sources for law of war restrictions. Though they are, to a large extent, codifications of customary law, customary international law remains as a viable source not only for circumstances unaddressed in the treaty law, but to govern the conduct of non-parties to the treaties.

[179] *Instructions for the Government of Armies of the United States in the Field*, General Order No. 100, Apr. 23, 1863, THE LAWS OF ARMED CONFLICTS: A COLLECTION OF CONVENTIONS, RESOLUTIONS AND OTHER DOCUMENTS 3 (Dietrich Schindler & Jiri Toman, eds., 1988) [hereinafter Schindler & Toman].

Though developed in the United States, the Lieber Code became widely read as expressing an emerging international law relating to restrictions imposed on combatants in armed conflict,[180] and it "strongly influenced the further codification of the laws of war and the adoption of similar regulations by other States."[181] Thus, in addition to influencing the codification of subsequent treaty law, it became the model for other countries, including Prussia in 1870,[182] the Netherlands in 1871, France in 1877, Serbia in 1879, Spain in 1882, Portugal in 1890, and Italy in 1896.[183]

Eventually, the Geneva Convention of 1864,[184] the Petersburg Declaration of 1868,[185] Protocol and Declaration of the Brussels Conference of 1874,[186] and the 1880 Oxford Manual of the Laws and Customs of War[187] took modest steps toward limiting the means and methods of warfare as well as ameliorating the suffering they cause. In each case, the restrictions on means and methods of war, as well as on treatment of combatants and noncombatants, provided the foundation for the international treaty norms still in force today.

1. Hague Conventions of 1899 (I-IV) and 1907 (I-XIV)

The conventions adopted in 1899 and 1907 at the Hague provide, to this day, the backbone of international regulation governing the means and methods of warfare. These eighteen treaties attempted to fulfil four main purposes: first, they sought to identify those who may lawfully participate in war, and define the duties and rights of those individuals; second, they sought to regulate means and methods by which States could lawfully conduct warfare; third, they sought to describe the conditions and manner under which belligerents could bombard or besiege; and fourth, they sought to regulate

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[180] Fritz Münch, *War, Laws of, History, in* 4 ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 327 (Bernhardt, ed., 1982).

[181] Schindler & Toman, *supra* note 179, at 3 (introductory note).

[182] Carnahan, *Lincoln, Lieber and the Laws of War*, *supra* note 146, at 215.

[183] Roberts & Guelff, *supra* note 131, at 7.

[184] Conditions for the Amelioration of the Condition of the Wounded in Armies in the Field, Aug. 22, 1864, Schindler & Toman, *supra* note 179, at 279. This convention has been superceded by the 1949 Geneva Conventions.

[185] Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight, Dec. 11, 1868, (1907 Supp.) 1 AM. J. INT'L L. 95. This declaration is the first agreement among States prohibiting the use of specific weaponry in time of war. The provisions of the declaration were later incorporated into the 1899 and 1907 Hague Regulations.

[186] Final Protocol and Project of an International Declaration Concerning the Laws and Customs of War, Aug. 27, 1874, Schindler & Toman, *supra* note 179, at 25. The provisions of the protocol, and the international declaration have been incorporated into the 1899 and 1907 Hague Conventions and Regulations.

[187] The Laws of War on Land, Sept. 9, 1880, Schindler & Toman, *supra* note 179, at 35 (originally published by the Institute of International Law). Again, the influences of the Oxford Manual on the 1899 and 1907 Hague Conventions and Regulations are clear.

truces, capitulations and armistices, and the military government of occupied territories.[188]

Because the laws of war were among the earliest parts of international law to be codified,[189] it may seem that the original principles would contribute little to the regulation of space combat. This is true only in part. Though the Hague Conventions had nothing explicit to say about aerial warfare, for example, several specific restrictions have been applied by extension. It is no surprise that the Conventions contemplate the means and methods of warfare then in existence. However, although nothing in the 1907 texts is directed toward space operations, articulation of the *jus in bello* for space warfare will require examination of the Hague Conventions–an examination analogous to that undertaken for aerial warfare. Just as principles from the Conventions have been stretched to limit means and methods of air war, a slightly broader reading of the primary texts could establish the emergence of a generalized *jus in bello* for space.

Significant provisions for airpower, and thus possibly for spacepower, are the restrictions on bombardment contained within the fourth Convention regulating land warfare,[190] and the ninth Convention regulating bombardment by naval forces.[191] As with most of the documents adopted by the 1907 conference, the Convention on land warfare was drafted using terms and concepts from its 1899 predecessor.[192] Both conferences sought to limit the permissible scope of artillery fire and the "bombardment" resulting therefrom. Although the ninth Convention only limited bombardment by "naval forces,"[193] its second Article provided a list of authorized targets, including "[m]ilitary works, military or naval establishments, depots of arms or war *matériel*, workshops or plant which could be utilized for the needs of the hostile fleet or army, and the ships of war in the harbor. . . ."[194] Because these targets were specifically excluded from the Convention's prohibitions on

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[188] P.J. Cameron, *The Limitations on Methods and Means of Warfare*, 1984 AUSTRALIAN Y.B. INT'L L. 252 (1985).

[189] Schindler & Toman, *supra* note 179, at vii (from the Introduction).

[190] Convention (IV) Respecting the Laws and Customs of War on Land, Oct. 18, 1907, (1908 Supp.) 2 AM. J. INT'L L. 90 (entered into force Jan. 26, 1910) [hereinafter Hague Convention (IV)].

[191] Convention (IX) Concerning Bombardment by Naval Forces in Time of War, Oct. 18, 1907, (1908 Supp.) 2 AM. J. INT'L L. 146 (entered into force Jan. 26, 1910) [hereinafter Hague Convention (IX)].

[192] Though still in force today, the fourth convention of 1907 lost the support of eighteen States which were parties to the 1899 second convention. These eighteen States or their successors (e.g. Yugoslavia) remain formally bound by the 1899 convention.

[193] *Id.* at art. 1.

[194] *Id.* Perhaps the most significant aspect of this list is its inclusion of industrial targets with military value. For the first time, this was explicitly recognized by an international instrument. Nonetheless, the entire list was regarded by the head of the U.S. delegation as simply declaratory of customary international law. Parks, *supra* note 123, at 18.

bombardment, including its application to "naval forces," it appears that the Convention recognizes that these targets could be attacked by any forces–naval, terrestrial, aerial, or even space.

A second feature of significance, from the ninth Convention, relates to its Article 2 and the concept of unavoidable collateral damage. After requisite precautions have been taken by the attacker, including ascertaining the status of the target, issuance of a summons followed by a reasonable time of waiting, and failure by the local authorities to destroy the targets themselves, the attacker is absolved of responsibility for "unavoidable damage."[195] Significantly, this places a burden to minimize collateral damage not only on the attacker, but on the defender as well. Although reflected in subsequent international instruments, this aspect of the law of war is increasingly forgotten. In 1907 it was simply "realized that collateral civilian casualties were regarded as the cost of war to a nation rather than the responsibility of the attacker."[196] This general principle will apply equally to space warfare. Thus, belligerents employing military space assets that constitute legitimate targets will be obliged to separate them from other space objects not supporting the armed conflict.

In contrast to the ninth Convention on naval forces, the prohibition on bombardment in the regulations annexed to the fourth Convention did not limit itself to land forces. Reflecting the principle previously articulated in the second 1899 convention, the fourth convention's general prohibition reads: "The attack or bombardment, by whatever means, of towns, villages, dwellings, or buildings which are undefended is prohibited."[197] Although the drafters of the Convention did not likely envision space warfare, this provision raises three potential issues related to limitations on space warfare. First, the specified targets require at a minimum that they be "defended" before making them subject to attack. This was an early way of restating the principle of military necessity. That is, unless a potential target was considered significant enough to defend, it was not deemed significant enough to attack as a legitimate objective.

A second issue raised by the bombardment prohibition relates to its scope. Applicable to bombardment "by whatever means," the prohibition against attack of undefended land targets restricts all bombardment of such targets, however or wherever originated. Unless properly defended, the

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[195] Hague Convention (IX) Annex, *supra* note 154, at art. 2.

[196] Parks, *supra* note 123, at 18. Parks further concludes that the rule of Article 2, was declaratory of customary law. Thus, however provocative such a claim may sound today, its roots go back to the codified foundations of the law of war, and beyond. This point about the legal obligations of the defender is a theme Parks sustains throughout his monumental, book-length article. The piece provides an excellent scholarly argument, citing to the provisions of both Hague and Geneva law, for the proposition that defenders bear as heavy an obligation to ameliorate the possibility and effects of collateral damage from air warfare as do attackers.

[197] Hague Convention (IV), *supra* note 154, at art. 25.

enumerated targets were not to be engaged by land or sea forces. Given the expansive terms used by the drafters, the prohibition could be interpreted to apply by extension to air and space forces.[198]

Finally, the prohibition implicitly recognizes that under proper conditions certain targets are lawful. Thus, under the terms of the convention, one could not state that towns, villages, dwellings, or buildings may *never* be lawful targets. There were cases envisioned in which even towns filled with civilians could be bombarded. Significantly however, the Convention did not state that a potential target was legitimate simply because it was defended, only that undefended targets were off limits. As a result, even a defended target may still have been protected if it did not otherwise qualify as a legitimate military objective. Just because a town full of civilians possessed armed protection, it was not thereby rendered a legitimate target unless it sustained an industrial or other function contributing to the prosecution of the conflict.

Chapter One of the regulations to the fourth Convention raises further distinctions that would prove important to all subsequent law of war rules.[199] It defined the conditions under which one qualified as a "belligerent" and thus protection as a "prisoner of war" if taken during the course of hostilities. As listed previously, the regulations establish four criteria defining a belligerent[200] which designation could apply not only to those in armies, but to militia members and those of volunteer corps as well. Chapter One further specifies that the category "belligerents" may include either combatants or non-combatants.[201] As the term suggests, combatants refer to those participating directly in the hostilities. As a rule, members of a State's armed forces are combatants, with the two basic exceptions being religious and medical personnel. These two categories of military members, though members of the armed forces and otherwise entitled to protection as "belligerents" or "prisoners of war," are non-combatants because they may not participate directly in the use of force.

Even more basic than the distinction between "combatants" and "non-combatants" was that between "combatants" and "civilians."[202] Civilians were viewed as a special class of "non-combatants" (unable to take part in the

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[198] Though the drafters of the convention could not have specifically foreseen the technological revolution in military affairs that would come later in this century, the absolute terms "whatever means" would seem to include means of bombardment from unanticipated new combat environments such as outer space. As for targeting from the air, the Greco-German Mixed Arbitral Tribunal held that the Convention IV rules relating to bombardment specifically applied to air warfare. GREEN, *supra* note 152, at 173 (citing Coenca Bros. v. Germany, 7 M.A.T. 683 (1927)).

[199] As with most provisions of the fourth 1907 convention, this one came substantially from the second 1899 convention. *See* Schindler & Toman, *supra* note 179, at 75.

[200] *See* Hague Convention (IV) Annex, *supra* note 154 and accompanying text.

[201] *Id.* at art. 3.

[202] Knut Ipsen, *Combatants and Non-Combatants, in* THE HANDBOOK OF HUMANITARIAN LAW IN ARMED CONFLICT 65, 66 (Dieter Fleck, ed., 1995).

hostilities), who were not "belligerents" (susceptible to capture and incarceration as prisoners of war) either. Neither they nor their property could be targeted directly as long as they retained their status as "civilians." However, a final important category, "unlawful combatants" applies to those non-combatants and civilians who are unauthorized to engage in hostilities, but do so nonetheless. These individuals lose the protection they would otherwise enjoy under the laws of war. As the 1977 Protocol (I) to the Geneva Convention recognizes, unlawful combatants do not lose all humanitarian protections,[203] but they are not accorded "prisoner of war" status if captured, and they face lawful penal consequences by the foreign belligerent State for their unlawful participation in the conflict.[204]

One additional category recognized by the Hague regulations merits attention–spies. This class of participants to the conflict would include one who, "acting clandestinely or on false pretenses, . . . obtains or endeavors to obtain information in the zone of operations of a belligerent, with the intention of communicating it to the hostile party."[205] This does not include soldiers who have penetrated the hostile force's zone of operations for the purpose of obtaining information.[206] As applied to space warfare, this might mean that a combatant who enters an opposing spacecraft cannot be considered a spy as long as his vessel bears its prescribed distinctive markings, and the astronaut wears his military uniform. Because of potentially damaging, serious effects that spies can have on a belligerent, spies enjoy the least protection under

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[203] Article 75(1) of Protocol (I) specifies that

> persons who are in the power of a Party to the conflict and who do not benefit from more favorable treatment under the Conventions or under this Protocol [i.e. prisoners of war; refugees and stateless persons] shall be treated humanely in all circumstances and shall enjoy, as a minimum, the protection provided by this Article without any adverse distinction based upon race, color, sex, language, religion or belief, political or other opinion, national or social origin, wealth, birth or other status, or on any other similar criteria.

Protocol I, *supra* note 156, at art. 75(1).

[204] The category "unlawful combatants" does not include those combatants who use means and methods of armed conflict that are violative of the *jus in bello*. These offenders may be war criminals, and they may be prosecuted under international law or the domestic law of the opposing belligerent, but they are not what has traditionally been known as unlawful combatants. Further, contrary to the impression left by some in the television and print media following the abduction of three U.S. soldiers in Macedonia during Operation Allied Force, prisoners of war may be tried under certain conditions. However, as Article 99 of the third 1949 Geneva Convention specifies, this cannot be for any "act which is not forbidden by the law of the Detaining Power or by international law, in force at the time the said act was committed." Geneva Convention Relative to the Treatment of Prisoners of War, Aug. 12, 1949, 6 U.S.T. 3316 (entered into force Oct. 21, 1950) [hereinafter Geneva Convention III].

[205] Hague Convention (IV), *supra* note 154, at art. 29.

[206] *Id.* at 54.

international law and are the most vulnerable if captured. Spies are not deemed prisoners of war and, subject to various minimal due process protections, may be tried by hostile belligerents for espionage.[207] In the near future however, spying is unlikely to become a significant issue for space warfare unless current trends toward unmanned missions change course. For ground operations in support of space warfare however, the traditional norms governing spying will apply. Thus, the lawful disposition of a spy having infiltrated a satellite control center will be no different than that for a spy operating elsewhere.

2. Geneva Conventions of 1949 (I-IV) and Protocols of 1977 (I-II)

The 1949 Geneva Conventions serve primarily as protection for individuals suffering as a result of armed conflict. Those employing the term "humanitarian law" as the preferred reference for the law of war, often seem to have the Geneva Conventions principally in view. This follows from the simple observation that the 1949 Conventions highlight the international interest in ensuring that warfare respects the human person to the maximum possible extent.[208]

During World War II, following numerous violations of the laws of war,[209] the world expressed great doubt that the laws of war would ever truly protect either combatants or civilians.[210] This sense was expressed by Winston Churchill after the war: "The only direct measure of defence on a great scale was to possess the power to inflict simultaneously upon the enemy as much damage as he himself could inflict."[211] This is to say that the laws of war were no "defense" against the indiscriminate use of force. Thus, to the extent that Churchill spoke for the general temper of his time, compliance with the laws of war was simply viewed as incidental to the prosecution of the war. If an international rule were adhered to, it was not for respect of the "law," but because doing so afforded some military advantage.

Out of this pessimistic environment emerged the diplomatic conference in Geneva, charged with limiting the harsh effects of war. Primarily concerned

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[207] For a relatively recently formulation of the principle, *see* Protocol I, *supra* note 156, at art. 46.

[208] Of course, the rules embodied in Hague Law are equally humanitarian and equally concerned with protection of the person. However, because Geneva Law explicitly provides for the sick, wounded, shipwrecked, and prisoners it is more often thought of as the fullest expression of humanitarian law.

[209] Two examples include the saturation bombing of civilian populations centers, and certain indiscriminate naval bombardments. Roberts & Guelff, *supra* note 131, at 93.

[210] Hays Parks suggests that international lawyers of that era even doubted the *applicability* of the law of war to modern warfare, and particularly to aerial bombardment. Parks, *supra* note 123, at 50.

[211] *Id.* (quoting M. GILBERT, WINSTON S. CHURCHILL: THE PROPHET OF TRUTH, 1922-1939 573 (1976)).

as they are with amelioration of the suffering of war victims, the four Geneva Conventions are only tangentially related to regulating the means and methods of war. They represent, as has been said, "Geneva Law" related to victims, and not "Hague Law" related to means and methods of warfare. Nonetheless, several provisions do limit means and methods, specifically targeting options.

Article 19 of the Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field specifies that "Fixed establishments and mobile medical units of the Medical Service may in no circumstances be attacked, but shall at all times be respected and protected by the Parties to the conflict."[212] Under Article 22, this protection for medical facilities applies even if the unit's personnel are armed, the unit is protected by a fence or armed sentries, small arms and ammunition taken from the wounded and sick remain in the unit, the unit's services include veterinary care, or the unit extends care to civilian wounded or sick.[213] These provisions clearly remove medical facilities from the list of permissible targets that belligerents may lawfully destroy. The fact that the prohibition contemplates "no circumstances" under which such targets may be attacked, signifies the comprehensive nature of the protection and forbids attack from any combat environment, including space.

A similar provision can be found in Article 18 of the Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War: "Civilian hospitals organized to give care to the wounded and sick, the infirm and maternity cases, may in no circumstances be the object of attack, but shall at all times be respected and protected by the Parties to the conflict."[214] Though this provision would also apply to space attacks, using the same absolute ("no circumstances") language of convention (I), Article 18 goes a step further by requiring belligerents to clearly mark civilian hospitals so that they are "clearly visible to the enemy land, air, and naval forces in order to obviate the possibility of any hostile action."[215]

In addition to protection of medical facilities on the ground, Geneva Law protects medical ships under the Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members

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[212] Geneva Convention for the Amelioration of the Condition of Wounded and Sick in Armed Forces in the Field, Aug. 12, 1949, art. 19, 6 U.S.T. 3114 (entered into force Oct. 21, 1950) [hereinafter Geneva Convention I].

[213] *Id.* at art. 22. Because the convention by its title purports to protect "armed forces in the field," the inclusion of the last circumstance seems particularly odd. Not only are civilians non-combatants, they are non-belligerents. Positing that a protected facility does not lose its protection merely by virtue of the presence of a *wounded* civilian, seems to state the obvious.

[214] Geneva Convention Relative to the Protection of Civilian Persons in Time of War, Aug. 12, 1949, art. 18, 6 U.S.T. 3516 (entered into force Oct. 21, 1950) [hereinafter Geneva Convention IV].

[215] *Id.* The reference to "land, air, and naval forces" appears intended to highlight that the prohibition applies to all combat environments.

of Armed Forces at Sea. Thus, Article 22 provides that such ships, "built or equipped by the Powers specially and solely with a view to assisting the wounded, sick and shipwrecked, to treating them and to transporting them, may in no circumstances be attacked. . . ."[216] Article 23 clarifies that such protection extends to such support establishments ashore that may be protected under Convention (I),[217] and Article 28 protects the sick-bays aboard a warship, even where fighting occurs on board the ship.[218] These provisions further restrict the potential methods of space warfare as all protected facilities could in theory be attacked from space.[219]

Motivated by continuing international conflicts, and particularly the revitalized interest in the law of war following the Vietnam War, nongovernmental organizations began arguing for a diplomatic conference to update the law of war. This followed moves immediately after WWII by the International Committee of the Red Cross (ICRC) attempting to restrict aerial bombardment. This emphasis on the need to update the law of war continued through the 1950s and 1960s. Following two significant U.N.G.A. Resolutions,[220] a diplomatic conference was convened in 1974 to draft new protocols.

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[216] Geneva Convention for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea, Aug. 12, 1949, art. 22, 6 U.S.T. 3316, (entered into force Oct. 21, 1950) [hereinafter Geneva Convention II].

[217] *Id.* at art. 23.

[218] *Id.* at art. 28.

[219] Indeed, protected persons are also potentially subject to attacks from space. Thus, to the extent that the Geneva Conventions protect individuals from attack, they restrict space warfare. One example pertains to the prohibitions on taking reprisals against prisoners of war. *See* Geneva Convention III, *supra* note 204, at art. 13. Similarly, belligerents may not take reprisals against civilians. *See* Geneva Convention IV, *supra* note 214, at art. 33.

[220] These Resolutions not only further empowered the ICRC to justify the need for a diplomatic conference, but represented the early disposition of the majority of States to the conference on several subjects that would later become controversial. The first resolution, *Respect for Human Rights in Armed Conflicts*, invited the U.N. Secretary-General, in conjunction with the ICRC, to study steps for better application of existing humanitarian conventions and to study the need for additional conventions. *See Respect for Human Rights in Armed Conflicts*, Dec. 19, 1968, G.A. Res. 2444, U.N. GAOR, 23rd Sess., Supp. No. 18, at 50, U.N. Doc. A/7218 (1969). The General Assembly adopted the Resolution by a unanimous vote of 111 to none. More importantly, this Resolution affirmed three principles, stated in a prior ICRC Resolution

> (a) That the right of the parties to a conflict to adopt means of injuring the enemy is not unlimited; (b) That it is prohibited to launch attacks against the civilian population as such; (c) That distinction must be made at all times between persons taking part in the hostilities and members of the civilian population to the effect that the latter be spared as much as possible.

Id. As displayed by the vote, these principles were not controversial and indeed were taken as a restatement of customary international law. The larger issue raised by the Resolution was the

The first of the two Protocols adopted by the conference pertained to international armed conflicts and is, to the extent that any law of war treaties will be relevant, more important for regulation of means and methods of space warfare. Protocol II limits itself to the regulation of armed force in "non-international armed conflicts," relates to the protection of victims of "internal" or "civil" wars, and governs the protection of the victims of such conflicts.[221] Substantively, the provisions of Protocol II, which are significantly fewer and "far less restrictive"[222] than those of Protocol I, supplement the provisions of common Article 3 of the Geneva Conventions–the latter requiring that minimal protections be accorded the victims of armed conflicts "not of an international character."[223] Traditionally, the customary law of war applied to non-international conflicts only if the government of a country in which the insurrection occurred, or some third State, chose to recognize the legal status

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use of human rights language to describe what were historically law of war restrictions. Although the identification of human rights with humanitarian law has become increasingly prevalent in the scholarly literature following publication of documents such as Resolution 2444, it remains to be seen whether this is good for the law of war. While human rights law has traditionally been rooted in philosophy and politics, the law of war is rooted in military exigency. As a consensus grows for centralized punishment of violations within both bodies of law, as envisaged by the International Criminal Court, one sincerely hopes that the unseemly politicization often characterizing State rhetoric regarding human rights concerns does not infect the quest for a robust, enforced law of war. If the latter succumbs to petty world politics, it may be largely due to the blurring of the humanitarian law of war, aimed at the focused restricting of suffering during armed conflict, with human rights law, aimed at far broader issues and concerns.

Following Resolution 2444 by two years, the U.N.G.A. adopted Resolution 2675 by a vote of 109 votes to none, with 18 States abstaining or absent. *Basic Principles for the Protection of Civilian Populations in Armed Conflicts*, Dec. 9, 1970, G.A. Res. 2675, U.N. GAOR, 25th Sess., Supp. No. 28, at 76, U.N. Doc. A/8028 (1971) [hereinafter Resolution 2675]. In two cases, the eight provisions of Resolution 2675 restated the substance of provisions already stated in Resolution 2444. Otherwise, Resolution 2675 exhorted States to respect civilian populations and property by exempting them from attack, and reemphasizes the human rights rationale for such protections. In some cases the provisions restated concepts existing in the Geneva Conventions, and in all cases, the Resolution "restates rules of international law." Schindler & Toman, *supra* note 179, at 267. Interestingly, regarding civilian property, the Resolution states that "[d]wellings and other installations that are used only by civilian populations should not be the object of military operations." Resolution 2675, U.N. GAOR, 25th Sess., Supp. No. 28, at 77. Implicitly, this affirms that unless such property is used exclusively by civilians ("only by"), it may be subject to attack if not otherwise protected on some other ground.

[221] Protocol Additional to the Geneva Conventions of Aug. 12, 1949, and Relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II), Dec. 12, 1977, art. 48, 1125 U.N.T.S. 609 (entered into force Dec. 7, 1978) [hereinafter Protocol II].

[222] Roberts & Guelff, *supra* note 131, at 448.

[223] Geneva Convention I, *supra* note 212, at art. 3; Geneva Convention II, *supra* note 216, at art. 3; Geneva Convention III, *supra* note 204, at art. 3; Geneva Convention IV, *supra* note 214, at art. 3.

of the insurgent group.[224] Because Protocol II, Article 1(2), excludes application of its terms for "situations of internal disturbances and tensions, such as riots, isolated and sporadic acts of violence and other acts of a similar nature. . ."[225] and such exclusions in the Geneva Conventions have been the basis for governments routinely denying the application of common Article 3,[226] it is doubtful that Protocol II will have much impact on the amelioration of human suffering caused by non-international armed conflicts.

Potentially more important for the regulation of means and method of space warfare are the provisions of Protocol I. Though formally a protocol to the Geneva Conventions, Protocol I includes regulation of military activity previously governed by "Hague Law." Despite the innovations worked by Protocol I's positions on insurgents and reprisals,[227] the United States found its

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[224] Robert & Guelff, *supra* note 131, at 447.
[225] Protocol II, *supra* note 221, at art. 1(2).
[226] Robert & Guelff, *supra* note 131, at 448.
[227] Protocol I, *supra* note 156, at art. 1(4). Addressing the "General Principles and Scope of Application" of the entire Protocol, Article 1(4) proclaims that

> [t]he situations referred to in the preceding paragraph include armed conflicts in which peoples are fighting against colonial domination and alien occupation and against racist regimes in the exercise of their right of self-determination, as enshrined in the Charter of the United Nations and the [United Nations General Assembly] *Declaration on Principles of International Law concerning Friendly Relations and Co-operation among States in accordance with the Charter of the United Nations.*

Id. This means that insurgents opposing "colonial domination and alien occupation and . . . racist regimes in the exercise of their *right* of self-determination" were to be accorded the full protections of the *jus in bello*, including limits on the state's means and methods of subduing the insurgents militarily. *Id.* (emphasis added) This provision alone proved too difficult politically for some States to accept. (States *not* having ratified the Protocol as of 1999 include: Afghanistan, Andorra, Azerbaijan, Bhutan, Fiji, France, Haiti, India, Indonesia, Iran, Iraq, Ireland, Israel, Japan, Kiribati, Lithuania, Malaysia, Monaco, Morocco, Myanmar, Nepal, Nicaragua, Pakistan, Papua New Guinea, Philippines, Singapore, Somalia, Sri Lanka, Sudan, Thailand, Tonga, Trinidad and Tobago, Turkey, Tuvalu, and the U.S.)

Another provision difficult to accept for some States, including the U.S., related to the concept of reprisals. Articles 51(6), 52(1), and 54(4), prohibit reprisals under any circumstances against the civilian population, against civilian objects, and against objects indispensable to the survival of the civilian population, respectively. *Id.* at art. 51(6), 52(1), 54(4). Parks claims that the first two provisions were not a codification of customary law, but a reversal of it. *See* Parks, *supra* note 123, at 94. He further states that flawed legal analysis of the doctrine of reprisals often results from confusion of the concept with others such as retaliation, revenge, or legitimate acts of self-defense. *Id.* Customarily, civilian individuals and property could be threatened and attacked as a lesser evil in order to avoid a greater evil, and to promote respect for the law of war. Though reprisals are politically sensitive because they entail commission of an otherwise illegal act in order to suppress other illegal acts, they have proven effective historically in deterring violations of the *jus in bello*. *Id.* at 95. Parks cites as an example the threat by President Franklin Roosevelt to use chemical weapons as sufficient warning to deter German use of such weapons. *Id.*

greatest difficulty with the general thrust of provisions relating directly the conduct of military operations–Articles 48 to 58.[228] Those articles define, among other things, the basic rule of distinction,[229] the meaning of "attack,"[230] the meaning of "civilians" and "civilian population,"[231] the rule protecting civilian populations,[232] the rule protecting civilian objects,[233] the rule protecting cultural objects and places of worship,[234] the rule protecting objects indispensable to the survival of the civilian population,[235] the rule protecting the natural environment,[236] the rule protecting works and installations containing dangerous forces,[237] the rule establishing necessary precautions to be taken in the event of attack,[238] and the rule establishing precautions to be taken against the effects of attack.[239] As may now be obvious, all of these provisions affect the conduct of space warfare insofar as each limits potential targets and restricts options otherwise available to military space forces.

Perhaps the biggest concern raised by these provisions was the attempt to return warfare to restricted means and methods of warfare "that [have] not been seen in this century."[240] Specifically, the cumulative effect of these provisions worked to "shift the responsibility for the protection of the civilian population away from the host nation (which has custody over its civilian population, and which traditionally has borne the principal responsibility for the safety of the civilian population) almost exclusively onto the attacker."[241]

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[228] Parks, *supra* note 123, at 112.
[229] Protocol I, *supra* note 156, at art. 48.
[230] *Id.* at art. 49.
[231] *Id.* at art. 50.
[232] *Id.* at art. 51.
[233] *Id.* at art. 52.
[234] *Id.* at art. 53.
[235] *Id.* at art. 54.
[236] *Id.* at art. 55.
[237] *Id.* at art. 56.
[238] *Id.* at art. 57.
[239] *Id.* at art. 58.
[240] Parks, *supra* note 123, at 112.
[241] *Id.* Just as significant an issue as is the burden shifting, is the legal effect of violations by the defender vis-à-vis the attacker. A common view of Protocol I, Article 58, which requires that "the parties" (including both attacker and defender) take precautions against the effects of attacks "to the maximum extent feasible," is that violation by the defender in its obligations toward its own civilians does not absolve the attacker of its obligations when considering attacks that put such civilians at risk. Protocol I, *supra* note 156, at art. 58. This appears to conflict with the position taken by the U.S. Air Force law of war manual: "[a] party to a conflict which places its own citizens in positions of danger by failing to carry out the separation of military activities from civilian activities necessarily accepts, under international law, the results of otherwise lawful attacks upon the valid military objectives in their territory." AFP 110-31, *supra* note 146, at ¶ 5-4b. For an interesting resolution of this apparent conflict, see Schmitt, *Book Review*, *supra* note 141, at 267. Key to the resolution is the clause "otherwise lawful attacks." Ultimately, the best view conceives violations by the defender to take precautions as "merely a factor in mitigation should the attacker violate its own." *Id.* It

Two problems with this attempt at burden-shifting arise. The first concerns the threat to State sovereignty in cases amounting to self-defense. As the statement of France indicated in the ICRC commentary to Article 48, had there been a separate vote on Article 48, "France would have abstained inasmuch as it considered the article to have 'direct implications as regards a State's organization and conduct of defense against an invader."[242]

A second concern raised by the formulations of Protocol I is its apparent failure to acknowledge that attacks are often taken as a reply to previous aggression.[243] In this regard, Allied strategic air operations over Nazi Germany and the multinational march into North Korea in 1950 would have been rendered militarily impotent had the restrictions of Protocol I applied. The conduct of military operations against Iraq during the 1991 Gulf War provides an additional example.

For these and other reasons as well, the Protocol attempts to restrict means and methods of warfare, including aerial warfare, to an extent not acceptable to a number of nations, without whose support the law of war can not properly function.[244] Given the denunciations by France and the United States, the Protocol did not serve to limit warfare in either the 1991 Gulf War, or the 1999 NATO air war against Yugoslavia, except to the extent it was viewed as declaratory, in part, of customary law. Given the strongly-held conviction of these two major airpower States, it is difficult to see Protocol I serving as a meaningful formal limitation on aerial warfare, and thus space warfare, for the foreseeable future. It will however, continue to raise political issues for the U.S. as it engages in coalition warfare with allies having ratified the Protocol.

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should also be noted that although AFP 110-31 presents a view from the United States Air Force, the document's preamble specifies that it "does not promulgate official U.S. Government policy."

[242] Parks, *supra* note 123, at 112 n.351. Parks notes further that the French position was not isolated, but representative. *Id.*

[243] *Id.*

[244] For additional perspectives, see G.H. Aldrich, *Prospects for United States Ratification of Additional Protocol I to the 1949 Geneva Convention*, 85 AM. J. INT'L L. 1 (1991); Burrus M. Carnahan, *Protecting Civilians Under the Draft Geneva Protocol: A Preliminary Inquiry*, 18 A.F. L. REV. 32 (Winter 1976).

3. *Additional Conventions Adopted Since 1972 Affecting the Jus in Bello*

Since the close of the diplomatic conference which adopted the Protocols to the Geneva Conventions, additional conferences have adopted six principal treaties (in some cases designated protocols to other treaties) affecting the *jus in bello*. These include, in chronological order, treaties on Biological Weapons,[245] Environmental Modification,[246] Conventional Weapons,[247] Chemical Weapons,[248] Blinding Lasers,[249] and Anti-Personnel Mines.[250] Of these, the most likely to effect potential means and methods of space warfare is the Environmental Modification Treaty.

This Treaty does not restrict the use of environmental modification techniques for "peaceful purposes,"[251] but does proscribe the "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."[252] The Treaty is of particular importance to space warfare in that "environmental modification techniques" are defined to include "any technique for changing – through the deliberate manipulation of natural processes – the dynamics, composition or structure of the earth, including its biota, lithosphere, hydrosphere and atmosphere, *or of outer space*."[253]

The Treaty's provisions make clear that its purpose is not so much environmental protection, as a restriction against States making or attempting changes to environmental processes as an instrument of warfare. The means of

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[245] Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Apr. 10, 1972, 26 U.S.T. 583 (entered into force 26 March 1975).

[246] Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, May 18, 1977, 31 U.S.T. 333 (entered into force 5 October 1978) [hereinafter Environmental Modification Treaty].

[247] Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, Oct. 10, 1980, 1342 U.N.T.S. 7 (entered into force Dec. 2, 1983) [hereinafter Conventional Weapons Treaty]. The treaty contained protocols on (1) fragments not detectable by X-rays; (2) mines, booby traps, and other devices; and (3) incendiary weapons. All three protocols went into force with the treaty in 1983. A fourth Protocol on Blinding Laser Weapons went into force on July 30, 1998. *See* Protocol on Blinding Lasers, *supra* note 172.

[248] Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, Jan. 13, 1993, S. TREATY DOC. NO. 21, 103d Cong. (1993), *reprinted in* 32 I.L.M. 800 (1993) (entered into force Apr. 29, 1997).

[249] Protocol on Blinding Lasers, *supra* note 172.

[250] Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction, Sept. 18, 1997, 36 I.L.M. 1507 (1997) (entered into force Mar. 1, 1999).

[251] Environmental Modification Treaty, *supra* note 246, at art. III(1).

[252] *Id.* at art. I(1).

[253] *Id.* at art. II (emphasis added).

warfare prohibited by the Treaty need not adversely affect the environment itself because the prohibitions of Article I apply only to the use of the environment as a weapon.[254] Further, though not incorporated into the convention itself, the Parties attached a series of "Understandings" to the Treaty, which, as part of the negotiating record, clarify terms used in the text. The "Understanding Relating to Article II" includes a non-exhaustive list of illustrative phenomena that could be caused by environmental modification techniques. In addition to earthquakes, tsunamis, changes in weather patterns, climate patterns, and ocean currents, these include *changes in the state of the ozone layer and changes in the state of the ionosphere.*[255] Although all of these effects could be attempted from space, the latter two seem the most likely possibilities. However, the restrictions established by this Treaty do not seem applicable to any major weapons programs publicly reported to be now in development. So long as space weapons do not change the outer space environment "through the deliberate manipulation of natural processes," the treaty is not likely to serve as a bar to the deployment or use of space weapons.[256]

In addition to the Environmental Modification Treaty, the four protocols to the Conventional Weapons Treaty limit the combat use of non-detectable fragments; mines, booby-traps, and other devices; incendiary weapons; and anti-optic lasers. The restriction on "mines, booby-traps, and other devices" will not apply to space warfare as its terms apply only to those devices "on land."[257] Though of possible significance, the protocol restricting use of incendiary devices seems unlikely to affect the development of means and methods of space warfare unless States Parties develop such weapons to be delivered from space. The protocol limiting use of blinding lasers will possibly become relevant as the U.S. could employ such devices in space.[258] There is increasing interest in the use of lasers in combat, even those which

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[254] Schmitt, *Green War*, *supra* note 143, at 82.

[255] *Report of the Conference of the Committee on Disarmament*, U.N. GAOR, 31st Sess., Supp. No. 27, at 91, 92, U.N. Doc. A/31/27 (1976).

[256] Given its narrow scope, the Treaty "affects only a very narrow band of possible operations." Schmitt, *Green War*, *supra* note 143, at 85.

[257] Protocol II (as amended), Environmental Modification Treaty, *supra* note 246, at art. 1, 35 I.L.M. 1206 (1996) (amended May 3, 1996) (entered into force Dec. 3, 1998).

[258] A recent controversy raises the question whether such weapons have ever been used against U.S. military personnel. An Apr. 4, 1997 incident suggested the possible Russian use of such a weapon against a Naval aviator. The aviator reported severe eye pain and headaches after seeing a distinct dot of red light emanating from the Russian ship *Kapitan Man* in U.S. waters. Despite Russian denials, and a subsequent search of the ship by U.S. authorities which discovered no laser, suspicions have continued given the several day delay in executing the search and medical reports showing the aviator's injury consistent with a laser attack. Associated Press, *Navy Officer Blames Russian Laser*, N.Y. TIMES, Feb. 11, 1999, at 1; B. Gertz, *Clinton Won't Back Navy Officer After Laser Attack*, WASH. TIMES, May 17, 1999, at 1.

may cause incidental eye injury.[259] However, rather than applying these four rather specific provisions to space warfare, the more likely course will entail development of further protocols to this Convention effecting specific limits on conventional space weaponry.

4. Jus Ad Bellum Under the United Nations Charter

The Charter of the United Nations governs the very legitimacy of States' use of force in the first place. As such, it is not formally part of the law of war but rather forms part of the *jus ad bellum*. Nonetheless, because the Charter governs the lawful use of force, its provisions are necessarily related to considerations of how that force is used under the *jus in bello*.[260]

The Charter is "two-faced," serving both as the constitutional document for the United Nations organization itself, as well as providing substantive principles of international law.[261] The substantive provisions are intended to advance the goals articulated in the Preamble of the Charter, including among others, the creation of conditions for the maintenance of international peace and security.[262] This objective rests on the proscription of the aggressive use of force, which finds expression in two portions of the Charter, paragraph 2(4)

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[259] Interestingly, the Protocol on Blinding Lasers implicitly recognizes that lasers are not prohibited as a weapon system so long as they are not "specifically designed" to cause blindness. Protocol on Blinding Lasers, *supra* note 172, at art. 1. Article 2 states: "In the employment of laser systems, the High Contracting Parties shall take all feasible precautions to avoid the incidence of permanent blindness to unenhanced vision. Such precautions shall include training of their armed forces and other practical measures." *Id.* at art. 2. This restriction presupposes that laser systems might in fact be used ("in the employment"), and that they might be used by military forces whose use will necessitate training for proper use so as to avoid functioning as a blinding weapon. Among others, the U.S. military is studying the use of an "Anti-Personnel Beam Weapon" that would likely cause slight skin or eye irritation by carrying an electrical charge through a lazed stream of ionized air. D. Mulholland, *Laser Device May Provide U.S. Military NonLethal Option*, DEFENSE NEWS, June 14, 1999, at 6.

[260] But note that the law of war applies whether a use of force is lawful or not. *See supra* note 140, and accompanying text.

[261] A third function of the Charter is to provide the constitutive features of the International Court of Justice, established under Article 92 of the Charter, by means of the Statute of the International Court of Justice appended to the Charter and consisting of seventy separate articles. STAT. OF THE INT'L CT. OF J., June 26, 1945, 59 Stat. 1031 (entered into force Oct. 24, 1945) [hereinafter STAT. OF THE ICJ].

[262] U.N. CHARTER (entered into force Oct. 24, 1945) [hereinafter U.N. CHARTER]. Article 1, paragraph 1, states the first purpose of the United Nations: "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 . . ." The Charter states this principle against the backdrop of its preamble which decries the "untold sorrow" of the world wars of the twentieth century and calls war a "scourge." *Id.*

and Chapter 7.[263] In this respect, the principal contribution of the U.N. Charter to the use of military force is its authoritative articulation of the *jus ad bellum*.[264]

The oft-cited provision of paragraph 2(4) enunciates the well-established international legal principle[265] prohibiting the use of force: "All Members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the Purposes of the United Nations."[266] Balancing this general proscription is the exception for "self-defense" found in Article 51: "Nothing in the present Charter shall impair the inherent right of individual or collective self-defense if an armed attack occurs against a Member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security. . . ."[267] Article 51 goes on to require member States to notify the Security Council of any actions taken pursuant to this right of self-defense.

Of the many legal issues these two provisions raise, two of the most obvious affect the use of force in outer space. First, what is the meaning of "threat or use of force" in relation to outer space as contained in Article 2(4)? And second, what is the meaning of "if an armed attack occurs" in Article 51? These issues have been widely discussed in the scholarly literature and will be only briefly addressed here.

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[263] Chapter 7, containing articles 39 through 51, applies to "Action with Respect to Threats to the Peace, Breaches of the Peace, and Acts of Aggression."

[264] While a thorough exposition of the *jus ad bellum* is beyond the scope of this article, some understanding of the field, and of its principal source, could work to eliminate confusion in legal analysis. For example, one might misidentify an issue as requiring analysis under the *jus in bello* which actually requires analysis under the *jus ad bellum*. Such confusion could lead to errant legal conclusions under the law of war.

[265] Malanczuk goes even further: "The prevailing view is that the Charter has enacted a comprehensive rule on the prohibition of the use of force, which has become recognized as *jus cogens* . . ." MALANCZUK, INTRODUCTION TO INTERNATIONAL LAW, *supra* note 130, at 311. The International Law Commission agrees: "the law of the Charter concerning the prohibition of the use of force in itself constitutes a conspicuous example of a rule in international law having the character of *ius cogens*." HARRIS, *supra* note 173, at 835 (quoting International Law Commission, *Commentary on the Vienna Convention on the Law of Treaties*, 1966 Y.B. INT'L L. COMMISSION 247-48). This is the view of the United States as well, as quoted from its pleadings at the International Court of Justice in the *Nicaragua* case. Military and Paramilitary Activities (Nicar. v. U.S.), 1986 I.C.J. 4. Taken from Article 53 of the 1969 Vienna Convention on the Law of Treaties, the concept of *jus cogens* constitutes "peremptory norm[s] of general international law," which become the most basic ordering concepts in international law. They are principles from which no treaty may derogate. Vienna Convention on the Law of Treaties, May 23, 1969, art. 53, 1155 U.N.T.S. 331 (entered into force Jan. 27, 1980) [hereinafter Vienna Convention]. In this way, *jus cogens* is the international legal norm that norms all other norms. Examples that are widely acknowledged by scholars include the rules against genocide and slavery.

[266] U.N. CHARTER, *supra* note 262, at art. 2(4).

[267] *Id.* at art. 51.

Under Article 2(4), States may neither *use* force in the course of their international relations, nor *threaten* it. Though widely ignored in State practice, the Charter makes no distinction between the illegality of using force and of threatening it. Ordinarily, the use of force follows a threat of it. In such cases, the use of force gets all the legal analysis, and the threat, if noticed at all, does not attract separate consideration as an independent violation.[268] In cases where the use of force does not accompany a threat, the threat is not generally considered sufficient reason to take action. Indeed, not only has the mere threat of force seldom led a State to protest the matter under Article 2(4), but "state practice reveals a relatively high degree of tolerance towards mere threats of force."[269] Nonetheless, the Charter's proscription remains. Given the fact that space warfare will require new application of existing legal regimes, if not new regimes altogether, new means and methods of using force will also give rise to new means of making threats, including those from space.

Significantly, the Charter's focus on force rather than war reflects a contemplated decision to outlaw all manner of armed conflict. Force is a broader category than war. Thus the Charter prohibits all cases of armed force whether or not the parties recognize a formal state of war between them. How States make this formal recognition also varies from situation to situation and can be difficult to ascertain. It ultimately depends upon either the issuance of a declaration or ultimatum, or the occurrence of an "act of war." And yet even what might constitute an act of war does not always initiate war. As professor Green puts it, "whether the armed conflict amounts to a war in the international legal sense of the term depends upon the reactions of the victim of the attack and also, to some extent, upon the attitude of non-parties to the conflict."[270]

Even more difficult historically than defining a state of war, has been the attempt to determine what "force" the Charter prohibits given the many sources of pressure nations may use in their relations with each other. It is now widely agreed that such force does not include political or economic force, as well as most forms of non-military physical force.[271] Included in the prohibition however, not only are cases of direct military force but indirect force as well. Thus, the use of irregular forces, mercenaries, or the arming or

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[268] Several reasons may account for this. Chiefly, the negative effects of a threat are thought to pale in comparison to the effects of actual force. And, as Sadurska notes, there may actually be occasions in which the threat of force "far from precipitating fighting, may be an effective mechanism for dissuading international actors from using violence." R. Sadurska, *Threats of Force*, 82 AM. J. INT'L L. 239, 247 (1988). In this way, the threat may actually work as a substitute for the use of force.

[269] A. Randelzhofer, *Article 2(4)*, *in* THE CHARTER OF THE UNITED NATIONS: A COMMENTARY 118 (B. Simma, et al., eds., 1994) [hereinafter Randelzhofer].

[270] GREEN, *supra* note 152, at 70.

[271] Randelzhofer, *supra* note 269, at 112, 113. The author points out that while these forms of coercion may not constitute "force" under Article 2(4), their use may violate the general principle of non-intervention.

training of indigenous rebel forces against their own government would constitute cases of indirect aggression prohibited by the Charter.[272] Regarding the latter however, the International Court of Justice clarified in the *Nicaragua v. United States* judgment that not all forms of aid violate the rule of Article 2(4), noting for example that the supply of funds to a rebel force does not constitute "force."[273] The potential implications of this distinction for space support are far reaching as it will allow spacefaring States to argue that the provision of *information* to insurgents, a principal benefit of space assets,[274] is more akin to the provision of money than of arms.

Perhaps the biggest question with respect to the self-defense principle embodied in Article 51 relates to the meaning of the phrase "if an armed attack occurs." This seems to preclude the right to defend with arms, until an actual armed attack has triggered the right. Thus, the phrase appears to rule out "anticipatory" self-defense.[275] As with the application of Article 2(4), nothing in Article 51 restricts the inherent right of self-defense,[276] to the use of force within earth's atmosphere. Although the delegates to the diplomatic conference adopting the Charter in 1945 did not likely have in mind the application of force from outer space, we have subsequently learned that its rudimentary possibility was then under review by the United States and Soviet Union. Nonetheless, as with the application of numerous international instruments to new situations and technological realities, there is no reason to exclude the terms of Articles 2(4) and 51 from application in outer space. As discussed in the next chapter, the most significant treaty on outer space specifically references the U.N. Charter.

One consequence of the right of self-defense is that the law does not absolutely prohibit war; defensive wars that are undertaken pursuant to Article 51 are not illegal.[277] However, recognizing the abstract rule is relatively

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[272] *Id.* at 113, 114.

[273] Military and Paramilitary Activities (Nicar. v. U.S.), 1986 I.C.J. 4, 119.

[274] *See* discussion of information warfare, *infra* Part VI, § D.

[275] Such forms of self-defense occur when a State uses armed force to repel an "imminent" attack before it actually occurs.

[276] In its lengthy review of customary international law related to the use of force in the *Nicaragua* case, the International Court of Justice stated that the right of self-defense referenced in the Charter at Article 51, as an "inherent right," is firmly rooted in customary international law. This explicit provision in the Charter therefore provides parallel authority for the assertion of the right.

[277] In addition to wars of a defensive character, the U.N. Charter also authorizes armed force pursuant to authority by the Security Council. "Should the Security Council consider that measures provided for in Article 41 would be inadequate or have proved inadequate, it may take such action by air, sea or land forces as may be necessary to maintain or restore international peace and security." U.N. CHARTER, *supra* note 262, at art. 42. Presumably, the enumeration of "air, sea or land forces" is meant to suggest that the Security Council may use *any* form of force it deems necessary, these three being the exhaustive means then in existence in 1945. On this interpretation, the list is not exclusive, but indicative of the scope of Security

simple, applying it to a specific conflict is not. Nonetheless, international law must assess the relative legal positions of competing belligerents in order to sort out what relations exists between the parties to the conflict, and to third party States. For example, although parties to a conflict increasingly ignore the distinction between "war" and other forms of armed conflict,[278] the law does recognize that a formal state of war[279] will entail certain consequences that mere armed conflict will not.[280]

Council authority. Though not specifically mentioned, the use of space forces would be a legitimate exercise of authority as well.

[278] In addition to the fact that Article 2(4) applies to conflicts not formally constituting wars, Professor Harris points out an additional reason for this–the terms of the 1949 Geneva Conventions and the 1977 Protocols apply to "all cases of declared war or of any other armed conflict." Harris, *supra* note 173, at 860 n.3.

[279] The laws of war have evolved with State practice regarding initiation of hostilities. De Mulinen points out that historically an armed conflict commenced with a previous warning either in the form of a declaration of war or an ultimatum containing a conditional state of war. *See* DE MULINEN, *supra* note 145, at 30. Subsequently, as such declarations and warnings fell out of use, the laws of war continued to apply to conflicts short of war. Thus, the common Article 2 to each of the four Geneva Conventions of 1949 applies the provisions of each convention to "all cases of declared war or of any other armed conflict which may arise between two or more of the High Contracting Parties. . . ." Geneva Convention I, *supra* note 212, at art. 2; Geneva Convention II, *supra* note 216, at art. 2; Geneva Convention III, *supra* note 204, at art. 2; Geneva Convention IV, *supra* note 214, at art. 2. The Conventions do not specify what constitutes an armed conflict, thus De Mulinen appears correct in asserting that "no minimum of intensity of violence or fighting, no minimum of military organization and no minimum of control of territory is required." DE MULINEN, *supra* note 145, at 31. Any armed violence between the representatives of one State and those of another will trigger application of the laws of war, whether the conflict amounts to "war" or not.

[280] Of the legal effects created by a formal state of war, perhaps the most interesting for purposes of the law of war is the termination of certain categories of treaties between the belligerent States. *See* J. Delbrück, *War, Effect on Treaties*, *in* 4 ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 310 (Bernhardt, ed., 1982). Delbrück notes that the effect of war on treaty obligation is nowhere specifically enumerated. The older consensus was that war terminated all treaty relations and obligations as between the belligerents. The newer approach in international law takes a more flexible approach, preferring to preserve international order and to see war as simply suspending the execution of certain treaties. Thus Justice Benjamin Cardozo, writing as a judge on the Court of Appeals of New York anticipated the current trend, "international law today does not [in cases of war] preserve treaties or annul them regardless of the effects produced. It deals with such problems pragmatically, preserving or annulling as the necessities of war exact. It establishes standards, but it does not fetter itself with rules." *Id.* (quoting from *Techt* v. *Hughes*, 229 N.Y. 222, 241 (1920)). Delbrück continues, "[w]ar may now be illegal, but it has not thereby become a phenomenon outside the realm of law." *Id.* at 311. In this way, the law prefers to give effect to treaties to the maximum extent possible. Those treaties that must be suspended during war include multilateral treaties with which the belligerents are unable to comply due to the impact of the war. Those that will be terminated include political treaties that depend for their existence and proper functioning on normal political and social relations between the belligerents – relations that are terminated by war. Significantly, though the Vienna Convention on the Law of Treaties provides that the severance of diplomatic relations between the parties to a treaty does not normally affect the

IV. Space Warfare Under the *Corpus Juris Spatialis*

> Even in the vast expanse of space it can be expected, further, that the host of participants who will in the future seek to enjoy the many different potential uses of this great resource will in countless ways, whether deliberately or inadvertently, interfere with each other.[281]
>
> M.S. McDougal, H.D. Laswell & I.A. Vlasic (1963)

With the exception of environmental protection, no major category of international law is of more recent origin than that devoted to outer space.[282] Given its recent origin, and the fact that it is predominantly driven by technological advances in the exploration and use of space, space law is a discipline in transition–additional norms continue to emerge as space technology advances. 'Space law' is defined as that comprising "all international and national legal rules and principles which govern the exploration and use of outer space by States, international organizations, private persons and companies."[283] Significantly, this broad definition reflects the rise of national legislation governing outer space activity, as well as of non-State actors in the increasingly commercialized and privatized space industry.

Despite its relative recency, literally "[t]housands of articles, studies, and books have been published on the subject of space law."[284] Indeed, several of these appeared before 1957, the year human activity within outer space

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legal relations between them as established by the treaty, the Convention does not specify how war effects the operation of treaties. Vienna Convention, *supra* note 265, at art. 63.

[281] MCDOUGAL, ET AL., *supra* note 40, at 514.

[282] Space law is "a newcomer to the family of legal disciplines." I UNITED STATES SPACE LAW: NATIONAL & INTERNATIONAL REGULATION 17, Release 98-2 (1998). That space law rightfully takes its place as a major branch of international law is now beyond question. Jennings notes seventeen categories of international law: (1) the position of States in international law, (2) the law relating to international peace and security, (3) the law relating to economic development, (4) State responsibility, (5) succession of States and governments, (6) diplomatic and consular law, (7) the law of treaties, (8) unilateral acts, (9) the law relating to international watercourses, (10) the law of the sea, (11) the law of the air, (12) the law of outer space, (13) the law relating to the environment, (14) the law relating to international organizations, (15) international law relating to individuals (including nationality, extradition, right of asylum and human rights), (16) the law relating to armed conflicts, and (17) international criminal law. *See* R.Y. Jennings, *International Law, in* 11 ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 278 (Bernhardt, ed., 1982).

[283] P. Malanczuk, *Space Law as a Branch of International Law*, 1994 NETH. Y.B. INT'L L. 143, 147 (1995) [hereinafter Malanczuk, *Space Law*].

[284] V. Kopal, *Evolution of the Doctrine of Space Law, in* SPACE LAW: DEVELOPMENT AND SCOPE 17 (N. Jasentuliyana, ed., 1992).

began.[285] Thus, while it is a recent phenomenon, space law today is a firmly established discipline resting essentially on five multilateral treaties. As used here, these five treaties comprise the "*corpus juris spatialis*" while "space law" includes prescriptive norms from other treaties as well, including those discussed in Chapter Five. Before analyzing the textual bases of space law it is important to note its several distinctive features. These are important to the application of existing space law to armed conflict in space.

One notable feature in the continuing development of international space law is its use, by analogy, of norms drawn from other branches of international law. Because this feature of space law is explained more fully below, only a brief reference to it will be made here.[286] The progressive development of space law has not emerged in a legal vacuum. "[T]here is, in certain respects, a catena of notions which justifies a comparison between the concepts applicable to outer space with those of other environments."[287] Specifically, in establishing an early framework for space activities, "lawmakers were able to borrow from existing principles of international law, including analogies from international maritime law, the Antarctic Treaty, and the Partial Test Ban Treaty."[288] From use of these analogies space law is able to draw specific conclusions. For example, one commentator cites the legal propriety of spying from space as having emerged by reference to the law of the sea. "[S]ince outer space is beyond State sovereignty, as are the high seas, and as espionage from (or over) the latter is generally accepted as being a legal activity, it has been concluded that espionage from outer space is also legal."[289] Others have accurately speculated on this basis that military spacecraft will be allowed to enter the territory of other States only upon special authorization, just as is the case with military aircraft.[290] As it has for over forty years, the principle of analogy will continue to play an important role in the evolution of space law.

Another important feature of space law derives from the permissive nature of public international law in general.[291] A specific example illustrates the point. Because space law prohibits only the stationing of weapons of mass destruction in orbit around the earth, States may orbit weapons of lesser

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[285] Although the U.S. had placed a man-made object in outer space prior to this, 1957 is considered the watershed year in which the "Space Age" is most often said to have begun. On October 4 of that year, the Soviet Union launched Sputnik I, the world's first man-made satellite. *See* HEPPENHEIMER, *supra* note 15, at 122.

[286] *See infra*, Part VI, § A.1.

[287] MATTE, SPACE ACTIVITIES, *supra* note 13, at 175, 176.

[288] N. Jasentuliyana, *The Lawmaking Process in the United Nations*, in SPACE LAW: DEVELOPMENT AND SCOPE 41 (N. Jasentuliyana, ed., 1992).

[289] B.M. HURWITZ, THE LEGALITY OF SPACE MILITARIZATION 29, 30 (1986) [hereinafter HURWITZ].

[290] *See* MCDOUGAL, ET AL., *supra* note 40, at 729.

[291] *See supra* note 141.

destructive capability for the simple reason that no specific prohibition exists.[292] In addition, States are free to make full use of military reconnaissance satellites given the absence of international prohibitions on such activity.

A third feature of international space law also flows from the general nature of public international law as well. International space law regulates the conduct of *States*. As distinguished from "Astrolaw,"[293] space law is limited to "the regulation of those activities by States in outer space which are, by nature, essentially international."[294] This remains true despite the rise of both public and private efforts at commercialization of space. While international agreements will increasingly recognize the presence of private interests in space, the dominant actors, with respect to international legal rights and obligations, will continue to be States.[295]

A. Customary Law

To the extent customary law exists for space law at all, it binds all States whether their consent be express or implied by silence in the face of emerging legal norms.[296] Yet what little customary law for space there is has

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[292] Of course, prohibitions could come from a variety of sources other than space treaties. Customary international law could also supply the requisite prohibition on State action. In the case cited however, as will be argued further below, no such prohibitions exist.

[293] As one source puts it, "Astrolaw contemplates the practice of law *in* outer space. . . . The direct subjects of Space Law are sovereign nations; the direct subjects of Astrolaw are natural and legal persons in space. . . . Astrolaw focuses not upon space as a legal regime, but upon space as a place." G.S. ROBINSON & H.M. WHITE, JR., ENVOYS OF MANKIND: A DECLARATION OF FIRST PRINCIPLES FOR THE GOVERNANCE OF SPACE SOCIETIES 147 (1986) [hereinafter ROBINSON & WHITE]. Others refer to Astrolaw as a necessary supplement to the space law treaty system, and as a "common law of outer space." D. O'Donnell & N.C. Goldman, *Astro Law as Lex Communis Spatialis*, *in* PROCEEDINGS OF THE FORTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE 322 (1998).

[294] C.J. Cheng, *New Sources of International Space Law*, *in* THE USE OF AIR AND OUTER SPACE COOPERATION AND COMPETITION 209 (C.J. Cheng, ed., 1998). Cheng further notes that although different titles for this body of law such as "Aerospace Law," "International Law of Outer Space," "International Space Law," "Space Law," and "The Law of Outer Space," "provide notional concepts about the scope of international space law . . . [i]n its inception, this new branch of law was defined as a corpus of rules which govern the space activity of *States*." *Id.* at 208 n.1, 209 (emphasis added).

[295] Though this is true generally as a basic tenet of international law, it is especially true of space law which makes States internationally responsible for all national activity, whether public or private. *See infra* note 324 and accompanying text.

[296] In classical international legal theory, customary international law serves as a formal source of law. Thus, Article 38 of the Statute of the International Court of Justice charges the Court with resolving disputes in accord with international law by applying, inter alia, "international custom, as evidence of a general practice accepted as law." STAT. OF THE ICJ, *supra* note 261, at art. 38.

been derived from the activity of very few States.[297] Because of this, and because of the increasing role of treaties both in international law in general and space law in particular, "[c]ustomary law is of far lesser importance and its significance for outer space activities has, in many respects, not been secured."[298] This is perhaps yet another function of the youth of space law relative to more established branches of international law–there simply has not been sufficient time and widespread uniformity for customary law to crystallize.

This consideration of customary space law raises two issues regarding the necessary preconditions for its creation. These merit some discussion here because the formation of limits to means and methods of space warfare will likely emerge via customary international law.[299] First, the time needed for a custom to evolve into law may be very short, leading some to minimize the importance of widespread State practice. Although space research and development had gone on for over a decade, it was not until the launch of Sputnik I in 1957 that international agreement emerged on basic principles that should govern outer space activity. With respect to the principle of freedom of use and exploration of space, that agreement came almost immediately following the launch of Sputnik I. Because the agreement was largely based

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[297] The two factors generally regarded as necessary for the crystallization of an emerging norm into customary law are the practice of States and general opinion that the norm under consideration bears the force of law. Thus Malanczuk writes,

> [w]hen inferring rules of customary law from the conduct of States, it is necessary to examine not only what States do, but also why they do it. . . . State practice alone does not suffice; it must be shown that it is accompanied by the conviction that it reflects a legal obligation. . . . The technical name given to this psychological element is *opinio iuris sive necessitatis* (*opinio iuris* for short). It is usually defined as a conviction felt by States that a certain form of conduct is required by international law.

MALANCZUK, INTRODUCTION TO INTERNATIONAL LAW, *supra* note 130, at 44. The author continues by pointing out the difficulty of ascertaining a state's *opinio juris* and the modern tendency to "infer *opinio iuris* indirectly from the actual behavior of States." *Id.*

[298] Malanczuk, *Space Law*, *supra* note 283, at 159. *But see* opinion of Professor Diederiks-Verschoor, "customary law is already playing a significant role in space law, and . . . States have evidently found it necessary, if not expedient, to abide by its rules." I.H.PH. DIEDERIKS-VERSCHOOR, AN INTRODUCTION TO SPACE LAW 12 (1993) [hereinafter DIEDERIKS-VERSCHOOR].

[299] As suggested in Part VI, § A.1.b., *infra*, the development of a *jus in bello* for space will likely track the method by which the *jus in bello* for aerial combat evolved. In the latter case, after over seventy years of aerial combat, the international community has yet to witness a treaty dedicated to means and methods of aerial warfare. The incremental, customary development of an aerial *jus in bello* will likely be the pattern for space warfare.

on the practice of only two States,[300] Professor Cheng went so far as to suggest the emergence of "instant" customary law.[301]

However, while it is no longer true that a rule of customary law may be established only after decades of uniform practice by States, at a minimum customary law requires the existence of a *custom* if only to retain a semantic integrity for the term "customary law." More substantively, international law still requires that customary law involve the passage of *some* time. Thus, writing after the appearance of Professor Cheng's 1965 article, the

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[300] Although a minority view, some scholars denied the existence of *any* customary law for outer space in the early days of space flight. Thus, as late as 1961, Professor Cooper wrote

> it is quite impossible to apply international legal principles in a satisfactory manner in any geographic area whose legal status is unknown. Today the legal status of outer space is as vague and uncertain as was the legal status of the high seas in the centuries before Grotius, in the *Mare Liberum*, focused attention on the need of the world to accept the doctrine of the freedom of the seas. . . . [N]o general customary international law exists covering the legal status of outer space.

J.C. Cooper, *The Rule of Law in Outer Space*, 47 AM. BAR ASS'N J. 23 (1961) (quoted in MATTE, SPACE ACTIVITIES, *supra* note 13, at 83).

[301] B. Cheng, *United Nations Resolutions on Outer Space: 'Instant' International Customary Law?*, 5 INDIAN J. INT'L L. 23 (1965) [hereinafter Cheng, *'Instant' Customary Law*]. In his fascinating article, Professor Cheng challenged the orthodox view of customary law. Placing greater stress on the requirement that States express acceptance of a general practice (*opinio juris*), Cheng continued by noting that

> it may be permissible to go further and say that the role of usage in the establishment of rules of international customary law is purely evidentiary: it provides evidence on the one hand of the contents of the rule in question and on the other hand of the *opinio juris* of the States concerned. Not only is it unnecessary that the usage should be prolonged, but there need also be no usage at all in the sense of repeated practice, provided that the *opinio juris* of the States concerned can be clearly established. Consequently, international customary law has in reality only one constitutive element, the *opinio juris*. Where there is *opinio juris*, there is a rule of international customary law.

Id. at 36. Though this attenuated view of customary law is widely disputed, Cheng's watershed 1965 article largely framed the debate. Indeed, no less a distinguished scholar than R. Bernhardt regards the notion of instant custom a distinct possibility under exceptional cases (though not under "traditional concepts") in which such instant law is useful or necessary "at least if a new rule is accepted without exception and the conduct of States conforms to it and no measures contrary to the rule are taken." Malanczuk, *Space Law*, *supra* note 283, at 160-61. *See* R. Bernhardt, *Customary Law*, *in* 7 ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 61, 64-65 (Bernhardt, ed., 1982). Perceptively, Malanczuk notes that the exceptional cases about which Bernhardt allows under the rubric "customary law" are nothing of the sort. "There may indeed be a need for this, but then it is not custom but some other (new) source of international law." MALANCZUK, INTRODUCTION TO INTERNATIONAL LAW, *supra* note 130, at 46.

International Court of Justice enunciated in a 1969 case that, though the time element may be short, it is nonetheless "indispensable" to the formation of customary law.[302] Later still, in the 1986 *Nicaragua* (Merits) case, the Court implicitly rejected the notion of instant customary law by employing the following reasoning:

> The mere fact States declare their recognition of certain rules is not sufficient for the court to consider these as being part of customary international law. . . . Bound as it is by Article 38 of the Statute . . . the Court must satisfy itself that the existence of the rule in the *opinio iuris* of States is confirmed by practice.[303]

By extension, this means there can be no customary law without confirmation of the rule in State practice. As the Court observed, such confirmation cannot come simply by means of declaration, devoid of State practice in space and *time*. The fact that customary law cannot crystallize without the passage of time underscores the preeminent place that treaties will play, at least for the foreseeable future, in the articulation of space law.

A second issue related to customary space law pertains to the status of States "specially affected" by an emerging norm under consideration. International law requires that for the norm to crystallize into customary law, its status as law must enjoy, at minimum, the acquiescence, if not the outright consent, of States specially affected by the norm in question. Again, the International Court of Justice addressed this requirement in its *North Sea Continental Shelf* judgments,

> [w]ith respect to the other elements usually regarded as necessary before a conventional rule can be considered to have become a general rule of international law, it might be that, even without the passage of any considerable period of time, a very widespread and representative participation in the convention might suffice of itself, *provided it included that of States whose interests were specially affected.*[304] (emphasis added)

Although not adopted universally as a condition *sine qua non* for the crystallization of customary norms, the idea was emerging even before the 1969 *North Sea Continental Shelf* judgments that specially affected States

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[302] North Sea Continental Shelf Cases (F.R.G. v. Den.; F.R.G. v. Neth.), 1969 I.C.J. Rep. 4, 43 [hereinafter North Sea Continental Shelf Cases]. Specifically, the Court stated that "an indispensable requirement would be that within the period in question, short though it might be, State practice, including that of States whose interests are specially affected, should have been both extensive and virtually uniform in the sense of the provision invoked." *Id.* This cautionary approach requires that to the extent the time element is shortened, State agreement on the emerging norm must increase. Yet, nowhere does the Court allow that the requirement for the passage of time may be dispensed with, even in cases of perfect unanimity.

[303] Military and Paramilitary Activities (Nicar. v. U.S.), 1986 I.C.J. 4, 97.

[304] North Sea Continental Shelf Cases, *supra* note 302, at 42.

must act consistent with an emerging custom for it to become law. Thus Lauterpacht writes:

> assuming here that we are confronted with the creation of new international law by custom, what matters is not so much the number of states participating in its creation and the length of the period within which that change takes place, as the relative importance, in any particular sphere, of states inaugurating the change.[305]

Today, although a mere paper protest would not appear to obstruct the formation of customary law, an interested State's continuous and resolute actual practice to the contrary would. In this way, a persistent objector, if "specially affected" by the norm under development, could frustrate the crystallization of such norm.[306] And, difficult as it may be to ascertain State practice for such analyses, the *North Sea* cases showed that this process of discovery requires examination of factual circumstances in great detail.

The number of States actively engaged in space activities is steadily growing. However, for now the total number likely to be deemed "specially

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[305] H. Lauterpacht, *Sovereignty Over Submarine Areas*, 1950 BRIT. Y.B. INT'L L. 376, 394. The author went on to point out, by way of example, the special importance of maritime powers such as the U.S. and U.K. for matters pertaining to the seas. To this perspective can be added the view of Virally, writing on the eve of the *North Sea* decisions: "[f]irm opposition of a number of states, especially if they constitute an appreciable section of the international community *or comprehend one or more of the great powers*, may no doubt obstruct the formation of a general customary rule." M. Virally, *The Sources of International Law*, *in* MANUAL OF PUBLIC INTERNATIONAL LAW 137 (M. Sørensen, ed., 1986) (emphasis added).

[306] J.I. Charney, *The Persistent Objector Rule and The Development of Customary International Law*, 1985 BRIT. Y.B. INT'L L. 1 (1986) [hereinafter Charney]. In those cases involving persistent objectors not "specially affected," international law allows that although the customary norm under development may fully ripen into customary international law, the objecting State is not bound. Thus held the International Court of Justice in both the *Anglo-Norwegian Fisheries* and *Asylum* cases. In the former, the Court stated "[i]n any event the ten-mile rule would appear to be inapplicable as against Norway inasmuch as she has always opposed any attempt to apply it to the Norwegian coast." Fisheries Case (U.K. v. Nor.) 1951 I.C.J. 116, 131. In the *Asylum* case, the Court stated that "even if it could be supposed that such a custom existed between certain Latin-American States only, it could not be invoked against Peru which, far from having by its attitude adhered to it, has, on the contrary, repudiated it." Asylum Case (Colom. v. Peru) [1950] I.C.J. 266, 277-78. "In both [cases], the Court had previously found that the substantive rule of law did not exist in the first place. The Court then went on to allow that even if the rule were international law, the objecting States in these cases would not legally be obligated to abide by the rule." Charney, *id.* at 9. *Accord* I RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW OF THE UNITED STATES, § 102 cmt. d (1987) (stating, "in principle a dissenting state which indicates its dissent from a practice while the law is still in the process of development is not bound by that rule of law even after it matures.") This is not to say that a State must express its affirmative *consent* in order to be bound by customary law, just that its objection can work to remove its obligation to comply with the subsequent customary norm that crystallized over its objection.

affected" remains small, perhaps six to ten.[307] This interest makes these spacefaring States important bellwethers for the development of customary law related to space warfare. To the extent these States persistently object to a would-be space norm, it cannot become customary law.[308]

Though custom does not appear to be of great importance presently, the consensus has developed that a few principles of customary international law apply to space activities. These include the "essential principles of the Outer Space Treaty which have been accepted by all States active in outer space by practice and with *opinio juris* after ratification, and where no evidence of dissenting practice on the part of non-ratifying States is available."[309] Specifically, these principles include the freedom of exploration and use of outer space by all States, and the prohibition on national appropriation of outer space.[310]

Because these customary principles are codified in the Outer Space Treaty,[311] and the treaty has been ratified by all States currently active in space, customary international law seems less important in ascertaining principles applicable to future space warfare. Customary law pertaining to outer space activities is for the most part a subset of treaty law.[312] However,

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[307] Among this number would certainly include the United States, Russia, the United Kingdom, France, China, India, and Japan.

[308] This examination of interested State practice appears to be the method employed consistently by the International Court of Justice in its examination of customary law, and comports with the opinion expressed by numerous scholars today. Thus, in the *Nicaragua* case, the Court undertook to establish the customary legal basis for the principle of nonintervention as it analyzed the dispute between the United States and Nicaragua. In so doing, the Court pointed out that although the U.S. expressed its opinion that U.N. General Assembly Resolution 2131 was not a formulation of law but only a statement of political intention, the U.S. later accepted resolution 2625 which purported to declare law on the same point as resolution 2131. Military and Paramilitary Activities (Nicar. v. U.S.), 1986 I.C.J. 4, 107. The Court's exercise in resolving the apparent U.S. reservation to the principle of nonintervention is instructive, and makes the most sense when viewed as an attempt to show that the U.S. was not a persistent objector to the principle. In this light, the Court has employed a method logically flowing from its prior assertion as to the required acceptance of "specially affected" States in the formation of customary international law. Given this disposition of the court, and apparently of international law in general, the emerging practice of the United States with respect to the recognition (or nonrecognition) of restrictions on space warfare, becomes most important.

[309] Malanczuk, *Space Law*, *supra* note 283, at 159.

[310] *See id.*

[311] *See infra*, Part IV, § B.1.

[312] This is subject to the observation that debate now exists as the to status of *potential* customary norms not otherwise addressed by treaty law. These include the notion that international law recognizes a right of space objects, headed either to or from outer space, to freely transit the sovereign airspace of other States. Although some have pointed to the lack of objection by certain States in the case of occasional violations of its airspace by space objects as evidence that the "norm" has crystallized, this view is highly suspect. At a minimum these

the body of customary law pertaining to space will assume much greater importance as non-parties to the relevant space treaties become active in space activities. For example, should Colombia, Iran, Indonesia, or Yugoslavia acquire the means of space launch in the coming years, all four being non-parties to the Outer Space Treaty, any restrictions on such States' space activity that do not come from obligations imposed by other space treaties[313]

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anecdotal occasions assume that the violated state was aware of the intrusion–unlikely in most cases usually cited. Thus Malanczuk observes that

> the contention can hardly be sustained that the practice of space powers to launch their space objects into outer space after 1957 by crossing the air space under the sovereignty of other countries developed into custom by the acquiescence of those States. The countries affected simply often lacked the technological capacities to find out.

MALANCZUK, INTRODUCTION TO INTERNATIONAL LAW, *supra* note 130, at 43. Beyond this, even if a State knew about the violation, isolated instances of an intrusion followed by a mere failure to protest is hardly sufficient to establish a customary norm binding the entire international community. More than this would be necessary to evince the requisite *opinio juris*. Thus Professor Wassenberg writes

> There is no a [sic] 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 transit through a State's airspace by a foreign space object, is not an argument to refer to a customary right of transit, as too few States have considered to be confronted with such transit (and none have been), and no *opinio juris* with respect to such practice has been pronounced as yet.

H.A. WASSENBERGH, PRINCIPLES OF OUTER SPACE LAW IN HINDSIGHT 36 (1991). By contrast, the widespread recognition of the principle of freedom of space, though it came rather quickly following the Soviet launch of Sputnik I, was accompanied not only by the lack of objection in the face of orbital overflights, but affirmative acquiescence by most States in the form of United Nations resolutions. An additional customary norm pertains to the right of space surveillance. In this instance a much stronger case can be made that international law contains a customary norm to freely observe other States. As Professor Diederiks-Verschoor notes "[i]t is important to bear in mind that there is as yet no statutory obligation on States, in U.N. Resolutions or elsewhere, to ask for prior consent . . ." DIEDERIKS-VERSCHOOR, *supra* note 298, at 11. Given this, and given the general international legal principle that in the absence of prohibition States are free to act as they please, it is perhaps better to see the right of space surveillance not so much as requiring specific authorization by an explicit customary norm but as the natural prerogative of a State flowing from its sovereignty and from the principle that space is free.

[313] For example, as of 1993, Colombia and Indonesia had not ratified any of the multilateral space treaties; Iran had ratified the Rescue & Return Agreement, and Liability Convention; and Yugoslavia had ratified the Rescue & Return Agreement, Liability Convention, and Registration Convention. Resolution of the difficult question of the Federal Republic of Yugoslavia's uncertain status within international law and its succession to treaties ratified by the Socialist Federal Republic of Yugoslavia is to some extent ongoing as of this writing (July

will occur largely by operation of customary international law. Should any of these States later ratify the Treaty, the binding effect of that customary law reflected in the Treaty would become far less important.

B. Treaty Law

In terms of certainty and specificity, treaties form the core of modern international law. This is especially true of space law in general and the *corpus juris spatialis* in particular, neither of which, as discussed above, has existed long enough to provide consensus on any but the most basic principles of customary law. Though in some cases restatements of customary international law,[314] outer space treaties have largely created new law. Of the treaties discussed below, agreement came as a direct result of the United Nations Committee on the Peaceful Uses of Outer Space (hereinafter COPUOS).[315] Comprising the *corpus juris spatialis*, these treaties deal specifically and directly with the legal regime governing outer space.

2000). For discussion of the international legal implication of the dissolution of the former Yugoslavia, *see* HARRIS, *supra* note 173, at 120-31.

[314] For example, in addition to the two principles cited above, namely, the freedom of space for use and exploration, and the prohibition on national appropriation of space or celestial bodies, a third customary principle provides for the rescue of astronauts in distress. Regarding the first two cited principles, see *supra* note 310 and accompanying text.

[315] Established by resolution of the U.N.G.A. in 1958, COPUOS has served as a central forum for international negotiations toward the development of space law. Although made up of only 61 members, less than one-third of the United Nations membership, and unable to adopt rules and regulations binding on State parties (unlike the International Civil Aviation Organization for example), COPUOS has nonetheless played a remarkably effective role in the early development of space law. Of the five treaties now in force under the *corpus juris spatialis*, all five originated within COPUOS. With only one exception in 1982, COPUOS has acted on the basis of consensus. "In other words, every member of the Committee . . . was given a veto." Cheng, *'Instant' Customary Law*, *supra* note 301, at 27. As might be expected, this makes the negotiation and drafting process "detailed, laborious, and time-consuming." N. Jasentuliyana, *The Lawmaking Process in the United Nations*, *in* SPACE LAW: DEVELOPMENT AND SCOPE 34 (N. Jasentuliyana, ed., 1992). This principle of action-by-consensus also increases the commitment to the legal regimes created as well.

This is not to suggest that COPUOS is the only international body concerned with space law. The scope of COPUOS' mandate in the progressive development of space law excludes consideration of military uses, which the major space powers relegate to "fora dealing with disarmament and arms control issues." Malanczuk, *Space Law*, *supra* note 283, at 150. The most notable such forum is the U.N. Conference on Disarmament. As of 2000, there were sixty-one member States of COPUOS (unchanged from 1995): Albania, Argentina, Australia, Austria, Belgium, Benin, Brazil, Bulgaria, Burkina Faso, Cameroon, Canada, Chad, Chile, China, Colombia, Cuba, Czech Republic, Ecuador, Egypt, France, Germany, Greece, Hungary, India, Indonesia, the Islamic Republic of Iran, Iraq, Italy, Japan, Kazakhstan, Kenya, Lebanon, Mexico, Mongolia, Morocco, Netherlands, Nicaragua, Niger, Nigeria, Pakistan, Philippines, Poland, Portugal, Republic of Korea, Romania, Russian Federation, Senegal, Sierra Leone, South Africa, Spain, Sudan, Sweden, Syrian Arab Republic, Turkey, Ukraine, the United Kingdom, the United States, Uruguay, Venezuela, Viet Nam, and Yugoslavia. COPUOS,

1. *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)–1967*

It is difficult to overstate the preeminent place in space law enjoyed by the first international treaty governing outer space, commonly known as the Outer Space Treaty.[316] Drawn principally from three previous United Nations General Assembly (U.N.G.A.) Resolutions,[317] the Outer Space Treaty is termed everything from "an ideological charter for the space age"[318] to the "*Magna Carta* of outer space law."[319] Of the five multilateral treaties dealing specifically with outer space activities, it is the most important "by far."[320] As a result, it is the legal source of first resort for the analysis of any space law topic.

Other than establishing what can only be called the "constitution" of outer space,[321] the Outer Space Treaty specifies that "Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[322] Of the many activities this provision clearly prohibits, it has generated some debate relating to its scope. For example, commentators are divided over its application to private, non-governmental claims of ownership

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Membership of the Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/AC.105/602 1 (1995).

[316] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967) [hereinafter Outer Space Treaty].

[317] Namely, Resolution 1772, Jan. 3, 1962, *International Co-operation in the Peaceful Uses of Outer Space*; Resolution 1962 (XVIII), Dec. 13, 1963, *Declaration of Legal Principles Governing Activities of States in the Exploration and Use of Outer Space*, and Resolution 1963 (XVIII), Dec. 13, 1963, *International Co-operation in the Peaceful Uses of Outer Space.* For a discussion of the second, and most important of these resolutions, see *infra* notes 482–485 and accompanying text.

[318] ROBINSON & WHITE, *supra* note 293, at 181.

[319] N. Jasentuliyana, *The Role of Developing Countries in the Formation of Space Law*, XX:II ANNALS AIR & SPACE L. 95, 97 (1995) [hereinafter Jasentuliyana, *Developing Countries*].

[320] I.A. Vlasic, *A Survey of the Space Law Treaties and Principles Developed Through the United Nations*, *in* PROCEEDINGS OF THE THIRTY-EIGHTH COLLOQUIUM ON THE LAW OF OUTER SPACE 324 (1996).

[321] "[The Outer Space Treaty] represents *de facto* and *de jure* the constitution of outer space." I.A. Vlasic, *Some Thoughts on Negotiating and Drafting Arms Control and Disarmament Agreements Relating to Outer Space*, *in* IV ARMS CONTROL AND DISARMAMENT IN OUTER SPACE: TOWARDS A NEW ORDER OF SURVIVAL 203, 212 (M.N. Matte, ed., 1991) [hereinafter Vlasic, *Negotiating and Drafting Agreements Relating to Outer Space*]. Subsequent multilateral space law treaties serve primarily as commentaries and clarifications of the Outer Space Treaty.

[322] Outer Space Treaty, *supra* note 316, at art. II.

over celestial bodies.[323] Increasing private investment in space makes this a live issue that military users of space must understand.

In addition to its "no sovereignty" provision, the Treaty established a few innovations in international law. One significant innovation pertains to the provision of Article VI requiring that States bear "international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities."[324] This departure from the general rule of international law, namely, that States bear responsibility only for State activity, makes the contracting State liable for the offenses (or any other activity) of its citizens or private organizations with respect to space activity.[325] This provision marks the first time that such an extension of State liability had occurred in a legally binding document.[326] Although this provision appears unlikely to affect significantly the ability of States to wage space warfare given the State-controlled nature of military forces, it could impact the research and development of weapons systems. For example, to the extent that a military space contractor pursues testing of space weaponry in outer space, the host State will bear "international responsibility" for the activity.

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[323] Private entrepreneurs are now declaring their intent to make claims of ownership over asteroids. *See, e.g.*, P. Landesman, *Starship Private Enterprise*, THE NEW YORKER, Oct. 26, 1998, at 178. As a matter of law, the possibility of private appropriation has been widely rejected as an implicit violation of the Outer Space Treaty's "no-sovereignty-in-outer-space" provision. However, growing privatization of space activities, recognition of the economic benefits of commercialization, differentiation of space resources from ocean resources, and hesitation among venture capitalists to invest short of security interests backed by ownership may lead to a gradual change in practice and law. The positions of Wassenberg and Gorove that private appropriation does not violate the Outer Space Treaty, while a minority view today, may became the majority view in the twenty-first century. *See* H. Wassenbergh, *Responsibility and Liability for Non-Governmental Activities in Outer Space, in* ECSL SUMMER COURSE ON SPACE LAW AND POLICY: BASIC MATERIALS 197 (1994); S. Gorove, *Interpreting Article II of the Outer Space Treaty*, 37 FORDHAM L. REV. 349, 351 (1969). Indeed, "some scholars writing in the wake of the Outer Space Treaty's ratification took the position that Article 2's no-sovereignty provisions bar *any* property rights in outer space resources. That position has lost its popularity over time, however, and is no longer held by many scholars." REYNOLDS & MERGES, *supra* note 59, at 82. As an example, some business interests have begun planning to construct space resorts. "The Space Transportation Association, an industry lobbying group, recently created a division devoted to promoting space tourism, which it sees as a viable way to spur economic development beyond earth." T. Beardsley, *The Way to Go in Space*, 280:2 SCIENTIFIC AMERICAN, Feb. 1999, at 81. *See also* W.B. Scott, *Studies Claim Space Tourism Feasible*, 146:14 AV. WK. & SPACE TECH., Apr. 7, 1997, at 58.

[324] Outer Space Treaty, *supra* note 316, at art. VI.

[325] As State responsibility for national space activity has been a cornerstone of the *corpus juris spatialis* since 1967, it may well be a principle of customary international law binding non-contracting States as well.

[326] The idea appeared previously in Principle 5 of U.N.G.A. Resolution 1962 (XVIII). However, this Resolution did not legally bind any State. *See* discussion *infra* note 482.

Further, the novel principle of State responsibility for "national activities in outer space" could render the home State liable for the unauthorized hostile space activities of its citizens, even if carried out from a foreign country. Despite the great difficulty in regulating such activity, this could mean that the U.S., for example, would bear responsibility to the Chinese, should a U.S. citizen manage to destroy a Chinese satellite in space, even if construction, launch, and control of the attacking object or method of destruction occurred entirely outside the U.S., and without its authorization.

An additional provision could be applied to space combat in a variety of respects. Article IX of the Outer Space Treaty provides in part:

> States Parties to the Treaty shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space, including the moon and other celestial bodies, with *due regard to the corresponding interests of all other States Parties* to the Treaty. States Parties to the Treaty shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to *avoid their harmful contamination and also adverse changes in the environment of the Earth* resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose. If a State party to the Treaty has reason to believe that an activity or experiment planned by it or its nationals in outer space, including the moon and other celestial bodies, would cause *potentially harmful interference with activities of other States Parties* in the peaceful exploration and use of outer space, including the moon and other celestial bodies, it shall undertake appropriate international consultations before proceeding with any such activity or experiment.[327] (emphasis added)

At the outset, one observes that Article IX, like most space law provisions, makes no distinction between military and civilian activities. Thus, ordinarily the requirements of Article IX apply fully to military operations in space.[328]

One possible limitation for space warfare is suggested by the language prohibiting "harmful contamination" of outer space, the moon, and celestial bodies. Significantly, the provision applies only to "studies of outer space, including the moon and other celestial bodies" and to the "exploration of them."[329] Thus, while "studies" and "exploration" would likely apply to the testing and development of space weaponry, the restriction does not seem logically applicable to the actual conduct of warfare. Unless by some tenuous definition "warfare" could be brought within the modifying terms "studies"

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[327] Outer Space Treaty, *supra* note 316, at art. IX.

[328] The entire body of international space law as it applies to space warfare is subject to the limitations effected by a state of war between belligerents. The difficult question of how an armed conflict terminates or modifies obligations otherwise binding on belligerents in peacetime cannot be avoided with respect to space warfare. For an example, see *supra* note 280 and accompanying text.

[329] Outer Space Treaty, *supra* note 316, at art. IX.

and "exploration," it appears that State activities in support of warfare, whether within space or in support of earth-based hostilities, are not prohibited from causing "harmful contamination" under Article IX.[330] It also bears noting that activities triggering the prohibition on harmful contamination, namely "studies" and "exploration," would also have to avoid "adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter."[331]

A potentially more significant point from Article IX relates to a State's duty to engage in "international consultations" prior to engaging in activities which the State "has reason to believe . . . would cause potentially harmful interference with activities of other States Parties in the peaceful exploration and use of outer space, . . ." It is not difficult to conceive scenarios in which the use of armed force in space would potentially cause "harmful interference" with other States Parties in their peaceful exploration and use of space. Assuming the hostile act were lawfully directed at an asset in conformity with the *jus ad bellum*, this requirement would not require consultation with the opposing belligerent State as it would not be engaged in the "peaceful exploration and use of outer space." However, it would require consultations with any third party (neutral) State owning space assets that might foreseeably be interfered with "harmfully." To the extent that a hostile act in space, whether lawful or not, could harmfully interfere with a third party State's asset, Article IX appears to require that the State must be consulted. Further, unlike other space treaties and U.N. resolutions that leave the timing of such consultations unclear, Article IX specifies that it must occur "before proceeding with any such activity or experiment." This could create a disincentive to carrying out an act of armed conflict as prior consultations with a third party State could, by public dissemination or otherwise, constitute a de facto notification to the opposing belligerent State of the anticipated attack. Nonetheless, the Article IX does not stand in the way of carrying through with such hostile acts once "consultations" have occurred, even if the third-party State objects to the anticipated activity or experiment. As a practical matter,

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[330] Though Article IX also requires States to "conduct all their activities in outer space . . . with due regard to the corresponding interests of all other States Parties to the Treaty," this vague exhortation could just as likely apply to the activities of States on earth as well. Outer Space Treaty, *supra* note 316, at art. IX. Certainly as a general proposition the intentional creation of harmful contamination would run counter to various principles of international law. However, as is often the case with armed conflict, the law recognizes that as a matter of brute reality, certain activities illegitimate in peace will be tolerated in war. Thus, in analyzing space warfare, the *corpus juris spatialis* cannot be read in isolation from the law of war. In the context of armed conflict, Article IX seems to create no greater duty for States with respect to the space environment than that which exists for the terrestrial environment. *But see* Professor Vlasic, "[a]lthough these provisions apparently are not aimed at hostile uses of outer space, they could nonetheless be invoked against military activities not otherwise banned by the Treaty." Vlasic, *Space Law and Military Applications*, *supra* note 11, at 397.

[331] Outer Space Treaty, *supra* note 316, at art. IX.

though the Treaty requires it, one wonders whether the international community even takes this consultation provision seriously given that so far as is publicly known, no such consultation has ever been undertaken since the adoption of the Outer Space Treaty in 1967.[332]

With respect to military forces in space, the most significant provision from the Outer Space Treaty appears in Article IV, which directly addresses the militarization of outer space:

> States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.
> The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited.[333]

Among the myriad issues raised by this section, a perennial debate has centered on the meaning of "peaceful purposes," the ambiguous term operating as one of several limitations on State uses of outer space. Because of the centrality of the phrase to questions of military uses of space, a historical sense of its use in international parlance is necessary. When first used by the U.S. in 1957, the "peaceful and scientific purposes" of outer space activities soon became the official goal of the United Nations. By vote of 56 to 9 (15 abstentions), the U.N. adopted Resolution 1148 (XII) on November 14, 1957, which advocated an inspection system to ensure the peaceful uses of space. "This was a landmark document not only because it represented the first General Assembly resolution on outer space but also because it introduced the phrase 'exclusively for peaceful purposes' in an authoritative U.N. text."[334]

Of course, simply using the term without definition does not fix its meaning. Professor Vlasic reports that although the first wide-ranging debate on the peaceful uses of outer space at the 13th session of the U.N.G.A. in 1958 saw virtually all participants using the term "peaceful" as an antonym for "military," the resolutions this session produced did not attempt "to interpret or

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[332] B. REIJNEN, THE UNITED NATIONS SPACE TREATIES ANALYSED 130-31 (1992) [hereinafter REIJNEN].

[333] Outer Space Treaty, *supra* note 316, at art. IV.

[334] I.A. Vlasic, *The Legal Aspects of Peaceful and Non-Peaceful Uses of Outer Space, in* PEACEFUL AND NON-PEACEFUL USES OF SPACE: PROBLEMS OF DEFINITION FOR THE PREVENTION OF AN ARMS RACE 37, 39 (B. Jasani, ed., 1991) [hereinafter Vlasic, *Peaceful and Non-Peaceful Uses of Outer Space*].

clarify the term 'peaceful' so commonly used in the context of contemporary space activities."[335] Significantly, although U.S. President Eisenhower proposed by letter to Soviet Premier Bulganin in 1958 that the U.S. and U.S.S.R. use outer space "only for peaceful purposes" and not for "testing of missiles designed for military purposes,"[336] the proposal was never consummated by agreement.

As discussed above, while the world community was debating the meaning of terms such as "peaceful purposes," the U.S. and U.S.S.R. were secretly developing satellite systems with clear military capabilities. Thus in the period from late 1958 to 1959, the U.S. adopted the view that "'peaceful' in relation to outer space activities was interpreted . . . to mean 'non-aggressive' rather than non-military. . . . By contrast, the Soviet Union publicly took the view, despite its own military uses of space, that 'peaceful' meant 'non-military' and that in consequence all military activities in outer space were 'non-peaceful' and possibly illegal."[337] This background forms the context for use of the phrase in the Outer Space Treaty. Though the Soviet Union and a number of other States consistently maintained the view that "peaceful" means "non-military," the majority of the international community has failed to agree. Consequently, the view "which today has gained general acceptance, is that non-aggressive military uses are peaceful. Thus, 'peaceful' has come to mean general space activity that is beneficial to and in the interests of all countries."[338] This is essentially the view maintained by the U.S., which stresses that all States possess the inherent right to defend against foreign aggression in outer space, as well as within earth's atmosphere.[339] Despite the long debate over the term "peaceful" as used in the Outer Space Treaty, its meaning has been well-settled through the practice of States and certainly includes military activities.[340]

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[335] *Id.*

[336] *Id.* (quoting text of letter as contained in MCDOUGAL, ET AL., *supra* note 40, at 395).

[337] *Id.* at 40.

[338] C.Q. CHRISTOL, THE MODERN INTERNATIONAL LAW OF OUTER SPACE 22 (1982) [hereinafter CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE]. In addition to the textual problems associated with equating the terms peaceful and non-military, (indeed Article IV itself contemplates the military use of space for scientific research) the interpretation suffers from a practical difficulty. Just about any use of space can support a military purpose. Thus, even if a satellite were developed, tested, launched, and controlled by a "civilian" organ of State government, the information it provided could be useful for military purposes. Weather, navigation, communications, and remote sensing are just a few applications of space capabilities of great use to military forces. To say that the Outer Space Treaty forbids this activity seems highly dubious. Yet this is the logical extension of the claim that all uses of space must scrupulously avoid any military uses and thereby remain peaceful.

[339] *See id.* at 29.

[340] Indeed the term includes the prospect of space weapons as well.

> If one chooses to ignore the controversy concerning the 'true' meaning of 'peaceful' in the Outer Space Treaty, it is safe to conclude that the Treaty

When assessing the meaning of a term in one treaty, it is instructive to examine its meaning as used in other treaties as well. Other than the "peaceful purposes" language contained in the Antarctic Treaty, discussed below,[341] the phrase appears more recently in the treaty governing the International Space Station (ISS). Consistent with the Outer Space Treaty, Article 1(1) of the ISS Agreement requires that uses of the ISS be reserved for peaceful purposes.[342]

> permits the deployment in outer space of anti-satellite weapons, directed energy weapons, or any other kind of weapon, as long as these weapons are not in conflict with the prohibitions of Article IV [such as weapons of mass destruction in orbit] of the Outer Space Treaty, or some other international agreement.

Vlasic, *Space Law and Military Applications*, *supra* note 11, at 397. As a linguistic matter, though the true meaning of peaceful can just as accurately mean "non-aggressive," (in part evidenced by the fact that Article IV forbids military bases, installations, fortifications, and maneuvers–a meaningless partial demilitarization if "peaceful" simply means "non-military") the relevant issue is this: what does the term allow and what does it prohibit under the law? On this, the *corpus juris spatialis* is clear.

[341] *See infra* notes 469, 471 and accompanying text. Though none go so far as the Antarctic Treaty in divorcing "military" activities from "peaceful purposes," other treaties specifically suggest that "peaceful," as used therein, means non-military. Thus,

> [a]n examination of agreements which use the term 'peaceful'–namely, the Statute of the International Atomic Energy Agency; the Antarctic Treaty; the Treaty for the Prohibition of Nuclear Weapons in Latin America; the Convention on the Prohibition of the Development, production and Stockpiling of Bacteriological (Biological) and Toxic Weapons and Their Destruction; and the Convention on the Prohibition of Military or Any Other Hostile Use of the Environmental Modification Techniques–shows that in all these treaties the term 'peaceful' is used in contradistinction to 'military.'

Vlasic, *Negotiating and Drafting Agreements Relating to Outer Space*, *supra* note 321, at 215. Assuming for the sake of argument that this interpretation is accepted for each treaty cited, the exercise simply demonstrates that when the drafters of a treaty intend for "peaceful" to mean non-military, they so state. In the absence of doing so, one cannot simply assume it. For example, Article 88 of the United Nations Convention on the Law of the Sea specifies that "the high seas shall be reserved for peaceful purposes." United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397, *reprinted in* 21 I.L.M. 1261 (entered into force Nov. 16, 1994). Given the history of State practice on the high seas, no one assumed that this article turned the high seas into a demilitarized zone. This provision "most certainly cannot be interpreted to mean that military uses of the high seas are prohibited. Both customary law and the uniform practice of States, before 1982 and after, are crystal clear on this point." Vlasic, *Negotiating and Drafting Agreements Relating to Outer Space*, *supra* note 321, at 215. Unless the treaty specifies that "peaceful" means non-military, or its negotiating history makes it obvious, it cannot be assumed.

[342] Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, The Government of Japan, The Government of the Russian Federation, and The Government of the United States of America Concerning Cooperation on the Civil International Space Station, Jan. 29, 1998, art. 1(1), IV UNITED STATES SPACE LAW:

Interestingly, the ISS Agreement seems to recognize the divergent interpretations of the phrase "peaceful purposes." Article 9, paragraph 3(b) provides that "the Partner providing an element shall determine whether a contemplated use of that element is for peaceful purposes."[343] In so agreeing, the Partners reasonably concede that the likelihood of disagreement over the meaning of the term justifies a provision stipulating who should determine its meaning. In this case, each Partner decides for itself whether its proposed use constitutes a peaceful purpose.

This comes as no surprise. Absent cases referred to the International Court of Justice, international obligations have often been subject to unilateral interpretation. Using the ISS Agreement as a reference, it appears safe to assert that unless an interpretation is so tenuous as to amount to bad faith, the decision regarding a proper interpretation of "peaceful purposes" under the Outer Space Treaty continues to rest with the party proposing the action. Legally speaking, because "peaceful purposes" in the Outer Space Treaty is not specifically defined it therefore may not mean the same thing as the identical phrase in the ISS Agreement. Further, the self-interpretation provision of the ISS Agreement applies only to the handful of States Parties to the ISS Agreement, which are but a fraction of those States who are parties to the Outer Space Treaty. Nonetheless, the meaning of a phrase in an international instrument becomes most clear in light of action by its States Parties. With the exception of China, the States most active in space are all members of the ISS Agreement. How these States behave under their "peaceful purposes" obligations in the ISS agreement will continue to illuminate the meaning of the phrase elsewhere.

A further point from Article IV regards the location to which the "peaceful purposes" restriction applies. The second paragraph limits use of "celestial bodies," including the moon, to peaceful purposes. This raises the question whether the "peaceful purposes" limitation, whatever its meaning, applies away from celestial bodies. Christol points out that though the Treaty uses "outer space," "moon," and "celestial bodies" at numerous points and in various combinations throughout the substantive articles, the omission of "outer space" in Article IV, paragraph 2 was "clearly intentional."[344] While the term "outer space" as used in the Outer Space Treaty includes the moon and "celestial bodies,"[345] the latter terms do not include within them the meaning conveyed by "outer space." Christol articulates the negotiating history of the Treaty and points out that though several States within COPUOS

NATIONAL & INTERNATIONAL REGULATION 98-1 (S. Gorove, ed., 1998) [hereinafter ISS Agreement].

[343] *Id.* at art. 9 ¶ 3(b).

[344] CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 20.

[345] Christol quotes the principal U.S. negotiator of the treaty, Ambassador Arthur Goldberg, for this proposition: "'obviously whatever the definition of outer space, the Moon and other celestial bodies are in outer space.'" *Id.* at 21.

objected to the omission of "outer space" from Article IV, paragraph 2, given the clear implication that this would permit non-peaceful purposes for outer space, the view of the U.S. and U.S.S.R. that the term "peaceful purposes" should apply only to the moon and celestial bodies won the day.[346] As such, the restriction does not formally apply to space activities away from celestial bodies.[347]

Nonetheless, though Article IV, paragraph 2 does not prohibit the non-peaceful use of outer space away from celestial bodies, such uses are nonetheless implicitly prohibited by other provisions. For example, at least to the extent that "non-peaceful" means the aggressive use of force, such uses are prohibited by the U.N. Charter's provision to the contrary.[348] Because the Outer Space Treaty restricts State activities in space to those "in accordance with international law, including the Charter of the United Nations,"[349] an aggressive use of force forbidden on earth is equally forbidden in space. Further, some States such as the U.S. have made the "peaceful" uses of outer space a tenet of national policy. Thus, the 1958 National Aeronautics and Space Act maintains that "activities in space should be devoted to peaceful purposes for the benefit of all mankind."[350] This was reiterated recently in the President's National Space Policy wherein the White House declared "The United States is committed to the exploration and use of outer space by all nations for peaceful purposes and for the benefit of all humanity."[351]

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[346] *Id.* at 24.

[347] Professor Vlasic provides one insight as to why the U.S. preferred to restrict the application of "peaceful purposes" to the moon and celestial bodies: "According to [a] former Legal Advisor in the U.S. Department of State, the "language of Article IV was carefully chosen to ensure that general principle of 'peaceful uses' would not interfere with the testing" of weapons such as nuclear ballistic missiles." Vlasic, *Peaceful and Non-Peaceful Uses of Outer Space*, *supra* note 334, at 42. Of course, on the widely-accepted view that peaceful means non-aggressive, such testing would not have been a problem. Indeed, on this understanding, the actual use of weapons in space can be peaceful if compliant with the *jus ad bellum*. Thus, Professor Christol's pragmatic recognition that

> [i]t is a fact that [Article 4(2)] says that the moon and celestial bodies *full stop* shall be used exclusively for peaceful purposes; and by that I take it to mean that this inhibition or restriction does not apply to outer space today. Though I do realize that there are many who make arguments which sometimes are a little overreaching, and whereas my sympathies go with them, my legal training tells me that we had better not read it that way . . .

C. Christol, *Discussion*, in M. COHEN & M.E. GOUIN, LAWYERS AND THE NUCLEAR DEBATE 233 (1988).

[348] *See supra* notes 266-274 and accompanying text.

[349] Outer Space Treaty, *supra* note 316, at art. III.

[350] National Aeronautics and Space Act of 1958, 42 U.S.C. § 2451(a) (1994).

[351] The White House, National Science and Technology Council, *National Space Policy*, Sept. 19, 1996 (from the Introduction). The policy statement articulates the long-held U.S. position

A further point under Article IV relates to the legal permissibility of satellite interceptors or anti-satellite (ASATs) satellites. ASATs deviate from the non-aggressive character of virtually all other satellites, and in so doing may appear to violate the non-aggressive mandate required of all space activities under the "peaceful purposes" restriction. However, regardless of their putative "destabilizing" character for international peace and security,[352]

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on the meaning of peaceful purposes by stating that "'Peaceful purposes' allow defense and intelligence-related activities in pursuit of national security and other goals." *Id.* ¶ 3.

[352] "In the case of weapons systems, there is a much broader feeling [beyond that for military support systems] that they are destabilizing and should be banned." P. Jankowitsch, *Legal Aspects of Military Space Activities, in* SPACE LAW: DEVELOPMENT AND SCOPE 143, 150 (N. Jasentuliyana, ed., 1992). Further, in a fascinating recent article, Lieutenant Colonel Bruce DeBlois argued that for reasons of national policy, the U.S. should resist the urge to weaponize space with ASATs. He boldly proclaims the U.S. National Space Policy "weak and ambiguous" with "no clear vision" and no one "in charge," and that for space matters "few people would argue" that the U.S. is "fumbling around in an ad hoc manner." DeBlois, *supra* note 3, at 52. Yet even this advocate of the "space sanctuary" school recognizes that "except for [weapons of mass destruction] and [anti-ballistic missile systems for the U.S. and Russia], no international prohibition on space weapons exists." *Id.* at 46.

It is beyond the scope of this article to fully consider the policy merits of weaponizing space. However, the debate that Lieutenant Colonel DeBlois invites is sure to yield a flood of comment, much of which will no doubt take issue with his central premise that space weapons are ultimately destabilizing. With respect to ASATs in the context of the cold war, Stares helpfully summarizes the opposing positions, portions of which still carry some currency in the post-cold war era:

> [The pro-ASAT school] starts from the belief that space is just another military arena where satellites will have to adapt to new threats with new countermeasures in the same way that their counterparts on earth have adapted. . . . [Proponents believe the U.S. can] deny the Soviets the use of their space assets in wartime while simultaneously preserving the security of U.S. space systems. Moreover, they argue that any attempt to constrain the development of antisatellite systems is illogical and unfeasible; illogical because there are no such limitations on weapons capable of attacking, say, high-flying reconnaissance aircraft or early warning radars, and unfeasible because of the unavoidable presence of the residual antisatellite systems . . . . The second school . . . starts from the belief that the United States is more dependent on the service of military satellites than the Soviet Union is and therefore has more to lose in the event of hostilities in space. The proponents of this view remain highly skeptical of the United States' ability to defend its vital space assets in the face of unconstrained antisatellite development by the Soviet Union. In addition to stimulating an expensive and in the end fruitless competition, they believe an ASAT arms race could seriously erode superpower stability during a severe crisis. Specifically, the knowledge that the other side had a highly effective ASAT weapon system capable of crippling one's own vital early warning and strategic communication satellites could become an overwhelming incentive to strike first in a major superpower crisis.

STARES, SPACE AND NATIONAL SECURITY, *supra* note 70, at 5.

the Outer Space Treaty does not prohibit the transiting, or even the orbiting, of conventional weaponry in space, including ASATs. The prohibition on orbiting of weapons of mass destruction, including nuclear weapons,[353] strongly suggests the distinction between those weapons, and conventional weapons of lesser destructive power, including those directed at satellites. Though Article IV(1) could easily be modified to effect the de-weaponization of space,[354] conventional weapons are not proscribed.[355]

A final point from the Outer Space Treaty relates to the prohibition on the establishment of "military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial

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[353] Because the Outer Space Treaty does not define nuclear weapon its prohibition has stimulated debate over newer technologies such as the X-ray laser which is powered by a nuclear explosion. Whether a nuclear-powered laser is a nuclear weapon will mean the difference between its lawful orbiting of earth or not. P. Jankowitsch, *Legal Aspects of Military Space Activities*, *in* SPACE LAW: DEVELOPMENT AND SCOPE 147 (N. Jasentuliyana, ed., 1992). Given its destructive power, the military significance of such a laser will be tremendous. For example, the intense X-rays emitted as a result of the initial nuclear blast lead some to speculate that one X-ray laser no larger than a packing crate would be able to destroy the entire Russian ICBM arsenal if they were launched at one time in a massive attack. TAYLOR, *supra* note 97, at 36. In addition to the possibility that such weapons may be nuclear weapons under the Outer Space Treaty, their immense destructive capability may otherwise render them weapons of mass destruction.

[354] Professor Stojak points out that though it is unlikely to happen, the change could occur without a new treaty were Article IV(1) modified to read:

> States Parties to the Treaty undertake not to place *in outer space* [instead of "in orbit around the earth"] any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on *the moon or* on celestial bodies, or station *weapons* [instead of "such weapons"] in outer space in any other manner.

M.L. Stojak, *Recent Developments in Space Law*, *in* ARMS CONTROL AND THE RULE OF LAW: A FRAMEWORK FOR PEACE AND SECURITY IN OUTER SPACE 62 (J.M. Beier & S. Mataija, eds., 1998) [hereinafter Stojak].

[355] The exception to this applies only to the U.S. and Russia under the Anti-Ballistic Missile Treaty, which prohibits interference with "national technical means" of arms control verification. See *infra* Part V, § A.2. With respect to the ban on orbiting of nuclear or other weapons of mass destruction, it has been widely observed that the proscription does not extend to partial orbits.

> To be 'in orbit,' an object must circumnavigate the planet at least one full time. When, on Nov. 3, 1967, U.S. Secretary of Defense McNamara announced that the U.S.S.R. had been testing a Fractional Orbiting Bombing System (FOBS), that could become operational in 1968, he hastened to add that as such an object, while entering outer space, does not completely circle the globe, it, like an intercontinental ballistic missile, was not in violation of the 1967 treaty.

HURWITZ, *supra* note 289, at 111.

bodies." Though this clause does not include the "moon" as does the one immediately preceding it, it is clear that the Outer Space Treaty uses "celestial bodies" as a phrase which includes the moon. Thus the first sentence of Article IV(2) speaks of the moon "and *other* celestial bodies." (emphasis added) As a result, Article IV can reasonably be read to prohibit both the creation of permanent military structures on the moon or other celestial bodies, as well as the testing of weapons there. Though non-nuclear weapons testing is not prohibited in outer space,[356] it cannot occur on celestial bodies. Such prohibition could well have been in response to published reports of the U.S. moon base program. In a January 21, 1958 speech about a planned military outpost on the far side of the moon, Brigadier General Homer A. Boushey explained:

> The moon provides a retaliation base of unequaled advantage. If we had a base on the moon, the Soviets must launch an overwhelming nuclear attack toward the moon from Russia two to two-and-one-half days prior to attacking the continental U.S.–and such launchings could not escape detection–or Russia could attack the continental U.S. first, only and inevitably to receive, from the moon–some 48 hours later–sure and massive destruction.[357]

Whatever its strategic value, such a proposal today would be clearly prohibited by the Outer Space Treaty.

2. *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue and Return Agreement)–1968*

Adopted in time for the imminent manned moon launchings of the United States, the so-called "Rescue and Return Agreement"[358] sought to clarify the duties of States relating to astronauts and objects launched into

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[356] For discussion of the prohibition on nuclear weapons tests in space, see *infra* notes 436-438 and accompanying text.

[357] W.E. Burrows, *The Military in Space: Securing the High Ground, in* SPACE: DISCOVERY AND EXPLORATION 142 (M.J. Collins & S.K. Kraemer, eds., 1993) (quoting speech by Brigadier General Homer A. Boushey).

[358] Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 672 U.N.T.S. 119, 19 U.S.T. 7570, T.I.A.S. No. 6599, (entered into force Dec. 3, 1968) [hereinafter Rescue & Return Agreement]. Although widely used, the shorthand "astronaut agreement" is unfortunate because it masks the treaty's application to return of *objects* as well as astronauts. A better shorthand reference would be the "rescue and return agreement." CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 152.

space.[359] Though it appears that space warfare in the foreseeable future will rely primarily on unmanned space activities, the Agreement's provisions on objects as well as those on astronauts will be relevant as a limitation on means and methods of space warfare. The Agreement is essentially an expansion of Article V of the Outer Space Treaty which required States Parties to regard astronauts as "envoys of mankind" entitled to "all possible assistance." Divided into provisions dealing with the return of Astronauts (Articles 1-4) and the return of space objects (Article 5), the treaty had been adopted by ratification, accession, or succession by eighty-four States as of 1997, including the U.S. and U.S.S.R.[360]

Regarding astronauts, the Agreement requires a State Party to make two notifications. It must either notify the launching authority or make a public announcement, *and* notify the U.N. Secretary General[361] under three conditions: when it receives information or discovers that the personnel of a spacecraft have (1) suffered accident; (2) experienced conditions of distress; or (3) made an emergency or intended landing on territory under its jurisdiction, on the high seas, or on any other place not under any State's jurisdiction.[362] Further, the Agreement requires the provision of "rescue" and "all necessary assistance" by States Parties in cases where astronauts land in their territory by reason of "accident, distress, emergency, or unintended landing."[363] This

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[359] Though never defined, it seems best to think of a space object as something distinct from astronauts. However, when international law finally settles on a definition of space object it may include astronauts. *See infra* note 365.

[360] Other than the Moon Agreement, the U.S. and Russia are parties to four of the five multilateral treaties under the *corpus juris spatialis*. For discussion of the Moon Agreement, see *infra*, Part IV, § B.5.

[361] Though the treaty does not specify whether the notifications to the launching authority and the U.N. Secretary General are conjunctive or disjunctive, the language of Article 2 requiring similar notifications is conjunctive.

[362] Rescue & Return Agreement, *supra* note 358, at art. 1.

[363] *Id.* at art. 2. Article 2 further specifies that if assistance by the launching authority would "effect a prompt rescue or would contribute substantially to the effectiveness of search and rescue operations" it *shall* cooperate with the State Party in whose territory the astronaut has landed. *Id.* This raises two observations. First, if the conditions for cooperation are satisfied, the launching authority must assist. Second, because Article 6 defines launch authority, in part, as "the State responsible for launching," it could constitute a State other than the astronaut's home state. For example, when the U.S. launches Canadian, French, or Spanish astronauts on its Space Shuttle, if the occupants were to land in the territory of another contracting party by reason of "accident, distress, emergency, or unintended landing," the U.S. as "launching authority" could be required under Article 2 to assist in any recovery efforts. *Id.* Such efforts would then be "subject to the direction and control of the Contracting Party, which shall act in close and continuing consultation with the launching authority." *Id.* With respect to the treaty, its provisions, including the duty to rescue and assist, formally apply only to States Parties. However, by analogy with Maritime Law, it seems likely that this duty to assist astronauts in distress is rooted in customary international law. The duty to assist mariners on the sea has long been established both by treaty (e.g. 1910 Brussels Treaty) and custom, and likely applies equally to astronauts.

assistance is equally mandatory for landings on the high seas or other places not under the jurisdiction of any States, but only for those Contracting States "in a position to do so ... if necessary."[364]

With respect to "space objects," a term undefined by this or any other space treaty,[365] the Agreement requires that notification be made to the launching authority following discovery of any space object within the territory of a contracting party, on the high seas, or any other place not under the jurisdiction of any State.[366] The treaty further requires that upon furnishing "identifying data," States Parties "shall" return space objects found beyond the territorial limits of the launching state.[367] However, while this provision would certainly require the return of space weaponry or satellites having landed back on earth, it does not specify *when* such return must take place or in exactly what condition. Presumably, the treaty requires return within a reasonable time, though that could perhaps occur *after* a thorough inspection and analysis of the space object by the State possessing it. Because the treaty makes no distinction between civil and military astronauts or launchings, its terms apply equally to astronauts and space objects used for both purposes.

A significant issue arose in 1978 pertaining to the reentry of a nuclear-powered ocean reconnaissance satellite owned and operated by the Soviet Union–Cosmos 954.[368] On January 24, 1978 the satellite crashed in Canada's Northwest Territories. According to the diplomatic exchanges following the incident, the U.S. offered assistance "within 15 minutes."[369] After some delay,

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[364] *Id.* at art. 3.

[365] The Liability Convention, does define space object as including the "component parts of a space object as well as its launch vehicle and parts thereof." Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, art. 1(d), 24 U.S.T. 2389, 961 U.N.T.S. 187 (entered into force Sept. 1, 1972) [hereinafter Liability Convention]. However in using the very term to be defined within the definition itself, the definition is so hopelessly circular that it amounts to no definition at all.

[366] Rescue & Return Agreement, *supra* note 358, at art. 5(1).

[367] *Id.* at art. 5(3).

[368] The satellite was designed for ocean reconnaissance and was powered by a "nuclear reactor working on uranium enriched with isotope of uranium-235." SPACE LAW AND INSTITUTIONS: DOCUMENTS AND MATERIALS 295 (I. Vlasic, ed., 1997) (containing Statement of Claim by Canada, Jan. 23, 1979). The Cosmos 954 crash was the first instance "in the history of space exploration where a claim was made by one sovereign state against another on account of damage caused by a falling space object." B. Schwartz & M.L. Berlin, *After the Fall: An Analysis of Canadian Legal Claims for Damage Caused by Cosmos 954*, 27 MCGILL L.J. 676 (1982). The satellite contained over 50 kg of enriched uranium, suggesting it was not designed for reentry in 1978 but only after a long orbital lifetime.

[369] President Carter notified Canadian Prime Minister Trudeau and actually repeated an offer made prior to the satellite's reentry. A.F. Cohen, *Cosmos 954 and the International Law of Satellite Accidents*, 10:1 YALE J. INT'L L. 78, 80 (1984). Not only does this suggest that the U.S. had tracked the satellite to its reentry point, but that the U.S. earnestly wanted an analysis of the Soviet spy satellite. Cohen reports that prior to the reentry, the Soviet Union secretly provided the U.S. with information about the satellite's reactor, though this information was only formally provided to Canada months after the crash. *See id.* at 179.

Canada accepted the U.S. offer of assistance but declined the Soviet offer.[370] Instrumental in the exchanges was the language of Article 5(2). Though it required Canada to "take such steps as it finds practicable to recover the object or component parts," the treaty allowed for Soviet assistance only "if requested."[371] Because Canada never made the request, the Soviet Union had no right to search for its property on Canadian soil (and thus protect it from discovery by the West).

Though intended as a clarification of the Outer Space Treaty, the Rescue and Return Agreement raises as many questions as it answers. One commonly raised question pertains the possibility that an astronaut landing in the territory of another State Party may wish to request political asylum. Though Article 4 does not seem to allow for this possibility, ("shall be safely and promptly returned"),[372] other principles of international law contained in the U.N. Charter and Universal Declaration of Human Rights do. Though a few States took the position that the treaty did not extinguish the right to request asylum in connection with an unintended landing from space,[373] most States, including the U.S., rejected this position and maintained that the treaty created a specific exception to the asylum rules.[374]

Other questions raised by ambiguities in the Agreement include the following: "How should rescue expenses be treated? Is the launching state obligated to reimburse the rescuing state? What if a rescue attempt is bungled–will the rescuing state be liable, or does some sort of Good Samaritan principle apply? Should there be such a principle, since rescue is mandatory?"[375] Though the treaty requires rescues for astronauts, it does not specify who pays for the rescue operation or in what proportion, unlike the case respecting searches for space objects under Article 5, and the subsequent Liability Convention.[376] The answers to each of these questions could affect the

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[370] Indeed, though the Soviet Union expressed no interest in the return of the object and therefore claimed it had no obligation to provide identifying data under Article 5(3) (required prior to return of the object), it expressed regret that its specialists did not participate in the search and removal of the object. CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 179. Because no State has ever requested return of a space object from another, Article 5 has never been tested in practice.

[371] Rescue & Return Agreement, *supra* note 358, at art. 5(2).

[372] *Id.* at art. 4.

[373] Austria, supported by France, wished to continue to offer asylum in keeping with its "traditional policies toward aliens." CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 175.

[374] REYNOLDS & MERGES, *supra* note 59, at 204. These States plausibly asserted that requests for asylum under conditions of the unintended landings specified in the treaty could be coerced, "particularly when the requestor is the victim of a recent space accident and may not be in full possession of his or her faculties." *Id.*

[375] *Id.* Also, though its terms suggest application to living astronauts, the treaty does not answer whether a duty exists to return the remains of expired astronauts.

[376] Liability Convention, *supra* note 365.

evolution of space warfare as States make wartime decisions in light of possible liability. The potentially significant issue of whether the Rescue and Return Agreement mandates return of astronauts in time of war is discussed in Part VI.[377]

3. *Convention on the International Liability for Damage Caused by Space Objects (Liability Convention)–1972*

The longest of the space treaties at 28 articles, the Liability Convention takes as its goal an elaboration of "effective international rules and procedures concerning liability for damage caused by space objects and to ensure, in particular, the prompt payment under the terms of this Convention of a full and equitable measure of compensation to victims of such damage."[378] As with the Rescue and Return Agreement, the Liability Convention undertook an expansion of the Outer Space Treaty, in this case Article VII, which made a launching State "internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons" for damage caused by its space objects.[379] With a few exceptions, the Liability Convention is likely to have only a tangential relationship to the regulation of space warfare.

The Convention sets up a two-tiered structure of liability. For damage caused by a space object on the surface of the earth or to an aircraft in flight, the launching State[380] is "absolutely liable."[381] Otherwise, the Convention

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[377] *See infra*, Part VI, § E.3.

[378] Liability Convention, *supra* note 365 (from the Preamble).

[379] Outer Space Treaty, *supra* note 316, at art. VII. Article VI of the Outer Space Treaty also provided the drafters of the Liability Convention some guidance in its assertion that States Parties "shall bear international responsibility for national activities in outer space . . . ." *Id.* at art. VI. Foster notes that the Outer Space Treaty left several left several questions unanswered:

> (a) what flight instrumentalities are covered by the term 'object?'; (b) what is meant by the phrase 'internationally liable?'; (c) what regime will govern the liability of States engaged in a joint venture–will they be jointly and severally liable or only severally liable?; (d) what is encompassed by the term 'damage?'; (e) how is an international organization to be responsible under the Treaty when it cannot become a party to, or even accept the obligations contained in the Treaty?; and (f) what mechanisms will be used to settle disputes arising when damage is caused?

W.F. Foster, *The Convention on International Liability for Damage Caused by Space Objects*, 1972 CAN. Y.B. INT'L L. 137, 143 n.3 [hereinafter Foster]. Of these, with the exception of the first, all have been clarified to some meaningful degree by the Liability Convention.

[380] Defined more expansively than "launching authority" under the Rescue & Return Agreement, "launching state" under the Liability Convention includes (1) the State who launches a space object; (2) the State who procures the launch of a space object; and (3) the State from whose territory or facility a space object is launched. Liability Convention, *supra* note 365, at art. I(c).

provides fault-based liability "[i]n the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State ..."[382] As with all other space treaties, the Liability Convention makes no distinction between civilian and military space objects which could form the basis of a claim. Thus, not only military operations short of armed conflict, but space operations during war itself could form the basis of monetary claims under the Convention, provided the space object[383] of the launching State caused "damage." Because the Convention defines the term broadly, to include "loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations,"[384] just about any damage directly caused by the space object will be compensable.

Other provisions establish the principle of joint and several liability;[385] apportionment of liability for joint launchings;[386] conditions under which a launching State may be exonerated from absolute liability;[387] exclusions of liability;[388] priority of presenting claims between a State on behalf of itself or national, territorial States on behalf of non-nationals, and State of residency of victims;[389] a one-year statute of limitations from the date of occurrence,

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[381] Liability Convention, *supra* note 365, at art. 2. This significant provision was the first time that an international agreement provided for attaching absolute liability to State actors.

[382] *Id.* at art. 3.

[383] As stated previously, the Liability Convention's definition of "objects" attempts, but fails to define the term. Though it would appear to include non-operational space debris, it leaves several unresolved issues. For example, it is unclear whether a space object is simply an object designed for travel in outer space. Foster notes that all of the draft definitions of "space object" in the COPUOS Legal Subcommittee "contained the criterion of being designed for movement in outer space." Foster, *supra* note 379, at 145. On this approach, sounding rockets that fail to leave earth's atmosphere and scientific equipment permanently left on the moon are not space objects. By contrast, a satellite in transit by rail that rolls off its platform causing damage would logically subject the State of origin to absolute liability. Though the Liability Convention attaches liability to "launching States" it does not specify that to be compensable the damage must occur during or after a launch. Further, because the Liability Convention definition of "space object" includes "component parts of a space object," it is unclear whether, for example, cargo and crew of a space object also qualify themselves as "space objects." They might if Christol is correct that "'component parts' is to be construed in a broad sense to include such property on board as would be conducive to the successful operation of the space object." CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 109. Because the Convention does not explicitly define the term "space object," these hypothetical scenarios raise potential future disputes over what types of objects can create liability.

[384] Liability Convention, *supra* note 365, at art. I(a).

[385] *Id.* at art. IV.

[386] *Id.* at art. V.

[387] *Id.* at art. VI.

[388] *Id.* at art. VII.

[389] *Id.* at art. VIII.

identification of the launching state, or acquisition of facts by the injured State putting it on notice of the damage;[390] and the availability of domestic remedies.[391] Following this, the Convention provides seven articles on the establishment, compositions, and procedure of a "claims commission" for the adjudication of claims made under the convention.[392] Though widely hailed as creating an equitable procedure for the resolution of liability claims, one of the Convention's "most publicized" defects was the failure to require that Claims Commission decisions would automatically bind litigants.[393]

Whether the Liability Convention has succeeded in achieving its goals remains to be seen. Though the Convention has specified a liability regime, it has never been used and thus cannot be judged "effective." The Cosmos 954 incident would have provided the first case study. However though it paid $3,000,000 of the Canadian $6,000,000 claim, the Soviet Union refused to engage in legal argumentation over the Convention's terms. Though the Convention does establish the international standard for compensation, and fixes the level of liability based on the spatial area in which the damage occurred, it is unlikely to affect a State's decision to use of force in space, or the selection of means and methods thereto.

4. Convention on Registration of Objects Launched into Outer Space (Registration Convention)–1975

The Registration Convention establishes a mandatory system of registration for space objects launched into orbit and beyond.[394] With reference to the Convention's preamble, one commentator cites two essential functions served by an international registration requirement: "(1) a well-ordered, complete and informative register would minimize the likelihood and even the suspicion of weapons of mass destruction being furtively put into orbit; (2) it is not possible to identify a spacecraft that has caused damage without an international system of registration."[395] Though the conclusion stated in the first point above seems overly optimistic, especially given the late reporting allowed under the Registration Convention, the second appears to be beyond question.

As with the previous two treaties discussed, the Registration Convention also clarifies a provision from the Outer Space Treaty. When establishing the principle that a launching State maintains jurisdiction and

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[390] *Id.* at art. X.
[391] *Id.* at art. XI.
[392] *Id.* at art. XIV–art. XX.
[393] CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 112.
[394] Convention on the Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 (entered into force Sept. 15, 1979) [hereinafter Registration Convention].
[395] DIEDERIKS-VERSCHOOR, *supra* note 298, at 41.

control in space over its launched objects, the Outer Space Treaty makes reference to the "registry" of States Parties.[396] Only in the 1975 Registration Convention did space law formally specify the requirement that States maintain a registry,[397] and the nature of its contents.

After defining "launching state," "space object," and "State of registry,"[398] the Convention provides that each State will maintain an "appropriate registry" that contains an entry for all space objects "launched into earth orbit or beyond."[399] The Convention allows each State to determine the specific contents of its registry and the conditions under which it is maintained,[400] however certain information must be provided for the registry kept by the United Nations Secretary General. Thus, the "heart" of the Convention, Article IV, specifies that launching States must provide the following information:

(a) name of launching State or States;
(b) an appropriate designator of the space object or its registration number;[401]
(c) date and territory or location of launch;
(d) basic orbital parameters, including:
  (i) nodal period,[402]
  (ii) inclination,[403]

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[396] Outer Space Treaty, *supra* note 316, at art. VIII.

[397] Arguably, the Outer Space Treaty implicitly required the maintenance of a registry simply because use of the term in the Treaty assumes that States maintain them. Yet, the matter was not stated as a requirement until 1975.

[398] Registration Convention, *supra* note 394, at art. I. The first two phrases are given definitions identical to those found in the Liability Convention.

[399] *Id.* at art. II(1). This suggests that space objects, or other objects, launched into *sub*-orbital trajectories need not be registered. Technically, this would include objects failing to complete a single circumnavigation of the globe, as for example objects following a 180 or 270 degree arc, short of the complete 360 degree path required of orbital flights.

[400] *Id.* at art. II(3).

[401] Essentially, this information has been made optional in view of Article V which suggests that space objects may or may not carry identifying markings: "Whenever a space object launched into earth orbit or beyond is marked with the designator or registration number referred to in Article IV, paragraph 1(b), . . ." The obvious but unstated assumption flowing from "whenever" is that in some cases the object might be marked, in some cases it might not, at the option of the launching state.

[402] Also termed "orbital period." "The time it takes a spacecraft or other object to circumnavigate Earth, . . . High altitude circuits take longer to complete than low ones. Elliptical and circular orbits have equal periods, if the average of apogee and perigee altitudes is the same." COLLINS, MILITARY SPACE FORCES, *supra* note 12, at 156.

[403] Also termed "orbital inclination."

> The angle of a flight path in space relative to the equator of Earth, . . . Equatorial paths are 0° for flights headed east, 180° for those headed west.

(iii) apogee,[404]
(iv) perigee;[405]
(e) general function of the space object.[406]

With respect to military launches, the Convention allows registry notifications to be sufficiently ambiguous so as to mask the true nature of the mission. The following two provisions of Article IV make this especially so: First, the fact that the information need only be provided "as soon as practicable," which launching States may and do interpret as weeks or months following the launch;[407] and second, the fact that only the "general function" of the space object need be disclosed – a phrase interpreted, again, by the launching State. The room for ambiguity afforded by the Convention allows States to protect the identity of their military satellites, which perform an entirely legitimate function under the law.[408] Writing euphemistically, Professor Diederiks-Verschoor observes that "[t]he underlying reason for the reluctance [to provide specific information on reconnaissance satellites] is that

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Polar paths are 90°. All other paths overfly equal parts of the northern and southern hemispheres (from 50° N latitude to 50° S, for example).

Id.

[404] "The maximum altitude attained by a spacecraft in elliptical orbit around Earth, its moon, or another planet." *Id.* at 146.

[405] "The minimum altitude attained by a spacecraft in elliptical orbit around Earth, its moon, or another planet. Spacecraft in [low-earth orbit] attain maximum velocity at that point where Earth's gravitational pull is strongest." *Id.* at 157.

[406] Registration Convention, *supra* note 394, at art. IV(1).

[407] In some cases, what is practicable may require delay for up to a year or more. During the prosecution of an international armed conflict, it would hardly be practicable for a belligerent to transmit the launch of its space objects to an opposing belligerent through the United Nations. Notification to the opposing belligerent is the practical result of such notifications made during the armed conflict, given the fact that "[t]here shall be full and open access to the information in this [United Nations] Register." *Id.* at art. III(2). On this interpretation of Article IV(1), a belligerent could avoid the difficult conclusion that the Registration Convention does not apply during armed conflicts–the belligerent could simply and reasonably apply the Convention's own terms in the context of armed conflict. This interpretative approach to the Registration Convention is available to belligerents in any conflict, not merely those involving space combat. Thus, during Vietnam, the 1991 Persian Gulf War, and the 1999 war in the former Yugoslavia, belligerents could legitimately delay notification to the U.N. Secretary General under Article IV until doing so provided no tactical advantage to the enemy. Once the military threat posed by earlier notification is passed, the notification became practicable for the State of registry.

[408] Indeed, protection of the "national technical means" (including space reconnaissance capabilities) under the Anti-Ballistic Missile (ABM) treaty between the U.S. and U.S.S.R., is the *sine qua non* of an effective verification structure. To the extent the ABM Treaty should survive in its current form, the U.S. and Russia must protect the secrecy of their space reconnaissance assets. The Registration Convention allows them to do this. For a discussion of the ABM Treaty, see *infra*, Part V, § A.2.

States do not trust each other."[409] She opines that a State's disclosure of spy satellite data to "the fullest possible" extent, with due regard to its national security interests, will perhaps allow registration to "overcome the suspicion barrier."[410] The problem with this understandably hopeful analysis, is that it overlooks the central point of a spy satellite–acquisition of information without the subject State's knowledge. Once its existence and characteristics are published, its effectiveness as a instrument for spying diminishes. What Diederiks-Verschoor and other authors seem to be suggesting with this type of analysis is that space reconnaissance activities should simply be outlawed. Though that is a question beyond the scope of this review, it suffices to say that such activities have been recognized as lawful for decades and likely will for the foreseeable future.[411]

5. Agreement Governing the Activities of States on the Moon and other Celestial Bodies (Moon Agreement)–1979

Of the five multilateral treaties devoted entirely to space, the Moon Agreement[412] is the most recent and enjoys the least support.[413] Additionally, the Agreement sheds little light on the international legal regime restricting space warfare beyond that contained in previous treaties. As a result, the Agreement is marginally relevant for international space law in general, and the military uses of space in particular. Nonetheless, the Agreement does contain provisions that could impact space warfare as persuasive authority for the creation of future international legal obligations on non-parties.

The Agreement reiterates for the moon many of the principles found in the Outer Space Treaty including the notions of "province of all mankind,"[414] exploration and use carried out for the "benefit and interests of all countries,"[415] the fact that the moon is "not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other

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[409] DIEDERIKS-VERSCHOOR, *supra* note 298, at 42.
[410] *Id.*
[411] In addition to reconnaissance satellites, the vague reporting requirements could easily obscure the true nature of attack satellites as well.
[412] Agreement on the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, G.A. Res. 34/68, U.N. GAOR, 34th Sess., Supp. No. 46, U.N. Doc. A/34/664 (1979) (entered into force July 11, 1984) [hereinafter Moon Agreement].
[413] As of 2000, nine States had ratified the treaty, few of which are active in space and none of which are major space actors. Among others, these include Australia, Mexico, and Pakistan. Multilateral Treaties Deposited with the Secretary-General (July 21, 2000), *available at* http://untreaty.un.org/ENGLISH/bible/englishinternetbible/partI/chapterXXIV/treaty2.asp (copy on file with the *Air Force Law Review*). France signed but has not ratified the treaty. *Id.*
[414] Moon Agreement, *supra* note 412, at art. 4(1); *accord* Outer Space Treaty, supra note 316, at art. I.
[415] Moon Agreement, *supra* note 412, at art. 4(1); *accord* Outer Space Treaty, supra note 316, at art. I.

means,"[416] and retention by States Parties of "jurisdiction and control" over their personnel and space vehicles.[417] Further, as with the Outer Space Treaty, the Moon Agreement requires that all activities on the moon be carried out in accord with "international law,"[418] and that States bear "international responsibility for national activity" on the moon.[419] Finally, both treaties specify that all stations, installations, equipment, and space vehicles "shall be open" to the other States Parties.[420]

The Agreement applies not only to the moon, but to "other celestial bodies within the solar system, other than the earth."[421] Though "celestial bodies" is nowhere defined in any of the space conventions, it would presumably include all planets, asteroids, and comets found within earth's solar system. This is suggested by the Agreement's exclusion from its scope of any "extraterrestrial materials which reach the surface of the earth by natural means."[422] Significantly, the Agreement authorizes removal from the moon of "samples" of "mineral and other substances."[423] Though debate continues on the permissibility and propriety of harvesting lunar resources, there is no moratorium on doing so given the lack of support for the Moon Agreement.[424]

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[416] Moon Agreement, *supra* note 412, at art. 11(2); *accord* Outer Space Treaty, supra note 316, at art. II.

[417] Moon Agreement, *supra* note 412, at art. 12(1); *accord* Outer Space Treaty, supra note 316, at art. VIII (using term "object" versus "vehicles, equipment, facilities, stations, and installations").

[418] Moon Agreement, *supra* note 412, at art. 2; *accord* Outer Space Treaty, supra note 316, at art. III.

[419] Moon Agreement, *supra* note 412, at art. 14(1); *accord* Outer Space Treaty, supra note 316, at art. VI.

[420] Moon Agreement, *supra* note 412, at art. 15(1); *accord* Outer Space Treaty, supra note 316, at art. XII. The Moon Agreement adds a fifth category, facilities, to the list of items open to States Parties.

[421] Moon Agreement, *supra* note 412, at art. 1(1).

[422] *Id.* at art. 1(3).

[423] *Id.* at art. 6(2). Unfortunately, the treaty does not define "sample." Thus it is not clear from the treaty's terms either what sized object constitutes a sample (1 cm? .5 m? 10 m? 100 m?) or how many samples may be removed. Article 6(2) goes on to state that "States Parties may in the course of scientific investigations also use mineral and other substances of the moon in quantities appropriate for the support of their missions." *Id.* While this comes close to providing guidance on a permissible amount, the fact that minerals and substances may "also" be used in this way suggests that it is in addition to the taking and retaining of samples. Thus, there is no clear answer.

[424] The Apollo 11 moon landing in 1969 is regarded as providing the first major impetus toward negotiating a specific treaty governing moon activities. The negotiators were motivated in part by "an awareness that tangible Moon rocks were being returned to Earth, the possibility that mineral and other substances, as well as intangible resources, might be exploited, and speculation that it might be possible to establish human habitations on the Moon." CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 246. The provision allowing for limited exploitation of the moon's resources came at the expense of proposals by some developing countries to outlaw the exploitation of natural resources in space except under the auspices of an international regime.

Regarding military activity, the Agreement forbids the placement of weapons of mass destruction, including nuclear weapons, on the moon itself, in orbit around the moon, or on trajectories to and around the moon, and on other celestial bodies.[425] Further, the Agreement's military provisions do not prohibit the placement of weapons in outer space in general, only weapons of mass destruction. The Agreement's language pertaining to military usage does however largely mirror Article IV of the Outer Space Treaty. Requiring that the use of the moon be "exclusively for peaceful purposes," the Moon Agreement continues "any threat or use of force or any other hostile act or threat of hostile act on the moon is prohibited."[426] Given the fact that the Agreement already specified that activity on the moon must occur pursuant to international law, and the provision on the "threat or use of force" simply parrots the language of Article 2(4) under the U.N. Charter, one wonders why this language was necessary. The reference to "any other hostile act or threat of hostile act" was new in 1979, suggesting that under the Moon Agreement a "peaceful" use will be a non-hostile use.

Perhaps the most significant feature of the Agreement of an enduring character is its articulation of the "common heritage of mankind" concept. Article 11 begins: "The moon and its natural resources are the common heritage of mankind."[427] Though articulated within the U.N. in the 1960s,[428] the common heritage of mankind (hereinafter CHM) principle found its first expression of a legally binding character in the Moon Agreement. Though not equivalent to the "province of mankind" language found in the Outer Space

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[425] Moon Agreement, *supra* note 412, at art. 3(3). The prohibition on orbiting weapons of mass destruction around the moon was thought to close a gap left by Article IV of the Outer Space Treaty. The latter outlawed the orbiting of weapons of mass destruction around the earth, and the installation or stationing of such weapons on celestial bodies or in outer space. Though the prohibition on stationing weapons of mass destruction in outer space could be read to foreclose the lawfulness of orbiting, for example, a nuclear weapon around the moon, the Outer Space Treaty did not specifically forbid orbiting of the moon by nuclear or other weapons of mass destruction. The Moon Agreement did.

[426] *Id.* at art. 3(2).

[427] *Id.* at art. 11.

[428] As applied to outer space, the concept first arose in July 1967 at the behest of the Ambassador of Argentina, Aldo Armando Cocca, in discussions held with the COPUOS Legal Subcommittee.

> A few months later, the Maltese Ambassador to the United Nations, Arvid Pardo, applied the principle to the law of the sea when he stated that the seabed was the 'common heritage of mankind.' The concept was formalized first in the 1979 Moon Agreement, and subsequently in the 1982 Law of the Sea Convention.

Jasentuliyana, *Developing Countries*, *supra* note 319, at 106. Prior to this, the CHM concept appeared in a 1970 U.N.G.A. resolution declaring principles governing the seabed and subsoil beneath it.

Treaty,[429] the CHM principle bears some similarities. According to Jasentuliyana, the CHM theory has a specific meaning when applied to the Moon Agreement and identifies five characteristics for territory designated as such: (1) it is not subject to State appropriation; (2) it is jointly managed by all States; (3) all States should equitably share in the benefits reaped from the exploitation of the resources of the areas; (4) the areas must be dedicated exclusively to peaceful purposes; and (5) the CHM should be conserved for future generations.[430]

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[429] During negotiations over the Moon Agreement, the Argentinean delegation submitted a working paper in which it proposed that the merit in "replacing the vague expression 'province of mankind' by the more meaningful expression 'common heritage of mankind' is that in doing so one has specified the commencement of an action, replacing an abstract statement by a means of operating, within a specified legal framework." Jasentuliyana, *Developing Countries*, *supra* note 319, at 107-08. Perhaps Diederiks-Verschoor puts the distinction best:

> The 'province of mankind' must be identified as a general political principle with certain moral overtones, meant to govern rights and duties in outer space. Its legal substance, according to Article I [of the Outer Space Treaty] is international cooperation and use of outer space without discrimination of any States, and the duty to take into account the interests of other States. The scope of the term 'common heritage' is much more restricted in legal terms, covering only the exploitation of the moon's natural resources.

DIEDERIKS-VERSCHOOR, *supra* note 298, at 45. As usual, Professor Christol gets to the heart of the matter:

> [despite commonalities] it is evident that the two principles carry separate and distinct characteristics. The province of mankind principle is linked to the *res communis* principle which allows for the exploration, use, exploitation, and voluntary sharing of common resources. On the other hand, the Common Heritage of Mankind principle, as contained in the Moon Agreement, may be characterized as a "*res communis* plus" principle in the sense that successful explorers, users, and exploiters of the moon and its natural resources will be obligated to conform to the decisions of the international legal regime identified in Article 11 of that agreement . . . . The province of mankind principle does not contemplate the formation of an international inter-governmental body or that there be an obligatory sharing of the tangible acquisitions of Moon and celestial body activity.

C.Q. Christol, *Important Concepts for the International Law of Outer Space*, *in* PROCEEDINGS OF THE FORTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE 73, 80 (1998).

[430] Jasentuliyana, *Developing Countries*, *supra* note 319, at 106-07. For more detailed analyses, see G.M. Danilenko, *The Concept of the Common Heritage of Mankind in International Law*, XIII ANNALS AIR & SPACE L. 247 (1988); N. Jasentuliyana, *The U.N. Space Treaties and the Common Heritage Principle*, 2 SPACE POL'Y 296 (1986); A. Cocca, *The Common Heritage of Mankind: Doctrine and Principle of Space Law–An Overview*, *in* PROCEEDINGS OF THE TWENTY-NINTH COLLOQUIUM OF THE LAW OF OUTER SPACE 17 (1986); N.M. Matte, *Limited Aerospace Natural Resources and their Regulation*, VII ANNALS AIR & SPACE L. 379 (1982); K.B. Walsh, *Controversial Issues Under Article XI of the Moon Treaty*,

Throughout its history, the CHM principle in international law has proven controversial. For the developing States, the concept as applied to space is an important protection against the "first-come-first-served" approach taken by the spacefaring States. For those States active in space, particularly Western States desirous of stimulating private investment, the concept is a threat to the economical exploitation of space resources. The attempt to institute a legal regime based on an (undefined) "equitable sharing" of the moon's natural resources creates uncertainty, which, in turn, stifles commercial interest. This problem is particularly acute given the Agreement's specification that the proposed international regime to govern exploitation of the moon's resources[431] is to be established "as such exploitation is about to become feasible."[432] Uncertainty over the terms of an international regime was largely responsible for the U.S. decision not to sign the Moon Agreement.[433] Ultimately, the conclusion reaches by Reynolds & Merges appears plausible:

VI ANNALS AIR & SPACE L. 489 (1981); and S.M. Williams, *The Common Heritage of Mankind and the Moon Agreement–Economic Implications and Institutional Arrangements, in* PROCEEDINGS OF THE TWENTY-FOURTH COLLOQUIUM ON THE LAW OF OUTER SPACE 87 (1981).

[431] The Agreement calls for an international regime that contains four purposes:

> (a) The orderly and safe development of the natural resources of the moon; (b) The rational management of those resources; (c) The expansion of opportunities in the use of those resources; and (d) an equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration.

Moon Agreement, *supra* note 412, at art. 11(7).

[432] *Id.* at art. 11(5).

[433] Indeed, friction between the U.S. and U.S.S.R. did not help the prospects for ratification. Although the other leading global space power, and presumably capable of developing the means to exploit the moon's natural resources, the U.S.S.R. generally sided with the interests of the developing States. Both were against incorporation of the CHM principal, however, the U.S. and U.S.S.R. could not agree on whether exploitation could begin before establishment of the international regime called for in Article 11—the U.S. position—or not, the Soviet position. *See* DIEDERIKS-VERSCHOOR, *supra* note 298, at 46. For further information on the debates within the U.S. Senate and State Department, see M.L. Nash, *Contemporary Practice of the United States Relating to International Law: Moon Treaty*, 74 AM. J. INT'L L. 418, 421-26 (1980). Though the State Department supported the Agreement, a large number of space interest groups mounted a tremendous protest to the implications of the CHM principle. What is most surprising is that despite the strong objection to the CHM principle coming from the U.S., "the U.S. delegation in COPUOS was the main architect [of the concept]." D. Goedhuis, *Some Recent Trends in the Interpretation and the Implementation of the Rules of International Space Law*, 19 COL. J. TRANSNAT'L L. 213, 231 (1981). *See also* C. Christol, *Current Developments: The Moon Treaty Enters Into Force*, 79 AM. J. INT'L L. 163 (1985).

"[a]bsent adoption by the major space powers, the Moon treaty is unlikely to play a major role in the future."[434]

V. SPACE WARFARE UNDER RELATED TREATIES AND OTHER AUTHORITATIVE SOURCES

> No one can predict with certainty what the ultimate meaning will be of the mastery of space.[435]
>
> President John F. Kennedy (1961)

In addition to the treaties and customary law dealing specifically with outer space, a few other treaties not previously discussed contain provisions relevant to the prospect of warfare in space. Also, several U.N.G.A. resolutions have, in some cases quite specifically, revealed the opinion of States on permissible activities in space. These sources are the focus of this chapter, which, though not formally part of the *corpus juris spatialis*, play a significant role in explicating the full range of international norms relevant to space warfare.

A. Treaties

1. Treaty Banning Nuclear Weapons in the Atmosphere, In Outer Space and Under Water (Limited Test Ban Treaty)–1963

Adopted before any of the "space" treaties, the "Limited Test Ban Treaty"[436] nonetheless provided the first treaty provision governing the use of outer space. Despite being the subject of numerous U.N.G.A. resolutions renouncing the use or testing of nuclear weapons, until the Treaty entered force in late 1963 any of the nuclear weapons-capable States were legally free to detonate their warheads anywhere they wished.[437] The Treaty forbids

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[434] REYNOLDS & MERGES, *supra* note 59, at 116.

[435] J.F. Kennedy, PUBLIC PAPERS OF THE PRESIDENTS OF THE UNITED STATES: JOHN F. KENNEDY, 1961, 405 (1962).

[436] Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Underwater, Aug. 5, 1963, 14 U.S.T. 1313, 480 U.N.T.S. 43 (entered into Force Oct. 10, 1963) [hereinafter Limited Test Ban Treaty]. As the title suggests, the Treaty effected a "limited" ban on nuclear testing that did not restrict detonations under ground. Important as its restrictions on space activities are, some scholars refer to it as a sixth space treaty. *See, e.g.*, REIJNEN, *supra* note 332, at ix.

[437] The only limitation of course being those locations where the detonation would constitute an illegal use of force under the *jus ad bellum*, or means and method of warfare against foreign property or persons in violation of the *jus in bello*. Because France and China never signed the treaty, they would in theory still be free to initiate detonations in the atmosphere, under water, or in outer space. Such activity would have to overcome the strong argument that doing so

> nuclear weapon test explosion[s], or any other nuclear explosion[s] . . . (a) in the atmosphere; beyond its limits, *including outer space*; or underwater, including territorial waters or high seas; or (b) in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such explosion is conducted.[438]

The Treaty went on to express hope that the parties would conclude a comprehensive treaty permanently banning all nuclear test explosions, "including all such explosions underground."[439]

While of great military significance the Treaty was essentially aimed at the prevention of global nuclear contamination.[440] Thus, although having the effect of an arms control agreement, the Limited Test Ban Treaty can "be viewed primarily as an environmental agreement rather than a military one."[441] This primary aim of the drafters comes into perspective when one considers the scope of nuclear testing that had gone on previously.[442] Between them, the United States and Soviet Union conducted 212 nuclear explosions from 1945 to 1958. With the exception of eighteen detonations, all occurred in the atmosphere.[443]

The Treaty establishes three significant implications for space warfare. First, while the treaty prohibits all nuclear detonations in space, even those that may have value for peaceful military or scientific purposes, it does not regulate

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violates customary international law, including that related to environmental protection. France continued to test on the high seas until 1973. Though Australia sought a declaration from the International Court of Justice that such testing violated international law, the Court determined the issue moot when France declared it would carry out no further such testing in the South Pacific. *See* Nuclear Test Cases (Australia v. France; New Zealand v. France), 1974 I.C.J. 253, 457.

[438] Limited Test Ban Treaty, *supra* note 436, at art. I(1) (emphasis added). Interestingly, the drafters sidestepped the issue of where space begins by simply forbidding detonations within the atmosphere and "beyond its limits, including outer space." *Id.*

[439] *Id.* The U.S. signed the Comprehensive Test Ban Treaty, which was rejected by the Senate in October of 1999.

[440] Of course, negotiators were not oblivious to the clear military implications as well. Jankowitsch writes, "In 1962, the international community was jolted and the situation changed dramatically when the first nuclear weapon was tested in outer space. Suddenly, the extension of the arms race into outer space posed a real and present threat to international peace and security, . . ." Jankowitsch, *Legal Aspects of Military Space Activities*, *in* SPACE LAW: DEVELOPMENT AND SCOPE 143 (N. Jasentuliyana, ed., 1992).

[441] REYNOLDS & MERGES, *supra* note 59, at 54.

[442] Although one of his highest priorities as President, Dwight D. Eisenhower declared the failure of his administration to secure a nuclear test ban "the greatest disappointment of any administration–of any decade–of any time and of any party." P.H. Nitze & S.D. Drell, *This Treaty Must Be Ratified*, WASH. POST, June 21, 1999, at 19.

[443] *See* N.M. Matte, *The Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water (10 October 1963) and the Peaceful Uses of Outer Space* IX ANNALS AIR & SPACE L. 391, 397(1984). The Soviets did not begin their testing until Aug. 29, 1949.

detonations of a non-nuclear nature such as those pertaining to conventional, biological, chemical, or high energy laser weapons.[444] Second, because the treaty outlaws "any nuclear weapon test explosion, *or any other nuclear explosion*" (emphasis added), it may prohibit the use of nuclear fission as a means of space propulsion.[445] To the extent nuclear power sources operate by means other than "explosion," the Treaty does not prohibit their use. Finally, the Treaty also prohibits the use of nuclear explosions for non-testing purposes as well. Thus, although, for example, the creation of an electromagnetic pulse in space by means of a nuclear detonation may present strategic military advantage, particularly in an anti-satellite role, such activity is forbidden by the treaty.[446]

2. Anti-Ballistic Missile (ABM) Treaty–1972

The ABM Treaty severely limits the deployment, testing, and use of missile systems designed to intercept incoming strategic ballistic missiles.[447] At the time of its adoption in 1972, the U.S.S.R. and the U.S. believed that the best way to avert the possibility of a nuclear exchange, as well as to curb the urge to continue a nuclear arms buildup, was to render each side defenseless to a nuclear attack. The two States agreed that just as the actual ability to defend with an ABM system would create strategic instability, even the perception that the other has the ability would be destabilizing.[448] Thus, with one exception, the two sides agreed to outlaw the testing, development, deployment, and use of ABM systems.[449] The exception allows each side to

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[444] REYNOLDS & MERGES, *supra* note 59, at 59.

[445] *Id.* at 61. The authors note that the United States abandoned its experimentation on the ORION nuclear propulsion system after ratification of the treaty. Such system used small atomic bombs as fuel. A similar process is thought to fuel the X-ray laser developed as part of the Strategic Defense Initiative. *See supra* note 353. The U.S. Congressional Office of Technology Assessment opined in 1985 that existing international law prohibits "the *testing or deployment in space* of nuclear space mines or ASATs that would require a nuclear detonation as a power source." U.S. Congress, Office of Technology Assessment, *Anti-Satellite Weapons, Countermeasures, and Arms Control*, 1985, at 21. The basis of this conclusion is likely not the Outer Space Treaty's ban on the orbiting or stationing of nuclear weapons in space, the definition of which is reasonably open to interpretation, but the Limited Test Ban Treaty's ban on nuclear detonations in space.

[446] Because electromagnetic pulses are not dissipated in space, a single two-megaton bomb exploded at 50 km or higher above the earth could affect the circuits of nearly all satellites up to the geostationary orbit. REYNOLDS & MERGES, *supra* note 59, at 59. While military satellites are shielded against such threats, commercial satellites usually are not. Of course, the treaty does not prohibit all explosions in space, only those generated by a nuclear blase.

[447] Treaty on the Limitation of Anti-Ballistic Missile Systems, May 26, 1972, U.S.-U.S.S.R., 23 U.S.T. 3435 (entered into force Oct. 3, 1972) [hereinafter ABM Treaty].

[448] REYNOLDS & MERGES, *supra* note 59, at 96.

[449] ABM Treaty, *supra* note 447, at art. I, II. As would become significant in 1983, the ABM Treaty did not prohibit research into ABM systems.

maintain one ABM system either around its national capital, or at an ICBM site.[450] Although the Preamble to the treaty cites a desire to decrease "the risk of outbreak of war involving nuclear weapons,"[451] the Treaty applies to defenses guarding against conventional weaponry carried by ballistic missiles as well.

The two primary provisions impacting space activity come from Articles V and XII. Article V(1) provides that "[e]ach party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based."[452] Though there were no space-based ABM systems in existence in 1972 when the Treaty was adopted, the space program of each Party was highly advanced and each could foresee the use of space-based ABM systems.[453] Article XII is perhaps even more significant to the long-term use of space by military systems beyond the more narrow question of ABM systems:

> 1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law.
> 2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1 of this Article.
> 3. Each Party undertakes not to use deliberate concealment measures which impede verification by national technical means of compliance with the provisions of this Treaty. This obligation shall not require changes in current construction, assembly, conversion or overhaul practices.[454]

Paragraph 1 is significant in numerous respects, not least of which is the codification of the "open skies" principle. With this provision, not only was the legality of space-based surveillance via satellite formally acknowledged, but such satellites "became an essential component of the international arms-

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[450] *Id.* at art. III, as amended. The treaty originally allowed two ABM systems having a radius of 150 km or less. This was reduced to one, by Protocol of 1974. *See* Limitation of Anti-Ballistic Missile Systems, July 3, 1974, U.S.-U.S.S.R., 27 U.S.T. 1645 (entered into force May 24, 1976). The Protocol specified that the U.S. would not deploy an ABM system in the area centered on its capital, while the Soviet Union would not deploy a system in the deployment area of its ICBM silo launchers. *Id.* at art. I. While the U.S. explored the development of a system as authorized by the Treaty, it never fielded one. By contrast, the Soviet Union did field one around Moscow. In addition, the U.S. suspected at least one other site maintained by the Soviets that was not authorized under the Treaty. As Shukman notes, "Mikhail Gorbachev was forced to admit, after years of denials, that one large radar, built near Krasnoyarsk in Siberia, was in breach of the agreement." SHUKMAN, *supra* note 39, at 57.

[451] ABM Treaty, *supra* note 447 (from the Preamble).

[452] *Id.* at art. V(1).

[453] REYNOLDS & MERGES, *supra* note 59, at 97.

[454] ABM Treaty, *supra* note 447, at art. XII.

control regime."[455] The legality of military surveillance activity from space was established in international law previous to the ABM Treaty, however the Treaty certainly gave formal sanction to the practice by the two leading spacefaring States.

The requirement under Article XII(2) that the Parties not interfere with the "national technical means" of the other Party can be viewed in part as a specification of the "peaceful purposes" limitation of the Outer Space Treaty. That is, any proposed destruction of a Party's national technical means, including surveillance satellites,[456] by the other, except pursuant to self-defense or U.N. Security Council resolution on the use of force,[457] would certainly constitute an "interference" with that system as well as a violation of the "peaceful purposes" mandate. In this way, the ABM Treaty acts as a partial limitation on the uses of anti-satellite capability maintained either by the U.S. or Russia.

Those following debates on missile defense in the United States will immediately recognize that the ABM Treaty has been widely criticized.[458] The

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[455] REYNOLDS & MERGES, *supra* note 59, at 97.

[456] The term 'national technical means' (NTM) includes

> a variety of technical information-gathering methods for monitoring both military activities and armaments subject to verification. NTM consists, most importantly, of satellites, ships, aircraft and ground-based radar stations, as well as other technical devices. . . . Of course, neither side entirely relies only on its technical means of verification; many additional methods for collecting intelligence are also used to complement the information obtained by technical means.

I.A. Vlasic, *Verifying Compliance With Arms Control Agreements: Whatever Happened to 'ISMA'?*, *in* ARMS CONTROL AND DISARMAMENT IN OUTER SPACE 191 (N.M. Matte, ed., 1985).

[457] The possibility of a Security Council use of force authorization is practically zero as both Parties to the Treaty maintain a veto over any such Security Council resolutions.

[458] Recently published criticisms are numerous: C. Krauthammer, *The ABM Trap*, WASH. POST, July 2, 1999, at 27 [hereinafter Krauthammer]; R.K. Bennett, *Needed: Missile Defense*, READER'S DIGEST, July 1999, at 117; J. Hackett, *Urgent Need to Exit ABM Treaty*, WASH. TIMES, June 11, 1999, at 19; Editorial, *Where's the Treaty?*, WALL ST. J., May 10, 1999, at 22; J. Skrlec, *ABM Pact Outdated, Kissinger Tells Panel: Rogue States Pose Threat*, WASH. TIMES, May 27, 1999, at 15.

These sources show that in addition to the growing chorus of criticism from the U.S. public and Congress, critics include those having negotiated the treaty itself, including Henry Kissinger and John Rhinelander. Critics point to the threat to U.S. cities of missile attacks by nations such as North Korea, Iran, and Pakistan. Even those skeptical of the technical feasibility of ABM systems are witnessing some recent system successes, after numerous failures. A successful June 10, 1999 test firing of the Army's Theater High-Altitude Area Defense system (THAAD), showed, according to program manager Brigadier General Richard Davis, that the U.S. now has "the guidance control, accuracy and the processing that allows us to hit a bullet with a bullet." P. Shenon, *After Six Failures, Test Of Antimissile System Succeeds*, N.Y. TIMES, June 11, 1999, at 1; *See also THAAD Seeker Views Hera Target Before*

Secretary of Defense recently announced that if Russia[459] fails to agree to modifications to the Treaty to allow for a minimal missile defense system, the U.S. reserves the right to withdraw from the Treaty altogether. Significantly, the treaty provides that

> [e]ach Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests. It shall give notice of its decision to the other Party six months prior to withdrawal from the Treaty. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests.[460]

Certainly, in case of war with the other Party or any other State, the Parties' "supreme interests" would be jeopardized, allowing for withdrawal. Whether

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Hit-to-Kill Intercept, 150:26 AV. WK. & SPACE TECH., June 28, 1999, at 42; World News Roundup, 150:24 AV. WK. & SPACE TECH, June 14, 1999, at 56. The system scored a second successful test on Aug. 2, 1999. M.A. Dornheim, *Tough Tests for THAAD Are Several Years Off*, 151:7 AV. WK. & SPACE TECH, Aug. 16, 1999, at 70. The second success prompted the DOD to consider an expedited fielding of the theater system; moving it from 2007 to 2006. R. Wall, *Missile Defense Changes Emerge*, 151:9 AV. WK. & SPACE TECH, Aug. 20, 1999, at 30; *See also* R. Wall, *THAAD At Crossroads After Intercept*, 151:6 AV. WK. & SPACE TECH, Aug. 9, 1999, at 29. The technical implications of these theater ABM successes are still unclear. This uncertainty is especially acute given a recent national missile defense test failure off the coast of California. *See* Elaine Sciolino, *Antimissile System Fails Over Pacific, Pentagon Reports*, N.Y. TIMES, July 8, 2000, at 1. However, as with early critics of ICBM or satellite technology who predicted such innovations were not feasible, the drive to accomplish each was simply a matter of scientific and fiscal willpower. It is likely that the quest for a technically feasible national missile defense system will follow a similar course. The strategic implications are more apparent. Among other benefits, a single THAAD missile battery could defend Taiwan while three batteries could defend the entire island of Japan. J. Hackett, *What the THAAD Hit Means*, WASH. TIMES, June 15, 1999, at 18. As currently proposed, a national missile system could protect most of the U.S. against a limited missile strike.

[459] Following the dissolution of the U.S.S.R. in 1991, Russia became the successor State to the former U.S.S.R.'s rights and obligations under the Treaty.

[460] ABM Treaty, *supra* note 447, at art. XV(2). Recent signs show that withdrawal by the U.S. may not be necessary. After repeatedly objecting to U.S. requests for a renegotiation of the Treaty so as to allow for a national missile defense, Russia decided to discuss the matter under President Yeltsin. J. Gerstenzang, *Clinton, Yeltsin OK New Look at Arms Treaties*, L.A. TIMES, June 21, 1999, at 1. Whether the process begun by these negotiations will result in meaningful progress remains to be seen. As of this writing, the U.S. had proposed a draft treaty that would allow a defensive system consisting of, in part, 100 missiles and launchers, as well as sophisticated new radars. Steven Lee Myers & Jane Perlez, *Documents Detail U.S. Plan to Alter '72 Missile Treaty*, N.Y. TIMES, Apr. 28, 2000, at 1. However, not only has the proposal met with great sceptism by the Russians, but several key national security experts have begun questioning the entire renegotiating strategy. Paul Mann, *Tide Surges Against Clinton's NMD Plan*, 152:25 AV. WK. & SPACE TECH., June 26, 2000, at 31.

the proliferation of ICBMs to States hostile to the U.S. jeopardizes its supreme interests is now under intense debate.[461]

Last year, both houses of Congress overwhelmingly passed a bill that enshrined into U.S. national security policy the fielding of a national missile defense system.[462] On July 23, 1999, President Clinton signed the National Missile Defense Act of 1999 which commits the United States to fielding a national missile defense system "as soon as is technically feasible."[463] The move represents a dramatic move in the U.S. quest for missile defense – a quest formally begun by President Reagan in 1983 with the announcement of preliminary research into a "peace shield" to guard against foreign missile threats.[464] Despite criticism, after decades of failures missile defense technology has reached "an historic phase in its favor." [465] Pressure to

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[461] For example, the U.S. recently discovered that the North Korean ICBM program maintains a 3-stage rocket capability. Its Taepo-Dong missile travels at 7 to 8 km per second, faster than the Army's Theater High Altitude Area Defense ABM system could counter. Krauthammer, *supra* note 458.

[462] E. Becker, *House Approves Star Wars Defense System*, N.Y. TIMES, May 21, 1999, at 1.

[463] M.A. Dornheim, *National Missile Defense Focused on June Review*, 151:7 AV. WK. & SPACE TECH, Aug. 16, 1999, at 66.

[464] Characteristically, Reagan communicated his disagreement with the assumptions made by the ABM Treaty in simple, populist terms. His views, articulated almost seventeen years ago, typify the current widespread disaffection with the treaty:

> I've become more and more deeply convinced that the human spirit must be capable of rising above dealing with other nations and human being by threatening their existence. . . . If the Soviet Union will join with us in our effort to achieve major arms reductions, we will have succeeded in stabilizing the nuclear balance. Nevertheless, it will still be necessary to rely on the specter of retaliation, on mutual threat. And that's a sad commentary on the human condition. Wouldn't it be better to save lives than to avenge them? . . . I clearly recognize that defensive systems have limitations and raise certain problems and ambiguities. If paired with offensive systems, they can be viewed as fostering an aggressive policy, and no one wants that. But with these considerations firmly in mind, I call upon the scientific community in our country, those who gave us nuclear weapons, to turn their great talents now to the cause of mankind and world peace, to give us the means of rendering these nuclear weapons impotent and obsolete. . . . My fellow Americans, tonight we're launching an effort which holds the promise of changing the course of human history. There will be risks, and results take time. But I believe we can do it. As we cross this threshold, I ask for your prayers and your support.

R. Reagan, Peace and National Security, Address to the Nation (Mar. 23, 1983), *in* WEAPONS IN SPACE 351-53 (A. Long, *et al.*, eds., 1986). Well before the President's "Strategic Defense Initiative" speech, derisively termed "star wars" by members of the news media, ABM research had been underway. "As early as the 1950s, Pentagon planners first suggested fielding anti-missile missiles." SHUKMAN, *supra* note 39, at 55.

[465] P. Mann, *Historic Turn Eyed in Missile Defense*, 151:1 AV. WK. & SPACE TECH, July 5, 1999, at 30. Specific improvements noted include radar capability and data processing, optical

renegotiate or withdraw from the Treaty will continue to mount, in part because such renegotiation or withdrawal will be absolutely necessary if the U.S. is to field a national missile defense system, while remaining compliant with its international legal obligations.

3. Antarctic Treaty–1959, and the United Nations Convention on the Law of the Sea–1982

Those looking for analogous legal regimes to that contemplated for outer space, often cite the regimes established for the continent of Antarctica and for the high seas. Of the two, the high seas receive particular attention. Not too long ago, the high seas seemed as vast to explorers as outer space does today. But in addition to their vastness, the freedom of movement thereon mirrors the freedom of movement reserved in law for outer space. Thus, one commentator notes the "maritime antecedents" of the freedoms of outer space.[466]

With respect to the status of the high seas, the United Nations Convention on the Law of the Sea (LOS Convention), the most comprehensive treaty ever created, largely mirrors customary international law.[467] Among its other numerous categories, it establishes the legal status for the high seas–the vast majority of the world's oceans which are free of any territorial claims or superior rights or interests by any one State. As with the legal status for outer space, the LOS Convention articulated the "freedom" of all States to traverse the high seas unimpeded.[468] Thus, under international law the high seas constitute an area that is *res communis omnium*–territory free for equal use by all States.

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systems, lasers and sensors, and miniaturization of crucial missile defense components such as rocket thrusters. *Id.*

[466] H. DeSaussure, *The Freedoms of Outer Space and Their Maritime Antecedents*, *in* SPACE LAW: DEVELOPMENT AND SCOPE 1 (N. Jasentuliyana, ed., 1992).

[467] United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 3 (entered into force Nov. 16, 1994; U.S. has signed but not ratified) [hereinafter LOS Convention].

[468] Article 87 states that "[t]he high seas are open to all States, whether coastal or land-locked. Freedom of the high seas is exercised under the conditions laid down by this Convention and by other rules of international law. It comprises, *inter alia*, . . . (a) freedom of navigation; (b) freedom of overflight." *Id.* at art. 87. Indeed the principal Outer Space Treaty negotiator for the U.S. stated that the analogy of the high seas was a guiding theme during the drafting of Article 1 of the Outer Space Treaty establishing the freedom of outer space. CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 41. From this, Christol concludes that the negotiators of the Outer Space Treaty were "aware of the *res communis* concepts applying to the ocean and were employing this analogy as they contemplated the legal rules to be applied in the exploration and use, including exploitation, of the space environment." *Id.* at 45.

By contrast, Antarctica constitutes territory that could be likened to *terra nullius*.[469] Previous to the 1959 Antarctic Treaty, several States laid claim to portions of Antarctica.[470] This meant that for a period of time, those portions were no longer *terra nullius*. However, the Treaty's Parties, including all States that previously made territorial claims, froze all of those claims. The Parties also contracted that no new claims to sovereignty over any portion of Antarctica would be permitted–a situation strikingly similar to that established for the whole of outer space by Article 2 of the Outer Space Treaty.

Especially significant is the dissimilarity between the terms "peaceful purposes" as used in the Outer Space Treaty and that in the Antarctic Treaty. As used in the latter treaty, the phrase "peaceful purposes" specifically operates to create a demilitarized zone. Thus, Article 1 specifies that "Antarctica shall be used for peaceful purposes. There shall be prohibited, *inter alia*, *any measures of a military nature*, such as the establishment of military bases and fortifications, the carrying out of military maneuvers as well as the testing of any type of weapons."[471] (emphasis added) Not only does this sweeping language rule out the possibility of "any" activity of a "military nature," but it clarifies the meaning of peaceful purposes as used in the Treaty.[472] For the Antarctic Treaty, peaceful purposes functionally excludes virtually any military activity. Thus, by law, Antarctica has become not only demilitarized, but weapons-free. Not so for outer space. Though the Outer Space Treaty does specifically restrict military activity in Article IV, it conspicuously omits the broad language modifying the phrase "peaceful purposes" as contained in the Antarctic Treaty. This use of the phrase in the Antarctic Treaty was undoubtedly evident to the drafters of the Outer Space Treaty, and provides further, albeit indirect, evidence that "peaceful purposes" under the Outer Space Treaty cannot simply mean non-military.[473]

Whether these two treaty regimes provide helpful analogies to outer space depends on the space activity contemplated. When applying the issue to military space combat, the high seas, though perhaps not necessarily the legal

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[469] That is, territory belonging to none. Regarding the principle of *terra nullius* and the example of Antarctica, see MALANCZUK, INTRODUCTION TO INTERNATIONAL LAW, *supra* note 130, at 149.

[470] *Id.*

[471] The Antarctic Treaty, Dec. 1, 1959, 402 U.N.T.S. 71 (entered into force June 23, 1961) [hereinafter Antarctic Treaty].

[472] Though the Treaty does permit the presence of military personnel, Article 1 ensures that the activity of such personnel will not be "of a military nature." *Id.* at art. 1.

[473] Although the Antarctic Treaty "has often been invoked as the most authoritative aid for the interpretation of the term 'peaceful' found in various outer space official texts," the phrase cannot be divorced from the immediate context in which it is subsequently used. Vlasic, *Peaceful and Non-Peaceful Uses of Outer Space*, *supra* note 334, at 41. As noted previously, understanding of the term evolved from its early use in 1957 as applied to space activity through its final expression in the Outer Space Treaty. *See supra*, notes 334-343 and accompanying text.

regime governing the high seas, appears a much better analogy than the territory of Antarctica. For example, while space affords tremendous tactical and strategic military advantage, Antarctica does not.[474] Further, although Article 2 of the Outer Space Treaty prohibits claims of national appropriation and sovereignty in space, the Outer Space Treaty also implies the legitimacy of weapons in space,[475] a possibility the Antarctic Treaty forecloses[476] for Antarctica, but the LOS Convention for the high seas does not.[477]

B. United Nations General Assembly Resolutions

The U.N. Charter invites the General Assembly to make "recommendations" on issues within its competence.[478] Further, the seminal Article 38(1) of the Statute of the International Court of Justice articulates the three formal sources of international law, none of which include U.N. resolutions: (1) treaties; (2) international custom; and (3) general principles of

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[474] Thus,

> [t]hough it is sometimes offered as a model for space, Antarctica has never offered military advantages that exceed the costs it imposes. . . . The arguments for many military uses of space, however, are cast in just such cost-effectiveness terms, making Antarctica, in that sense, not the analog but the inverse of space.

W. Durch, *Introduction* to Durch & Wilkening, *supra* note 13, at 7.

[475] By explicitly prohibiting the orbiting of nuclear weapons and other weapons of mass destruction in Article 4, the Outer Space Treaty implies that States remain free to orbit non-nuclear weapons that are not weapons of mass destruction.

[476] Antarctic Treaty, *supra* note 471, at art. 1. The military inefficiency of Antarctica likely accounts for the wide adherence to this provision of the treaty.

[477] Interestingly, the LOS Convention claims at Article 88 that the "high seas shall be reserved for peaceful purposes." LOS Convention, *supra* note 467, at art. 88. As Professor Vlasic notes however, this

> most certainly does not mean 'non-military,' given the well-known fact that the high seas are navigated by naval vessels of many nations and used for tests of nuclear missiles as well as for naval maneuvers. Hence, it is difficult to find the rationale for the inclusion of the reference to 'peaceful purposes' under the heading 'high seas.'

Vlasic, *Peaceful and Non-Peaceful Uses of Outer Space*, *supra* note 334, at 41. If the term "peaceful" as used in the LOS Convention were given the meaning ascribed to the similar term in the Outer Space Treaty by the majority of States, that is non-aggressive, the comparison of outer space with the high seas for purpose of military use becomes all the more apt. While the high seas have been the location of military activity for centuries, outer space is becoming increasingly so. That both environments must be used for non-aggressive (peaceful) purposes does not impugn the current military uses, so long as they remain compliant with the *jus ad bellum*.

[478] U.N. CHARTER, *supra* note 262, at art. 10.

law recognized by civilized nations.[479] From this basis, the consensus has emerged that U.N.G.A. resolutions do not in and of themselves bind States.[480] Nonetheless, the space resolutions have proven significant to the formation of space law. Indeed, as becomes evident below, such resolutions not only predated the subsequent space treaties, but have for a variety of reasons

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[479] STAT. OF THE ICJ, *supra* note 261, at art. 38.

[480] A standard text on international law includes helpful commentary on U.N.G.A. resolutions:

> General Assembly resolutions are not as such legally binding upon member or non-member States in the manner of legislation enacted by national parliaments. In terms of the sources listed in Article 38(1) [of the Statute of the International Court of Justice], although some writers have argued that General Assembly resolutions might be seen as informal treaties or as indicating general principles of law, the most common view . . . is that they contribute in some way to the formation of custom. It is generally agreed by writers that General Assembly resolutions may serve as a convenient statement of a custom already established by state practice of the accepted kind (diplomatic notes, etc.), or may at once or gradually cause States to march in step in their practice so as to create one . . . General Assembly resolutions may also contribute to custom more directly as a form of 'collective' State practice. They are the collective equivalent of unilateral general statements or, in the context of a particular dispute, '150 diplomatic protests.'

Harris, *supra* note 173, at 61. Following the adoption of Resolution 1721, the U.S. delegate stated that "[w]hen a General Assembly resolution proclaimed principles of international law – as resolution 1721 (XVI) had done – and was adopted unanimously, it represented the law as generally accepted in the international community." Cheng, *'Instant' Customary Law*, *supra* note 301, at 35. Key to this broad assertion is the word "represented." That is, the Resolution did not become customary law, it simply served as the vehicle by which the international community expressed unanimous agreement that the resolution's substance was reflective of the law. The U.S. delegate's statement is broad in that it purported to give the U.N. principles the status of customary international law before any custom had developed. For the criticism of this assumption, see *supra* notes 301-303 and accompanying text. The assumption aside however, the statement recognizes that formally speaking, the U.N. Resolution does not bind any State, whether expressing legal principles and adopted unanimously or not. As a 1975 U.S. Department of State pronouncement asserted:

> [a]s a broad statement of U.S. policy in this regard, I think it is fair to state that General Assembly resolutions are regarded as recommendations to Member States of the United Nations. To the extent, which is exceptional, that such resolutions are meant to be declaratory of international law, are adopted with the support of all members, and are observed by the practice of states, such resolutions are *evidence* of customary international law on a particular subject matter.

Harris, *supra* note 173, at 62 (emphasis added). For further discussion of the legal significance of U.N.G.A. resolutions, see *infra* note 485.

become the vehicle of choice for expressing international opinion on various space-related topics.[481]

1. Declaration of Legal Principles Governing State Activity in the Exploration and Use of Outer Space–1963

The space resolution adopted in late 1963 by the United Nations General Assembly is of interest today largely for tracing the negotiating history of the Outer Space Treaty. Certainly a diplomatic breakthrough when it emerged from the bilateral U.S./Soviet negotiations, the "Declaration of Legal Principles"[482] found itself incorporated almost entirely into the 1967 Outer Space Treaty.[483] In many regards, it was the "first significant step in the development of space law."[484]

The importance of the Resolution can be seen by the use of two terms in its title, "Declaration" and "Legal Principles." Because of the lengthy negotiating and drafting history predating the resolution, and its unanimous support, it practically amounted to a treaty when adopted. Though not binding on any State,[485] the Resolution does not read like a traditional resolution.

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[481] This is likely a result of the increasingly fractious nature of international negotiation over space issues since the 1979 Moon Agreement. The international governing organization called for by the Moon Agreement enshrined the interests of developing States not seen before in treaty law. To many of the more developed States, this progress came at the expense of their own economic and security interests. Thus, the absence of any new space treaties since 1979 is likely the result of failures in negotiation, as well as a genuine reticence by the more developed States against undertaking treaty obligations with which the State has little intention of complying or even incentive for entering.

[482] *Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space*, Dec. 13, 1963, G.A. Res. 1962 (XVIII), U.N. GAOR, 18th Sess., Supp. No. 15, at 15, U.N. Doc. A/5515 (1964). It should be noted that though several of the U.N. Resolutions addressing outer space issues use the term "principles" in the title, these are not used in the same sense as the term appears in Article 38 of the Statute of the International Court of Justice. As articulated by the U.N.G.A., "principles" related to the use of outer space, remote sensing, or nuclear power sources in space are worthy precepts toward which States should aim in their use of outer space, but they are not "general principles of law recognized by civilized nations." STAT. OF THE ICJ, *supra* note 261, at art. 38 ¶ 1.c.

[483] In lockstep fashion, the Outer Space Treaty adopted the Resolution's nine provisions practically word for word. Thus, Principle 1 became Article I, sentence 1 of the Outer Space Treaty. Principle 2 calling for the free exploration and use of space in accord with international law became Article I, sentence 2. Principle 3 became Article II. Principle 4 on the applicability of international law to outer space became Article III. Principle 5, setting forth the novel requirement that States bear international responsibility for national activities in space became Article VI. Principle 6 became Article IX. Principle 7 became Article VIII. Principle 8 became Article VII. Principle 9 became Article V.

[484] Jasentuliyana, *Developing Countries*, *supra* note 319, at 97.

[485] Though the Soviet Union wanted the substance of the Resolution incorporated into a legally binding instrument, it did not claim that the vehicle used, the U.N. resolution, achieved that end. The fact that a General Assembly Resolution assumes for itself the term "Declaration"

Rather, it declares and announces legal principles instead of merely recommending a course of action. The considerable authority of its pronouncements were cemented in law just four years later with adoption of the Outer Space Treaty.

2. Principles Relating to Remote Sensing of the Earth from Outer Space–1986

In contrast to the "Declaration of Legal Principles" of 1963, the 1986 Resolution on remote sensing activities addresses a specific form of outer space activity. The Resolution defines remote sensing as follows in Principle I: "the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use and protection of the environment."[486] Given the absence of any governing treaty,[487] the Remote Sensing Resolution is the most authoritative

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does highlight the importance of the document. It does not however render the resolution "legally more binding than any other recommendation." Cheng, *'Instant' Customary Law*, *supra* note 301, at 31. As the United Nations Office of Legal Affairs has noted in a Memorandum on "Use of the Terms 'Declaration and Recommendation'"

> 3. In United Nations practice, a 'declaration' is a formal and solemn instrument, suitable for rare occasions when principles of great and lasting importance are being enunciated, such as the Declaration on Human Rights. A recommendation is less formal. 4. Apart from the distinction just indicated, there is probably no difference between a 'recommendation' or a 'declaration' in United Nations practice as far as strict legal principle is concerned. . . . However, in view of the greater solemnity and significance of a 'declaration,' it may be considered to impart, on behalf of the organ adopting it, a strong expectation that Members of the international community will abide by it. Consequently, in so far as the expectation is gradually justified by State practice, a declaration may by custom become recognized as laying down rules binding upon States.

Id. Use of the word "may" in the last quoted sentence, means that the 'declaration,' by itself, cannot bind States. Nonetheless, some scholars speak in terms suggesting that Resolution 1962 is itself law. Thus, Judge Lachs, former Chairman of COPUOS concluded that "it is difficult to regard the 1963 Declaration as a mere recommendation: it was an instrument which has been accepted as law." M. LACHS, THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING 138 (1972).

[486] *Principles Relating to Remote Sensing of the Earth from Space*, Dec. 3, 1986, GA Res. 41/65 (XLII), U.N. GAOR, 29th Sess., 95th Plen. Mtg., U.N. Doc. A/Res/41/65 (1987) [hereinafter *Remote Sensing Resolution*].

[487] Though not specifically geared toward remote sensing, several provisions of the Outer Space Treaty could apply to remote sensing. These include Article I (equal use of space by all States), Article III (activities conducted in accord with international law in the interest of maintaining international peace and security), Article VI (States bear international

international document to provide not only a general definition, but also the basic parameters of permissible State activity. Passed unanimously by the General Assembly, the Resolution was the culmination of previous efforts from 1968 through 1985.[488] Although related to the activity of military reconnaissance satellites, the Remote Sensing Resolution aims rather at formulating norms for civilian and commercial users.[489] Nonetheless, the biggest users of civil and commercial remote sensing data are the military and intelligence agencies.[490] Thus, the Resolution could become relevant to space warfare to the extent that a belligerent uses commercially available data in support of its military operations.[491]

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responsibility for national activities), and Article XI (duty to inform U.N. Secretary General of space activities of member States to the greatest extent feasible).

[488] C.Q. CHRISTOL, SPACE LAW: PAST, PRESENT AND FUTURE 73 (1991) [hereinafter CHRISTOL, SPACE LAW]. After outlining the five general categories of compromise leading to agreement, Christol points out that the principle of "open skies" won the day. *Id.* at 76. He notes that in the end, even States initially hesitant to agree on freedom of surveillance from space "consulted self interest" and developed an expectation that the benefits to be gained by access to sensed data would outweigh any lost sovereignty to be suffered. *Id.* at 88.

[489] Although the Resolution made no exception for military activities, this civil/commercial orientation can be seen from the Resolution's specific definition of "remote sensing" which aims at "improving natural resources management, land use and protection of the environment." *Remote Sensing Resolution, supra* note 486, at Principle (princ.) I(a). Major civil and commercial applications for remote sensing data include: water resource management (surface water inventory, flood control mapping, irrigation demand estimation, water circulation, lake eutrophication survey, ground water location); forestry and rangeland management (forest inventory, clearcut assessment, habitat assessment, fire fuel potential); fish and wildlife management (habitat inventory, wetlands location, vegetation classification, snow pack mapping, salt exposure); land resource management (corridor analysis, facility siting, land cover inventory, flood plain delineation, solid waste management, lake shore management); environmental management (water quality assessment, coastal zone management, wetlands mapping, resource inventory, dredge and fill permits); agriculture (crop inventory, crop yield prediction, assessment of flood damage, disease monitoring); and geological mapping (lineament mapping, mineral surveys, powerplant siting, radioactive waste storage). U.S. Congress, Office of Technology Assessment, *Remote Sensing and the Private Sector*, Mar. 1984, at 57. Some of these could easily be converted to military reconnaissance and surveillance purposes for locating targets, tracking fleet movements, identifying supply and transport facilities, monitoring air activities, and warning of enemy preparation or attack.

[490] A number of civil satellite systems produce data that is commercially-available to both private and public entities: KFA-1000 (Russia, 6 m resolution, 120 km swath); Radarsat (Canada, 8-30 m resolution, 55-550 km swath); ADEOS (Japan, 8-16 m resolution, 80 km swath); SPOT (France, 10-27 m resolution, 60-81 km swath); Landsat 6 (U.S., 15-120 m resolution, 185 km swath); JERS-1 (Japan, 18 m resolution, 100 km swath); CBERS (Brazil, 20 m resolution, 120 km swath); ERS-1 (European Space Agency, 15-30 m resolution, 80 km swath); RS-1 (India, 36-72 m resolution); MOS-1 (Japan, 50 m resolution). B. PRESTON, PLOUGHSHARES AND POWER: THE MILITARY USE OF CIVIL SPACE 29 (1994) [hereinafter PRESTON]. An update to include improvements since 1994 would swell this list as to the total number of systems, as well as technical capabilities. Today, imagery at 5 m resolution is widely available.

[491] Preston makes clear the military connection to remote sensing:

Of the fifteen principles contained in the Resolution, the most important include the fourth, twelfth, and thirteenth. Principle IV specifically links remote sensing activities to Article I of the Outer Space Treaty, and encourages that remote sensing activities occur "on the basis of respect for the principle of full and permanent sovereignty of all States and peoples over their own wealth and natural resources."[492] Widely viewed as a provision in favor of developing nations, this Principle further protects the "legitimate rights and interests of the sensed State."[493] The practical effect of these protections are unclear as the Resolution does not define several key terms, such as "legitimate."

Central to the Resolution's system of principles is the distinction between "primary data,"[494] "processed data,"[495] and "analysed [sic] information."[496] While the first two categories should be made available to a "sensed State," the latter need not. Thus, Principle XII specifies that as soon as primary and processed data are produced, the sensed State will have access to such data on "a non-discriminatory basis and on reasonable cost terms."[497] While perhaps appearing to be a victory for the interests of sensed States, many of which are in the process of development and have no indigenous remote sensing capability, this "access" provision amounts to a victory for the liberty of the few States most active in space.[498] Principle XII does not call on sensing States to offer prior notification to sensed States of its activities, and it certainly does not require prior permission for remote sensing from space–two

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> From a traditional military view of national security, the obvious reason to worry about sensing from space is the ability of adversaries to exploit intelligence from remote-sensing information to achieve military advantage on the battlefield. A broader perspective on national security would include economic benefit and foreign policy advantage. For example, the Joint Chiefs of Staff basic national defense doctrine includes psychological or informational powers in its list of elements of national strategy. Remote sensing from space affects all of these: battlefield intelligence, economic strength, and diplomacy.

Id. at 25.

[492] *Remote Sensing Resolution*, *supra* note 486, at princ. IV.

[493] *Id.*

[494] *Id.* at princ. I(b). Primary data are defined as "the raw data that are acquired by remote sensors borne by a space object and that are transmitted or delivered to the ground from space by telemetry in the form of electromagnetic signals, by photographic film, magnetic tape or any other means."

[495] *Id.* at princ. I(c). "[T]he products resulting from the processing of the primary data, needed to make such data usable."

[496] *Id.* at princ. I(d). "[T]he information resulting from the interpretation of processed data, inputs of data and knowledge from other sources."

[497] *Id.* at princ. XII.

[498] Arguably it is a victory for Article I of the Outer Space Treaty as well which requires that the use and exploration of outer space remain "free."

issues creating lively debate as the State delegations negotiated the Resolution's final text.

Finally, Principle XIII exhorts sensing States, upon request, to "enter into consultations with a State whose territory is sensed in order to make available opportunities for participation and enhance the mutual benefits to be derived therefrom."[499] Here the Principle assumes that the sensing is already occurring ("is sensed") before the consultations are to begin. Further, consultations is an unspecified term that appears not to bind States to much of anything in actual practice.[500] Still, the provision is of some value as it encourages sensing States to reveal their activity to the sensed State. In cases where the sensed State would not otherwise know of the remote sensing activity over its territory, this appears to be a logical prerequisite for the sensed State to take advantage of access to the data encouraged under Principle XII.

As Professor Christol notes, though unanimity on the resolution was in some cases grudging, there have been no formal departures from the terms of the Resolution.[501] As is generally true for U.N. resolutions, the longer they are used as the international standard, the stronger their authority becomes.

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[499] *Id.* at princ. XIII.

[500] Again, as with all U.N. resolutions, language suggesting that States "shall" take action or "will" refrain therefrom does not require such action or bind such States. The mandatory, directive language used in the Remote Sensing Resolution, as with other U.N. resolutions, is always subject to this clarification. *See, e.g.*, the following phrases from the principles indicated, Principle II–"shall be carried out;" Principles III and IV–"shall be conducted;" Principle V and VIII–"shall promote international co-operation;" Principle VII–"shall make available technical assistance;" Principle IX–"shall inform the Secretary-General of the United Nations;" Principle X–"shall promote the protection of the Earth's natural environment;" Principle XI–"shall promote the protection of mankind from natural disasters;" Principle XII–"shall have access;" Principle XIII–"shall . . . enter into consultations;" Principle XIV–"shall bear international responsibility;" and Principle XV–"disputes . . . shall be resolved through . . ." To the extent that these provisions draw from the authority of international law, they simply reiterate a State's preexisting obligations.

[501] CHRISTOL, SPACE LAW, *supra* note 488, at 94. The author goes so far as to suggest that the Resolution's principles are representative of customary international law. After considering the fact that, despite the lack of thorough agreement, there is no overwhelming demand to overturn the principles or even reduce them to a treaty, Christol concluded in 1988 that

> [f]or the moment the debate has been somewhat stilled. Even the best of agreements can become controversial or even unstuck. Perhaps the best long-term approach is to retain remote sensing on the agenda of COPUOS so that efforts can be made to transmit the terms of the Principles into a treaty. In this manner those who wish to dissent from the Principles can opt out. In considering this approach they may find that they may have no where to go. As has been abundantly indicated, *they will not find it easy to escape the norms of customary international law.*

Id. at 95 (emphasis added).

Other commentators writing more recently have agreed. Thus, "[t]his resolution has come to represent a codification of customary legal principles that are binding on nations." J.I.

3. *Principles Relevant to the Use of Nuclear Power Sources in Outer Space–1992*

Beginning around the time of the 1978 crash of the Soviet Cosmos 954 satellite in Canada's Northwest Territories,[502] COPUOS began working on an international technical framework for the regulation of nuclear power sources in space. Despite earlier resolutions touching on nuclear power,[503] the project came to full fruition on December 14, 1992 with adoption by the U.N.G.A. of the "Principles Relating to the Use of Nuclear Power Sources in Outer Space."[504] Because the NPS Resolution deals with the politically sensitive subject of nuclear power, its adoption is significant; this is particularly so given the specificity of its terms. To the extent that State practice consistent with the Resolution creates customary international law, the framework set forth could significantly affect space warfare–at least as to those nuclear power sources used in space warfare fitting within the scope of the Resolution.[505]

Gabrynowicz, *Defining Data Availability for Commercial Remote Sensing Systems: Under United States Federal Law*, XXIII ANNALS AIR & SPACE L. 93, 95 (1998).

[502] *See supra* notes 368-370 and accompanying text for a discussion of the Cosmos-954 incident.

[503] Paragraph 9 of General Assembly resolution 33/16, dated Nov. 10, 1978, requested that launching States "inform States concerned in the event that a space object with nuclear power sources on board is malfunctioning with a risk of re-entry of radio-active materials to earth." This subsequently became Principle 5 of the NPS Resolution. Further, paragraph 11 of General Assembly resolution 42/68, dated Dec. 2, 1987, endorsed "the agreements reached in the Scientific and Technical Sub-Committee [of COPUOS] with respect to the use of nuclear power sources in outer space." As Terekhov notes, "[t]hose agreements were the recommendations formulated by the technical experts with the view to ensuring safe use of NPS in outer space, which recommendations had been subsequently reflected in the NPS [Resolution]." A.D. Terekhov, *U.N.G.A. Resolutions and Outer Space Law*, *in* PROCEEDINGS OF THE FORTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE 97, 101 (1998) [hereinafter Terekhov].

[504] *Principles Relating to the Use of Nuclear Power Sources in Outer Space*, Dec. 14, 1992, U.N. Doc. A/Res/47/68 [hereinafter *NPS Resolution*].

[505] Because the Outer Space Treaty forbids the orbiting of "objects carrying nuclear weapons," the Resolution did not address the question of nuclear power sources in space used for weaponry. Outer Space Treaty, *supra* note 316, at art. IV. Although a strict exegesis of Article IV of the Outer Space Treaty reveals that what is prohibited by this clause is the orbiting of "*objects carrying* nuclear weapons" not "nuclear weapons" themselves, the subsequent clause–"or station such weapons in outer space in any other manner" – appears to foreclose the possibility of nuclear warheads in space. *Id.* The obvious exception, undoubtedly heavy on the minds of Outer Space Treaty drafters during the course of negotiations, were the case of ICBMs capable of delivering nuclear warheads to terrestrial targets after transiting outer space for several minutes. Although such objects would put nuclear weapons or conceivably other weapons of mass destruction into space, such delivery systems would not constitute a placement "in orbit" or a "station[ing]" of such weapons in space, and would not therefore violate the Outer Space Treaty. For a discussion of the meaning of placing an object in orbit, see *supra* note 355. As used in the *NPS Resolution*,

The NPS Resolution provides in the Preamble that its terms apply to "nuclear power sources in outer space devoted to the generation of electric power on board space objects for *non-propulsive purposes*."[506] Thus, any application to space weaponry that the Resolution may have relates only to those means of warfare using a nuclear power source to sustain electrical systems for the object.[507] Following this initial qualification, the Resolution's eleven Principles contain guidelines and criteria for safe use (Principle 3), safety assessments (Principle 4), and notification of re-entry (Principle 5). The Resolution also makes reference to the Outer Space Treaty in its assertions regarding State responsibility (Principle 8), and to the Liability Convention regarding State liability and compensation (Principle 9).

The heart of the Resolution is to be found in Principle 3. In establishing conditions for the safe use of nuclear power in space, it exhorts States to use an NPS only for missions "which cannot be operated by non-nuclear energy sources in a reasonable way."[508] Thus, without defining "reasonable," the Resolution attempts to limit State use of an NPS while recognizing that for certain missions, such power sources are appropriate. Indeed the Resolution continues by establishing the three cases in which nuclear reactors may be used: (1) on interplanetary missions; (2) in "sufficiently high orbits";[509] and (3) in low-earth orbits if they are stored in sufficiently high orbits after the operational part of their mission.[510] Further,

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nuclear reactors in space apply neither to nuclear weapons (except those which might conceivably use nuclear power for "generation of electric power"), nor to nuclear power sources used for propulsion. *NPS Resolution*, *supra* note 504 (from the Preamble). Thus, it appears the law would allow the orbiting of nuclear power sources used for space weaponry. Such is not likely covered by the phrase "nuclear weapon" as used in the 1967 Outer Space Treaty, which more properly refers not to the weapon's method of propulsion, but to the nuclear source of its destructive power.

[506] *NPS Resolution*, *supra* note 504 (from the Preamble).

[507] Though the Resolution does not cover nuclear propulsion, and is not legally binding in any event, there are other reasons it may not find widespread use as a prescriptive guide for military spacecraft. Collins notes that even though nuclear space propulsion has many proponents, it "attracts little official support and few funds, because it is costly compared with chemical systems, and powerful opponents (rightly or wrongly) fear it is unsafe. International political pressure to ban such engines is great." COLLINS, MILITARY SPACE FORCES, *supra* note 12, at 103.

[508] *NPS Resolution*, *supra* note 504, at princ. 3.

[509] "Sufficiently high orbits" are those

> in which the orbital lifetime is long enough to allow for a sufficient decay of the fission products to approximate the activity of the actinides. The sufficiently high orbit must be such that the risks to existing and future outer space missions and of collision with other space objects are kept to a minimum.

Id. at princ. 3(2)(b).

[510] *Id.* at princ. 3(2)(a).

Principle 3 specifies that nuclear reactors for space missions must only use enriched uranium 235 as fuel,[511] and that design and construction of the nuclear reactor "shall ensure that it cannot become critical before reaching the operating orbit during all possible events."[512]

Significantly, Principle 5 states what may well be a rule of customary international law: "Any State launching a space object with nuclear power sources on board shall in a timely fashion inform States concerned in the event this space object is malfunctioning with a risk of re-entry of radioactive materials to the earth."[513] This general statement would certainly affect space combat as to cases in which malfunctioning weapons, containing nuclear power sources, appear likely to reenter earth's atmosphere and impact on foreign soil. The existence of an ongoing state of hostilities would render the duty to warn less certain as between the belligerents, though it would probably apply to dangerous, radioactive space objects likely to impact neutral States, even if pursuant to accidents occurring in military operations.

According to an unofficial report, States appear to be following the recommendations contained in the NPS Resolution.[514] As an example, the

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[511] *Id.* at princ. 3(2)(c).

[512] *Id.* at princ. 3(2)(e).

[513] *Id.* at princ. 5(1). In the aftermath of the Cosmos 954 incident, the former Soviet Union disclaimed a duty to warn Canada of the impending crash, though it did in general recognize a duty to warn. *Supra* notes 368-370 and accompanying text, Because its errant calculations revealed the satellite's debris would either be incinerated on reentry, or land over the Aleutian Islands, the Soviet Union did notify the U.S. prior to impact. In one of the diplomatic exchanges, the Soviets maintained that

> [c]alculations made on the basis of [Cosmos 954's] last orbits within the visibility range of our tracking facilities showed that if, because of the satellite's emergency condition, individual parts of the satellite were not fully consumed in the atmosphere and reached the earth's surface, they might fall into the open sea in the region of the Aleutian Islands. In this connection, the appropriate information was given to the U.S. government.

REYNOLDS & MERGES, *supra* note 59, at 181. Because Canada agreed that the Soviets had a duty to warn, this agreement on the basic norm–that the Soviet Union had a duty to warn–represents significant State *opinio juris* on one of the few cases involving the reentry of a space object carrying radioactive materials. Indeed, whether customary law or not, the Convention on Early Notification of a Nuclear Accident requires such notifications as contemplated in Principle 5 of the NPS Resolution. Convention on Early Notification of a Nuclear Accident, Sept. 26, 1986, 1439 U.N.T.S. 275 (entered into force Oct. 27, 1986; signed but not ratified by the U.S.). This treaty, adopted soon after failure of the Soviet Chernobyl nuclear reactor, applies to "any nuclear reactor *wherever located.*" *Id.* at art. 1(2) (emphasis added). Thus, even for reactors located in space, the treaty mandates notification to other States Parties of accidents "from which a release of radioactive material occurs *or is likely to occur* and which has resulted or may result in an international transboundary release that could be of radiological safety significance for another State." *Id.* at art. (1) (emphasis added).

[514] Terekhov, *supra* note 503, at 101. Again, these U.N. principles are recommendations even though the NPS Resolution, as with the previous Remote Sensing Resolution, makes frequent

Russian report to the U.N. Secretary General of its anticipated launch of the Mars 96 satellite powered by plutonium-238 is cited.[515] When the satellite malfunctioned and reentered the atmosphere, the Russians made notification of that event as well, in accord with Principle 5. Similarly, the U.S. notified the Secretary General of its launch of the Cassini space probe, containing about 35 kg of plutonium-238 dioxide.[516] These instances of "compliance" are important. To the extent that spacefaring States behave in accord with the U.N. Resolution as though doing so represents a legal norm, the behavior will slowly come to *be* a legal norm in the form of customary international law–if it isn't already.

C. International Telecommunication Union

The growth of the telecommunications industry predates the space age. Nonetheless, since the advent of satellite telecommunications the industry's rate of growth has increased tremendously. The International Telecommunication Union (ITU), through its Radio Regulations Board (RRB) coordinates the international use of the radio spectrum.[517] As a limited natural resource, the spectrum will support only a finite number of users among the radio frequencies before signal interference begins to occur. As a result, a coordinated global effort to deconflict use of the spectrum becomes the *sine qua non* of the world-wide telecommunications capability. The RRB is the forum for such coordination and its radio regulations specify with great detail the international standards for coordinating use of radio frequencies.

As suggested above, the U.S. military maintains its own military satellite telecommunications network.[518] However, because of the potential for interference, it must pay careful attention to the regulations issued by the ITU in order to avoid harmful signal interference. Although not applicable to the military or other national security functions,[519] the ITU regulations govern the

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use of "shall" in its attempt to encourage State behavior. The distinction between a resolution's use of "shall" and its use of "should" matters little and does not affect the document's non-binding character. "[T]he fact that, for example, the [Remote Sensing Resolution] contain[s] 'shall' and the [Benefits Resolution] uses mostly "should" is not perceived as an indication that the former makes stronger recommendations than the latter. In view of the foregoing, it appears that the "shall/should" controversy has basically lost its relevance at least as far as outer space declarations are concerned." *Id.* at 102.

[515] *Id.* at 101.

[516] *See, e.g., Is Cassini Risky? Look to Facts, Not Emotion*, 147:13 AV. WK. & SPACE TECH., Sept. 29, 1997, at 66.

[517] J. Wilson, *The International Telecommunication Union and the Geostationary Satellite Orbit: An Overview*, XXIII ANNALS AIR & SPACE L. 249 (1998).

[518] *Supra* note 59.

[519] "Members retain their entire freedom with regard to military radio installations." Constitution and Convention of the International Telecommunication Union, Dec. 22, 1992, art. 48(1), S. Treaty Doc. No. 104-34 (1996) (as amended through 1994), *available at*

majority of telecommunications systems in space. During military operations, and especially during armed conflict, the military must operate its telecommunication networks, or lease the capability from civilian providers, so as to avoid radio interference. This obligation comes not as the result of legal mandate, but military necessity. Because armed forces heavily rely on telecommunications for efficient command and control,[520] including commercially operated telecommunications systems,[521] their use of the radio spectrum must be done taking into account other users with the potential for harmful interference. Failing to do so risks losing the critical ability to communicate. Armed conflict creates numerous unforeseen challenges for military forces; these have been termed the "friction" of war.[522] Interference-free communications provides one of the best lubricants against that friction, and therefore becomes an indispensable component in the successful prosecution of war.

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http://www.itu.int/publications/cchtm/cnv.htm. Because the RRB regulations do not regulate military activity either in peacetime or war, they cannot be classified as part of the *jus in bello*. Nonetheless, because they govern the civil and commercial use of radio spectrum, they become a critical factor in establishing a military telecommunications capacity in support of armed conflict. Beyond this, however, Article 48(2) requires "so far as possible" that military radio installations

> observe statutory provisions relative to giving assistance in case of distress and to the measures to be taken to prevent harmful interference, and the provisions of the Administrative Regulations concerning the types of emission and the frequencies to be used, according to the nature of the service performed by such installations.

Id. at art. 48(2).

[520] Toward the end of the 1991 Persian Gulf War, the DSCS system was providing 75 percent of all inter and intratheater multichannel trunking. Leased commercial satellites provided 20 to 25 percent of all satellite communications used by U.S. forces. See PRESTON, *supra* note 490, at 131, 132. For a discussion of the DSCS system, see *supra* note 59. The Commander in Chief of USSPACECOM later testified before the U.S. Congress that, "[e]ffective command and control of U.S. and coalition forces simply would have been impossible without military satellite communication systems. Over ninety percent of the communications to and from the area of operations were carried over satellite systems." PRESTON, *supra* note 490, at 133.

[521] The effects of losing commercial telecommunications services were dramatically illustrated for participants of the 1999 U.S. "Army-After-Next Space and Missile Defense" wargame. When the "Blue" forces lost information superiority as a result of degraded commercial space services, participants witnessed a "drastic impact on combat capabilities. . . . Regional commanders found they had to compete with other paying customers for commercial space services, such as communications. Ideal time slots and capacities were not always available." P. Proctor, ed., *Wargame Wake-Up Call*, 150:14 AV. WK. & SPACE TECH., Apr. 5, 1999, at 17.

[522] CLAUSEWITZ, *supra* note 127, at 119.

VI. THE LAW OF WAR IN OUTER SPACE

[The humanitarian law of armed conflict] applies to all forms of warfare and to all kinds of weapons, those of the past, those of the present and those of the future.[523]

International Court of Justice
(1996)

A review of current scholarship analyzing the application of the law of war to outer space warfare yields little information. While many authors have written on space militarization and weaponization, and some on space warfare, almost none have undertaken an analysis of space warfare in the context of the law of war.[524] Indeed, it would seem that popular culture in the form of science fiction movies has taken a greater interest in the subject than have legal scholars and practitioners.[525] For at least two reasons, this must change. First,

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[523] ICJ Advisory Opinion on Nuclear Weapons, *supra* note 120, ¶ 86. In this important opinion, the Court cites several of the numerous statements advanced by States for the conclusion that the law of armed conflict applies to nuclear weapons whether nuclear weapons were in existence at the time the law developed or not. Two relevant points arise from this discussion. First, as the Court quotes from the representative statements of States, the following phrases are used and are assumed by the court to be synonymous: "international humanitarian law" (New Zealand), "rules applicable to armed conflict" (Russian Federation), "*jus in bello*" (United Kingdom), and "law of armed conflict" (United States). Second, as the noted quotation above makes clear, the court's conclusion that humanitarian law applies to nuclear weapons is equally applicable to any "past . . . present and . . . future" forms of warfare and kinds of weapons. This statement certainly provides the ICJ's answer to the question of whether the law of war will apply to space warfare.

[524] While the author is aware of one paper presented at a Princeton symposium in May 1999 by Professor M. Bourbonniere, with one exception he is aware of no other authors in print on the specific topic under review. That exception, dating to 1959, presciently outlined several themes related to the regulation of space warfare from the relative infancy of military space development in the 1950s. J.G. Verplaetse, *The Law of War and Neutrality in Outer Space*, 29 NORDISK TIDSSKRIFT FOR INT'L RET 49 (1959). Verplaetse pointed out that "[t]he unknown cannot be regulated, even less juridically organized." *Id.* Somewhat surprisingly, 41 years after the appearance of this article, the regulation of means and methods of space warfare still appears to be largely unknown. Verplaetse's prediction about the possibility of armed conflict in space remains as true today as ever: "Human forecast cannot but accept the likelihood that outer space will soon be part of the theater of war of terrestrial belligerents." *Id.* at 51.

[525] In the 1999 production *Star Trek Insurrection*, one scene has Chief Engineer Lieutenant Geordi LaForge commenting on a weapon's explosive impact with his spaceship: "I thought subspace weapons were outlawed by the Khitomer Accords?" "They were," comes his crewmate's ominous reply thereby identifying a violation of the 24th Century law of war. Beyond this specific reference, a review of the following recent cinematic releases shows the general popularity of space and science-fiction themes at the box office: *Apollo 13, Independence Day, 2001: A Space Odyssey, Armageddon, Deep Impact, Contact, Lost in Space, My Favorite Martian, Wing Commander, Battlefield Earth, Titan A.E., Galaxy Quest,*

use of the space environment in warfare is not just a matter of speculative planning for future conflicts, it has already occurred. As the conflicts in the Persian Gulf and Kosovo made clear, space assets were decisive in battle planning and execution. Second, failure to analyze one's legal obligations raises the very real specter of violating obligations that do in fact exist. Given that the U.S. contemplates armed conflict within the space environment, it must not proceed oblivious to norms establishing permissible and impermissible means and methods of warfare. For example, the increasing use of high-technology wargames using space combat scenarios is uncovering knotty legal issues.[526] It is also giving added urgency to questions that become increasingly "real world" such as the following: "[d]oes intentional interference with a U.S.-owned satellite orbiting 600 mi. above the Earth constitute an act of war?"[527]

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the *Star Wars* remake, and a total of eight *Star Trek* movies. The increasing popularity of these movies may account for the lack of scholarly legal analysis as commentators find it difficult to take seriously what the popular mind relegates to the category "science fiction."

[526] Just this year, the Air Force established the first annual wargame devoted entirely to space. The Air Force hopes the game will, entitled "The Air Force Space Game," will eventually "become a Title-10 game on a par with annual events such as Navy 'Global,' 'Army After Next' and Air Force 'Global Engagement." William B. Scott, *Innovation Is Currency of USAF Space Battlelab*, 152:14 AV. WK. & SPACE TECH., Apr. 3, 2000, at 52.

[527] Indeed, even beyond wargame scenarios, events prompting such questions have already occurred. One author has reported electronic interference by a hostile Middle East power against a U.S. military satellite.

> In one recent case the interference continued for weeks. When the U.S. satellite changed to a different channel, the interference also changed channels, suggesting a deliberate attempt by a Third World country to jam a U.S. military communications satellite. The potential of radio interference is especially significant considering that the United States is dependent on satellites for 75 percent of its long-distance military communications.

Hackett & Ranger, *Proliferating Satellites Drive U.S. ASAT Need*, SIGNAL, May 1990, at 156. While cases such as this arguably do not rise to the level of an "armed attack" justifying the use of armed force in self defense under the U.N. Charter, they do raise questions about the legitimacy of coercive responses short of armed conflict, and whether non-aggressive military action could or should be interpreted as a threat or use of force under Article 2(4). *See supra* notes 262, 267, and accompanying text. For an insightful analysis of the analogous problem of computer network attacks under the *jus ad bellum*, see M.N. Schmitt, *Computer Network Attack and the Use of Force in International Law: Thoughts on a Normative Framework*, 37:3 COL. J. TRANSNAT'L L. 885 (1999) [hereinafter Schmitt]. Beyond this, the 1997 "Army After Next" wargame "jolted military and civilian leaders by showing that if U.S. satellites are quickly destroyed in the early stages of a conflict, ground forces can rapidly grind to a halt." W.B. Scott, *Wargames Revival Breaks New Ground*, 149:18 AV. WK. & SPACE TECH., Nov. 2, 1998, at 56, 58. To be effective, wargames require clear rules specifying what players can and cannot do. To the extent space wargaming continues raising questions to which there are no clear answers, such as application of the law of war and the *jus ad bellum*, these scenarios have served a useful purpose in prompting the development of national policy. However, with

Given the numerous previous uses of space assets for combat support, the evolution from passive, defensive support systems to active, offensive, weaponized systems seems only a matter of time. Professor Spires provides the following instructive review of space assets used in combat:

> As early as the Vietnam conflict, weather and communications satellites furnished useful data and imagery to commanders in Southeast Asia and linked them with Washington, D.C. More recently, satellite communications had proven important in the British Falkland Islands campaign and in Urgent Fury, the Grenada invasion of 1983. In 1986, during Operation Eldorado Canyon, space systems provided a vital communications link and supplied important mission planning data to aircrews that bombed targets in Libya. In 1988, Operation Earnest Will witnessed the first use of GPS test satellites to support ships and helicopters during mine sweeping operations in the Persian Gulf. During Operation Just Cause in Panama in 1989, DSCS satellites provided long-haul communications links and DMSP supplied important weather data.
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> These operations, however, involved only portions of the military space community for a relatively brief period of time, and the contribution of space systems was not widely understood or appreciated. Desert Storm, by contrast, involved the full arsenal of military space systems. Nearly sixty military and civilian satellites influenced the course of the war.[528]

To these military uses can be added the extensive use of space assets in the 1999 Operation Allied Force campaign in Yugoslavia.[529] What this review

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respect to law of war principles, the games often reveal a shortcoming beyond the control of the U.S. military or government: an inability to ensure that the development of international law will account for anticipated military capabilities. On the possible role law of war manuals might play in remedying this shortcoming, see *infra* note 598 and accompanying text.

[528] SPIRES, *supra* note 3, at 244-45.

[529] The North Atlantic Treaty Organization (NATO) air strikes against Yugoslavia in 1999 (Allied Force) were even more heavily supported by space assets than the 1991 Persian Gulf War. In the Yugoslavian conflict, although the United States Space Command (USSPACECOM) classified all orbital data on U.S. military spacecraft during the conflict stating that even the *reason* for the classification remained classified (suggesting the critical role space systems played), several facts were apparent. NATO made heavy use of two National Reconnaissance Office (NRO) Lacrosse imaging radar satellites for pre-strike intelligence and post-strike bomb damage assessment with resolutions of one to three meters. Offering more precise resolutions, NATO used NRO's three KH-11 satellites for more sensitive optical and infrared imagery. It was also thought that NATO was using as many as three other of NRO's highly secret smaller imaging spacecraft. For weather data, NATO used ten spacecraft, including four USAF DMSP spacecraft flying in 500-mile polar orbits and two European Meteosat spacecraft in geosynchronous orbits. As in Desert Storm, Allied Force made heavy use of the twenty-four medium-earth orbit satellites comprising the Global Positioning System (GPS). These were used for precision strikes guiding both munitions and aircraft. *See* C. Covault, *Military Space Dominates Air Strikes*, 150:13 AV. WK. & SPACE TECH., Mar. 29, 1999, at 31. In addition to the Meteosat assets, several other non-U.S. space systems also contributed to NATO's effort including France's Helios 1 military imaging

demonstrates is that the military use of space for combat continues toward more robust, integrated systems. The increasing reliance on space assets strongly suggests that the space environment will eventually become a distinct theater of military operations.[530]

A. Bases on Which the Law of War Applies to Outer Space

To those familiar with international law, it may seem strange to undertake a separate discussion of the bases on which the law of war applies to outer space conflicts. As a general proposition of international law, a State's legal obligations are not conditioned geographically unless otherwise specifically noted or unless the circumstances of the obligation make such conditions obvious. As a result, it may appear self-evident that the law of war will apply, to the extent it has relevance, to future space conflicts.[531] But this

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satellite, which provided images of one to five meter resolutions. *See* P. Sparaco, *French Satellite Details Air Strike Damages*, 150:15 AV. WK. & SPACE TECH., Apr. 12, 1999, at 26.

[530] While recognizing the tremendous qualitative difference between the use of space in support of combat operations, and the weaponization of space itself, the author believes it virtually assured that within the near future space will be widely viewed as its own military theater of operations and thereafter weaponized. Increasing awareness in the U.S. of the need to protect national space assets continues to drive the debate closer toward weaponization. Though space weapons will likely be developed with the principal purpose to defend satellites, some will undoubtedly be fielded to provide for an offensive counter-attack. In both cases, the strategic and political implications appear to be the same. As Colin Gray points out, it "is a distinction without a difference." C.S. GRAY, AMERICAN MILITARY SPACE POLICY: INFORMATION SYSTEMS, WEAPON SYSTEMS AND ARMS CONTROL 49 (1982) [hereinafter GRAY]. Gray proceeds to articulate four strategic reasons why the U.S. should weaponize space. Though written before the breakup of the Soviet Union, and largely directed toward a Soviet adversary, the continuing Russian threat coupled with the evolution of new space powers, could make Gray's points equally compelling today: first, both the U.S. and Soviet Union (now Russia) use space for military purposes that would be critically important during war; second, passive defensive techniques, or survival aids short of weaponization, are not certain to succeed; third, the Soviet Union likely already has deployed ASATs; and fourth, it is unlikely that U.S. spacecraft can be protected through deterrence given that the Soviets have too much to gain by attacking them in war. *Id.* at 49-51.

> Overall, these arguments amount to the following policy judgment: U.S. self-denial of ASAT capability will not contribute to the survival prospects of U.S. C3I assets in space–indeed, quite the opposite is true. Such self-denial could, and most probably would, permit the Soviet Union [or other potential future space adversary] to gather and relay strategic intelligence fatal to the validity of the U.S. policy of continuing deterrence.

Id. at 51.

[531] Professor Cheng hints that such is the case in his syllogistic argument for the proposition that the legal regime for outer space is analogous to the basis status of the high sees. His major premise, "that international law is inherently applicable to outer space," would certainly

is not necessarily accurate for the simple reason that the specific legal norms governing space warfare, with very few exceptions,[532] have yet to emerge. Thus, to provide the basis for further development, the conclusion that the principles of the law of war apply to outer space should prevail only on the basis of reasoned legal argumentation. At least three methods of argument, discussed below, appear to sustain the conclusion that the existing law of war does apply to space warfare: argumentation by analogy, argumentation based on specific reference to the terms of the Outer Space Treaty, and argumentation based on the Martens' clause.

1. Analogy

As discussed earlier, development of the *corpus juris spatialis* has occurred in part by use of legal analogies.[533] Analogy has been used in two senses. First, the environment to be regulated–outer space–is compared to other environments, such as the high seas and Antarctica. On this basis, the international community has developed the legal regime governing outer space after drawing from legal norms governing these other environments. Second, the use of analogy occurs after a legal norm within the *corpus juris spatialis* has already been established. In this sense a principle of law is interpreted by means of analogy with a specific principle from another legal regime. This could be termed argumentation by micro-analogy, while the other constitutes argumentation by macro-analogy.

Both types of argumentation will be useful with respect to developing a *jus in bello* for space. On the macro-level, the *jus in bello* governing means and methods of combat on land, sea, or air, provides potential similarities to means and methods of space combat made possible by the existing and proposed technologies discussed in Chapter Two. The closer the factual similarity, the more likely it is that the existing norm will undergird the developing legal regime for space. Similarly, given the relative youth of space law, argumentation by micro-analogy is just about the only means of interpreting the general *corpus juris spatialis* to fit specific legal issues relating to the military use of outer space. Though use of analogies in any sense can be misleading if it amounts to misrepresentation of the existing norm used as the analogy, it will undoubtedly guide the quest for articulating the current *jus in*

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include the law of war. B. Cheng, *Astronauts*, *in* 11 ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 40 (Bernhardt, ed., 1982).

[532] These include restrictions on the orbiting of nuclear weapons or other weapons of mass destruction under Article IV of the Outer Space Treaty, as well as the detonation of nuclear weapons in outer space under the Limited Test Ban Treaty.

[533] *See supra* notes 466-477 and accompanying text.

bello for space, as well as the development of the many further norms likely to emerge in the context of State practice.[534]

a. Parallels to Sea Warfare

Given the general jurisdictional parallels and legal analogies drawn between outer space and the high seas,[535] a similar comparative approach is natural in attempting to establish the status of outer space in conditions of armed conflict. The sovereign rights of all States on the high seas are equal. So too in outer space. Once armed conflict has begun however, with the exception of avoiding the territory and property of neutral States,[536] the legal status of the place in which combat occurs becomes less important. Thus, if State A launches an "armed attack" against State B, the latter may respond in self-defense either in State A's territory, State B's territory, the high seas, international airspace, or outer space. As a result, though space law has made significant use of analogies from the law of the sea, a unique analogy between warfare in space and warfare on the high seas appears inapposite, at least as distinguished from analogies with international airspace and the territory of opposing belligerents.

b. Previous Application of the Law of War to Aerial Warfare

In addition to the use of analogies drawn by the *corpus juris spatialis* from the law of the sea, it is likely that the *jus in bello* for space will draw on the developmental patterns characterizing evolution of the *jus in bello* for aerial warfare.[537] When the Hague conferences met in 1907, aviation was a

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[534] As implied throughout this article the *jus in bello* for space demonstrates an "already/not yet" character. Legal commentators understandably seem reluctant to speak of an existing and distinct *jus in bello spatialis* ("not yet"), though as has been shown in Parts III-V above, numerous specific customary and conventional norms operate to limit means and methods of space warfare that States may lawfully employ ("already").

[535] For example, the U.N. Convention on the Law of the Sea distinguishes between territorial sea (complete State sovereignty and jurisdiction) and high seas (no State sovereignty or jurisdiction, except jurisdiction over its registered vessels). LOS Convention, *supra* note 467, at art. 2(1), 87(1). Similarly, in the space above the earth, States recognize the distinction between national airspace (complete State sovereignty and jurisdiction) and outer space (no State sovereignty or jurisdiction, except jurisdiction over its registered objects). *Compare* Convention on International Civil Aviation, Dec. 7, 1944, art. 1, 61 Stat. 1180, 15 U.N.T.S. 295, *with* Outer Space Treaty, *supra* note 316, at art. II.

[536] "As a general rule, neutral territory is treated as sacred space; it is inviolable." J. Astley & M.N. Schmitt, *The Law of the Sea and Naval Operations*, 42 A.F. L. REV. 119, 140 (1997). The law of neutrality is a part of the law of war but not of the *jus in bello* and is largely consistent with the law of the sea. Thus, the maritime rights and duties of States in peacetime continue to exist for the most part during armed conflict. *See id.* at 138.

[537] At the risk of descending into logical abstraction, a further clarification is necessary. With reference to the macro/micro categories established above, the form of argumentation here

fledgling industry. There were profound uncertainties about how or even if aviation could be effectively used in war. Thus, the 1907 Conventions do not specifically address limits on aerial warfare.[538] As aeronautical technology developed, the international community never adopted a binding legal regime restricting means and methods of aerial warfare. Though the 1923 Hague Rules of Aerial Warfare are thought to reflect customary law in some respects, not a single nation ever ratified this agreement. What does exist by way of restriction, exists in piecemeal form through an array of instruments comprising the laws of war. This evolutionary, piecemeal approach to restrictions on aerial warfare is likely to characterize the evolutionary growth of international restrictions on space warfare as well.

Military roles and missions for space assets in the U.S. have developed along lines similar to those of airpower during the beginning of this century.[539] In both cases, intelligence-gathering and support operations came first, followed by each respective medium used as a means of transportation. Finally, offensive and defensive combat roles followed. As USSPACECOM plans for offensive and defensive combat capabilities in space, the comparison with airpower appears complete. Of course, the possibility always exists that space combat will be outlawed by international agreement. However, "the odds are poor. . . . Deep-seated [human] traits create tremendous temptations for aggressors to take all, unless probable costs of such action exceed anticipated gains."[540]

As a result of the parallel development of air and space military missions, and of the piecemeal recognition of international limits on means and methods for prosecuting aerial war, it is reasonable to predict that the *jus in bello* for outer space will evolve as did the *jus in bello* for airspace: incrementally, by analogy to former means and methods of warfare, and in the absence of a comprehensive treaty-based system of prohibitions.

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amounts to a *meta*-macro-analogy. That is, not only are we in this case comparing one combat environment to another to conceive a suitable legal framework for war, we are examining the *development* of that comparison as it has been used to establish the newer framework for aerial combat. Thus, the suggestion made here as to the evolution of norms limiting aerial warfare depends not only on the comparison of entire legal systems (macro-analogy between aerial combat and land/sea combat) within international law, but on an analysis of the larger (meta) process by which the comparison led to the newer legal regime in the first place.

[538] The possible exception being the proscription on discharging projectiles from balloons. *See* Declaration (XIV) Prohibiting the Discharge of Projectiles and Explosives from Balloons, Oct. 18, 1907, 36 Stat. 2439.

[539] COLLINS, MILITARY SPACE FORCES, *supra* note 12, at 1 n.2.

[540] *Id.* at 2.

2. *Outer Space Treaty*

Article III of the Outer Space Treaty provides perhaps the clearest indication that the international law of war will apply to space warfare:

> 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.[541]

Two significant observations arise from this provision. First, Article III applies the restrictions of all international law to outer space activities ("in accordance with"). As products of "international law," this surely includes both the *jus ad bellum*, made obvious by Article III's specific reference to the U.N. Charter, and the *jus in bello*. This observation provides the strongest evidence that as far as its principles will apply to future technologies, the law of war has been incorporated into military space operations by virtue of the Outer Space Treaty.

A second observation relates to the requirement that a State's exploration and use of outer space be "in the interest of maintaining international peace and security." This well-worn phrase in international law comes directly from, among others, the U.N. Charter.[542] As historically used, the phrase assumes that military force will be available to the international community to ensure international order.[543] As international law has limited the means and methods States may use in employing military force in combat, those limits form a part of the context in which the maintenance of international peace and security, including the use of force in space, must occur.

3. *Martens' Clause*

A final observation regarding the application of the laws of war to military space operations relates to what became known at the Hague

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[541] Outer Space Treaty, *supra* note 316, at art. III. In addition, the Outer Space Treaty references international law as well at Article I. "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." *Id.*

[542] U.N. CHARTER, *supra* note 262, at art. 1(1). The phrase appeared previously in the Covenant of the League of Nations. Covenant of the League of Nations, June 28, 1919, 225 Consol. T.S. 188.

[543] That is, it requires the "activity which is necessary for maintaining the conditions of peace." R. Wolfrum, *Article 1*, *in* THE CHARTER OF THE UNITED NATIONS: A COMMENTARY 50 (B. Simma, et al., eds., 1994).

diplomatic conferences as the "Martens' Clause." This clause, so named for the Russian delegate proposing its inclusion, was inserted into the preamble of the 1899 Second Convention and the 1907 Fourth Convention. The clause was intended to supplement the prohibitory rules adopted at both conferences. The clause appears in several law of war documents, and reads as follows in its 1907 iteration:

> Until a more complete code of the laws of war has been issued, the high contracting parties deem it expedient to declare that, in cases not included in the Regulations adopted by them, the inhabitants and the belligerents remain under the protection and the rule of the principles of the law of nations, as they result from the usages established among civilized peoples, from the laws of humanity, and the dictates of the public conscience.[544]

The clause reminds States Parties that explicit prohibitions within the Treaty do not supercede general, implicit prohibitions operating in the background by way of "principles of the law of nations."[545] In this way, the clause covers not only customary international law but also incorporates all rules and principles of the general law of nations.[546] As a result, it does more than simply claim that customary international law fills in the gaps left by conventional law.

The further influence of the clause can be seen by its inclusion into successive law of war documents throughout the twentieth century. Thus, versions of the principle quoted above have appeared in each of the four 1949 Geneva Conventions,[547] the 1977 Protocol (I) to the Geneva Conventions governing international armed conflicts,[548] and the 1980 Convention on Conventional Weapons.[549] This widespread incorporation of the principle, adopted by the vast majority of States, strongly suggests that the Martens' Clause itself may have become a principle of customary international law.[550]

The continuing vitality of the doctrine expressed in the Martens' Clause will be particularly important for space warfare, often thought to be the most technologically innovative form of warfare. Because the doctrine is

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[544] Hague Convention (IV), *supra* note 190 (from the Preamble).

[545] *Id.*

[546] The distinction between customary law and other general principles of law was later announced as comprising two separate sources of international law. *See* STAT. OF THE ICJ, *supra* note 261, at art. 38.

[547] Geneva Convention I, *supra* note 212, at art. 63 ¶ 4; Geneva Convention II, *supra* note 216, at art. 62 ¶ 4; Geneva Convention III, *supra* note 204, at art. 142 ¶ 4; Geneva Convention IV, *supra* note 214, at art. 158 ¶ 4.

[548] Protocol I, *supra* note 156, at art. 1(2).

[549] Conventional Weapons Treaty, *supra* note 247 (from the Preamble).

[550] This possibility is strengthened by the claim of the International Military Tribunal at Nuremburg in 1946 that convention IV is declaratory of customary international law. Roberts & Guelff, *supra* note 131, at 44.

phrased "dynamically,"[551] implicitly anticipating the need to regulate means and methods of warfare developed through technological advances, it will always operate to limit the lawful prosecution of space warfare. No matter what new means or methods are developed, they will remain subject to "the principles of international law derived from established custom, from the principles of humanity and from the dictates of public conscience."[552]

B. Problems of Legal Definition and the Use of Force in Space

As is the case with domestic law, international law depends for its coherence and consistency on clear definitions of key terms. The quest to further develop a *jus in bello* for space will be plagued with the conspicuous absence of authoritative definitions of several significant terms and concepts. In addition to the difficulty of applying existing law, this situation holds important lessons for the future drafting of space treaties, including the importance of avoiding terms and phrases open to more than one reasonable interpretation.[553] Though the lack of definition or use of ambiguous terms often reflects the presence of irreconcilable difference among the drafters, such devices can work to utterly frustrate the aims of the treaties in which they appear. It certainly will complicate the emergence of a distinct *jus in bello* for space.

1. Militarization of Space

The militarization of outer space does not necessarily entail its weaponization.[554] Many of the legal issues arising from the militarization of space do so in part because of the absence of clear definitions for terms used in the relevant space treaties. For example, aside from peaceful purposes[555] and

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[551] H. Strebel, *Martens' Clause, in* 3 ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 252 (Bernhardt, ed., 1982).

[552] Protocol I, *supra* note 156, at art. 1(2).

[553] Vlasic, *Negotiating and Drafting Agreements Relating to Outer Space, supra* note 321, at 209.

[554] *See* definitions of "militarization" and "weaponization," *supra* note 11.

[555] As suggested above, the common view today regards peaceful purposes as synonymous with non-aggressive. Such operations would include not only peacetime military activity, but also activity involving the use of force during armed conflict. What makes an activity aggressive and thus non-peaceful is not the use or absence of armed force, but the larger purpose to which it is put. An aggressive act unlawfully initiated by one belligerent, may trigger a lawful, though overwhelming armed response from another in individual or collective self-defense. The latter response is not rendered aggressive even though it may involve a ferocious degree of force, or even what constitutes an act of war. In this way, even an act of war may have a larger peaceful purpose. To the extent a use of force is taken in self-defensive, or pursuant to a U.N. Security Council authorization, and is proportional to the initial aggressive act (that is, to the initial violation of the *jus ad bellum*), it complies with

outer space,[556] the law lacks basic authoritative definitions of other terms including space object, and space debris. As noted previously, the Liability Convention defines "space object," but its general circularity leaves the definition unhelpful.[557] Functionally, the "space object" as used in international parlance includes "space debris." As it is generally conceived, a space object includes any artifact, manned or unmanned, that is launched into orbit. This includes objects that have ceased to function and have become debris. The lack of legal definition for these basic terms makes the already difficult task of applying two distinct branches of international law to space combat that much more difficult.

2. Weaponization of Space

Beyond terms relevant to the militarization of space are those related to the more controversial prospect of space weaponization. Not only has the U.S. historically eschewed the prospect of fielding space weapons, but even as their use has recently attracted renewed attention, some officers within the military publicly advocate a space sanctuary policy – that is, no weapons in space.[558] Many others, including the current Chief of Staff of the U.S. Air Force, view

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international law and may occur in space just as elsewhere. For a discussion of the requirement that the *jus in bello* principle of proportionality applies to acts of self-defense, see Military and Paramilitary Activities (Nicar. v. U.S.), 1986 I.C.J. 4, 103 ("The Parties also agree in holding that whether the response to the attack is lawful depends on observance of the criteria of the necessity and the proportionality of the measures taken in self-defense.").

[556] Perhaps the most difficult of all space law issues relates to the delimitation, or boundary, separating a State's territorial airspace and outer space.

> There is no clear answer to the question of where space begins. But equally clearly, at some point above the earth, there exists an environment completely different from the one we have here. A sort of customary law has developed . . . to the effect than any object in orbit is in space, and that seems enough to satisfy everyone for the time being.

REYNOLDS & MERGES, *supra* note 59, at 12. For an excellent, recent legal analysis of the air and space boundary question, see Elizabeth Kelly, The Spaceplane: The Catalyst for Resolution of the Boundary and 'Space Object' Issues in the Law of Outer Space? (1998) (unpublished LL.M. thesis, McGill University) (on file with author, and the Nahum Gelber Law Library, McGill University).

[557] Liability Convention, *supra* note 365, at art. 1(d).

[558] *See* DeBlois, *supra* note 3; ZIEGLER, *supra* note 3. Joseph Justin points out that the "space sanctuary" school "is fundamentally opposed to any military weapons in space." Justin, *supra* note 3, at 104. Justin goes on to claim that the space sanctuary perspective "believes space should not be used as a military instrument of policy" and that the military role in space is to work for demilitarization. *Id.* Although this may represent the classic sanctuary position, DeBlois and Ziegler do not advocate space as a sanctuary free from any military presence, just free from weapons.

the ultimate weaponization of space as "inevitable."[559] Whatever policy the U.S. adopts, one must immediately confront the question "what constitutes a weapon?" As one example, the meaning of nuclear weapon as used in the Outer Space Treaty may become less and less evident in future decades witnessing an evolution of space weaponry.[560] While some hearing the term nuclear weapon may immediately equate it with thermonuclear devices designed for detonation under controlled circumstances, it is certainly correct to observe that "nuclear energy may be used in different ways and may be a potential weapon even if not so designed."[561] As a result, in the absence of clear definition, one could argue that following its malfunction, the Chernobyl nuclear reactor, for example, became a "nuclear weapon."

Further complicating any legal analysis of the permissible scope of the weaponization of space one confronts a further definitional vacuum. Despite the heavy militarization of space, 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 for purposes of analysis. And, without this foundational definition, one cannot define phrases on which it logically relies, such as nuclear weapon and weapon of mass destruction. The difficulty arises in that any comprehensive definition of space weapon will include space systems equally used for non-military, non-destructive, and non-aggressive 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."[562]

One proposed definition illustrates this challenge:

> A space weapon is a device stationed in outer space (including the moon and other celestial bodies) or in the earth environment designed to destroy, damage, or otherwise interfere with the normal functioning of an object or being in outer space, or a device stationed in outer space designed to destroy, damage, or otherwise interfere with the normal functioning of an object or

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[559] David A. Fulghum, *USAF Chief Signals Key Funding Priorities*, 153:1 AV. WK. & SPACE TECH., July 3, 2000, at 56. Expanding the point, General Michael Ryan asserted that while the weaponization of space is still decades off, "there is some inevitability that it will occur if just to protect extensive communications and navigation systems already there.... I think there will be attacks–challenges to our space capability. We will have to protect our assets in space because we're becoming much more dependent on them. So I see defense as a primary emphasis." *Id.*

[560] *See supra*, note 353 for further discussion of the definition of "nuclear weapons" as applied to X-ray lasers.

[561] S. Gorove, *Space Without Weapons: International Legal Aspects of Weapons and Harms, in* SPACE WITHOUT WEAPONS 29 (N.M. Matte, ed., 1989) [hereinafter Gorove, *Space Without Weapons*].

[562] Paul B. Stares, *The Problem of Non-Dedicated Space Weapon Systems, in* PEACEFUL AND NON-PEACEFUL USES OF SPACE: PROBLEMS OF DEFINITION FOR THE PREVENTION OF AN ARMS RACE (B. Jasani, ed., 1991) 147 [hereinafter Stares, *Non-Dedicated Space Weapon Systems*].

> being in the earth environment. Any other device with the inherent capability to be used as defined above will be considered as a space weapon.[563]

Of particular interest is the second sentence. While it acknowledges that space objects not designed as weapons may *become* weapons if they can "be used" as such, it arguably leaves the definition so broad as to include just about any object at all.

Objects in orbit travel at roughly 17,000 miles per hour. This fact alone gives them the "inherent capability" to destroy or interfere with an object or being in space or in the earth environment. This is equally true of functioning satellites, dead satellites, and space debris. Similarly, under this definition commercial telecommunications satellites are space weapons as they have the inherent capability to interfere with the normal functioning of other telecommunications satellites. Indeed a rifle, a hunting knife, or even any sharp object on earth possesses the capability to destroy and/or interfere with a ground station, making impossible the normal functioning of the satellite it supports. These observations are not intended to suggest "space weaponry" should not be defined. They are simply intended to illustrate the difficulty of creating a definition that will distinguish space weapons from the larger categories weapons, space objects, or even objects.

Put another way, should the developing law of war ever proceed to restrict the use of existing or potential space weapons, the definition of space weapons will have to confront the difficult problem of what to do about "non-dedicated systems"–that is, those space systems not designed as weapons.[564] It

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[563] B. Jasani, *Introduction* to PEACEFUL AND NON-PEACEFUL USES OF SPACE: PROBLEMS OF DEFINITION FOR THE PREVENTION OF AN ARMS RACE 13 (B. Jasani, ed., 1991).

[564] Stares, *Non-Dedicated Space Weapon Systems*, *supra* note 562, at 147. Stares goes on to suggest 5 criteria that assist in determining the military capability of non-dedicated systems:

> 1. Operational readiness. How soon could the non-dedicated system be readied for use as a space weapon? What does it entail to make it ready? Are trained personnel available to convert it and use it for this purpose? Are the necessary support systems, such as target detection and tracking sensors also available? 2. Target coverage. What targets does the non-dedicated system realistically threaten? How many such attacks can it carry out? 3. Speed of attack. How quickly can single or multiple attacks using non-dedicated systems be carried out? Is there any warning associated with their use that might allow defensive countermeasures to be implemented? 4. Operational confidence. What is the probability that single and multiple attacks using non-dedicated systems will succeed in their intended mission? 5. Operational costs. What, if any, are the military or political costs associated with the use of non-dedicated systems as space weapons?

Id. at 151. With reference to ASATs, non-dedicated systems are also termed "residual" ASATs. *See* STARES, SPACE AND NATIONAL SECURITY, *supra* note 70, at 3.

will also have to elucidate whether the restriction applies to the weapon's subcomponents as well.[565] A consensus among States on such a definition will facilitate application of the law of war to armed conflict in space.

In the meantime, consideration of technologies useful for space combat will proceed under the principle that State action is permitted in the absence of clear legal prohibition.[566] Though regularly denounced by a large segment of the international community as destabilizing for the use and exploration of outer space,[567] in principle none of the potential means and methods of space warfare discussed previously in Chapter Two, with the exception of nuclear weapons, violate international law.[568] Of course, the use to which these

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[565] Professor Gorove, referring to nuclear and other weapons of mass destruction, maintains that "unless specifically covered, subcomponents which in themselves do not qualify as a weapon, should not be taken to be included in a ban relating to the weapon." Gorove, *Space Without Weapons*, *supra* note 561, at 31.

[566] For a discussion of this general international legal principle, see *supra* note 141.

[567] Indeed, the Soviet Union went so far as to present a "Draft Treaty on the Prohibition of the Stationing of Weapons of Any Kind in Outer Space" to the 36th Session of the U.N. General Assembly on Aug. 20, 1981. In pertinent part, the draft treaty would have required

> States Parties . . . not to place in orbit around the earth objects carrying weapons of any kind, install such weapons on celestial bodies, or station such weapons in outer space in any other manner, including on reusable manned space vehicles of an existing type or of other types which States Parties may develop in the future.

(Article 1(1)). It would have equally required States Parties "not to destroy, damage, disturb the normal functioning or change the flight trajectory of space objects of other States Parties, if such objects were placed in orbit in strict accordance with Article 1, paragraph 1, of this treaty." (Article 3). GRAY, *supra* note 530, at 115.

While the treaty would not have prohibited land-based ASATs, it would have significantly expanded the scope of the partial deweaponization provision of Article IV, Outer Space Treaty. Outer Space Treaty, *supra* note 316, at art. IV. The U.S. dismissed the Soviet draft treaty as a "hypocritical propaganda ploy." STARES, THE MILITARIZATION OF SPACE, *supra* note 40, at 230. Following announcement that the U.S.S.R. would unilaterally refrain from deploying ASATs "for the entire period during which other countries, including the U.S.A., will refrain from stationing in outer space antisatellite weapons of any type," the Soviets presented a second draft treaty that would have prohibited the testing and deployment of "any space based weapons intended to hit targets on the Earth, in the atmosphere, or in space." *Id.* at 231. Over great scientific and congressional pressure, the Reagan administration rejected this proposal as well citing the extreme difficulty, if not "impossibility," in verifying an ASAT treaty. *Id.* at 233.

[568] After a discussion of the relevant provisions of the Outer Space Treaty and the Moon Agreement, Professor Christol observed in 1988 that

> [i]n the years since 1967 [Outer Space Treaty] and 1979 [Moon Agreement] science and technology have perfected new generations and families of weapons, including those employing highly focused energy, such as laser weapons, and those based on sub-atomic particles, such as particle beam weapons. Pursuant to the general legal principle that which is not prohibited

weapons are put could render them unlawful for a specific objective if, for example, their use rendered them disproportionate (or indiscriminate or inhumane) under the law of war as judged against the military objective in view. But this is an inherent possibility for any weapon, which, by itself, does not render the weapon unlawful.

3. Use of Force in Space

Beyond definitional limitations, a thorough articulation of legal standards applicable to space warfare should account for the ways most likely to trigger *jus ad bellum* restrictions on the resort to the use of armed force. One commentator has observed that space law, including the Limited Test Ban Treaty, Outer Space Treaty, Anti-Ballistic Missile Treaty, and the Moon Agreement, was developed to "permit, indeed to endorse, the arms race, including the militarization of space."[569] Though speaking with a sense of irony and regret, this scholar's comments raise the twin questions of the law's tolerance of one State's infliction of intentional damage on another's assets, and of the capture of foreign space assets. Though the U.N. Charter forbids the "threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the Purposes of the United Nations,"[570] the meaning of this prohibition remains hotly contested. The prevailing view is that this provision is an absolute bar to the use of force with the sole exceptions being self-defense and authorization by the Security Council. The other view, greatly bolstered by the recent NATO air war in Kosovo, asserts that the prohibition pertains only to the use of force for purposes inconsistent with the Charter such as the subjugation of another State, or annexation of its territory.[571] A State's interpretation of the general prohibition on the use of force will obviously greatly impact its decision

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is permitted, it may be concluded that the more recent exotic weapons do not fall within the constraints of the foregoing treaty provisions.

C.Q. Christol, *Outer Space: Battle-Ground of the Future?*, *in* SPACE LAW: PAST PRESENT AND FUTURE 59 (C.Q. Christol, ed., 1991). The Russians have objected to the orbiting of particle beam weaponry claiming that it constitutes a "weapon of mass destruction." TAYLOR, *supra* note 97, at 34. However, given its likely capacity for great precision, the weapon need not generate "mass" destruction, though it may be lethal for its intended target. Some authors suggest, inexplicably, that just about all space weapons constitute weapons of mass destruction. *See, e.g.*, M.N. Andem, *Implementation of Article IV of the Outer Space Treaty of 1967 During the 21st Century*, *in* PROCEEDINGS OF THE FORTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE 338, 344 (1998).

[569] M.M. Matte, *A Treaty for 'Star Peace,' in* 2 ARMS CONTROL AND DISARMAMENT IN OUTER SPACE 190 (N.M. Matte, ed., 1987).

[570] U.N. CHARTER, *supra* note 262, at art. 2(4).

[571] Vlasic, *Negotiating and Drafting Agreements Relating to Outer Space*, *supra* note 321, at 211.

whether or not to use it. For example, if a State finds in the Charter no prohibition on individual or collective "humanitarian intervention," it will expand to the uses of force it deems lawful in any of the combat environments, including space.[572]

Beyond general principles under the *jus ad bellum*, one can find reference to the intentional use of force within space law itself. A careful reading of the Liability Convention discloses that the *corpus juris spatialis* implicitly recognizes that under certain circumstances the intentional destruction of space objects might occur.[573] As previously discussed, the Liability Convention subjects States Parties to absolute liability for damage caused by its space objects on the earth's surface, or to aircraft in flight,[574] and to liability based on fault for damage by its space object to the space object of another State "being caused elsewhere than on the surface of the earth."[575] However, Article VI provides exoneration from absolute liability in cases where either the claimant State, or the natural or juridical persons it represents, caused the damage wholly or partially by gross negligence, or an act or omission done with intent to cause damage.[576] A proper understanding of the phrase "intent to cause damage" provides insight into the Convention's foresight as to the possibility of uses of force against space objects.

Under Article VI, the scope of the exoneration applies only as to "absolute liability" under Article II, and therefore exoneration from liability for damage by space objects done on the surface of the earth or to aircraft in flight. Given the purpose of space objects, that is, launch into space, this provision for exoneration would certainly include intentional acts taken against space objects *while in space* that later cause damage on the earth or in the air. Obviously, the exoneration for intentional damage caused by a claimant State presupposes the possibility that such intentional damage will occur. Thus, despite the provisions of the Outer Space Treaty prescribing the "peaceful" use and exploration of space, the Liability Convention recognizes the distinct possibility that States may engage in intentional damage to space objects. While this does not imply the Convention's sanction for such events,[577] it does

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[572] The more restrictive view of Article 2(4) is admittedly difficult to square with the U.N. Charter's plain language and the historic reticence in the U.N.G.A. against foreign interventions. Nonetheless, "[e]xamination of the language and the negotiating background of Article 2(4) provides no unequivocal indication of its intended meaning." Vlasic, *Negotiating and Drafting Agreements Relating to Outer Space*, *supra* note 321, at 211.

[573] HURWITZ, *supra* note 289, at 148-50.

[574] Liability Convention, *supra* note 365, at art. II.

[575] *Id.* at art. III.

[576] *Id.* at art. VI.

[577] In fact, the exoneration from liability shows the very opposite. The Convention purports to punish States engaging in intentional destructive acts by eliminating their remedy against the launching State. As Article VI(2) establishes however, if the damage is caused by activities of the launching State that are inconsistent with the international law, including the U.N. Charter and the Outer Space Treaty, there will be no exoneration from absolute liability "whatever."

suggest that the international community realistically expected that a claimant State might take action amounting to the intentional damaging of a space object.[578]

Legally speaking, the capture of a foreign space object is related to the question of intentional uses of force. Under the Outer Space Treaty a State Party to the Treaty "on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object."[579] At face value, this means that a satellite, for example, registered by State X belongs to State X for purposes of jurisdiction and control. Nonetheless, when State X uses its satellite to intentionally and wrongfully disable State Y's satellite, assuming that doing so amounts to an "armed attack" under the U.N. Charter, State Y may in self defense disable State X's satellite.[580] In such circumstances, State X has violated one of the conditions assumed to exist by the Outer Space Treaty–the peaceful use of outer space. Having properly acted in self-defense, may State Y capture State X's aggressor satellite for intelligence or other purposes? It certainly seems that the law of war authorizes belligerents not only to kill opposing belligerents but to destroy their weaponry. If State Y can lawfully destroy State X's satellite, it can certainly capture it, Article VIII of the Outer Space Treaty notwithstanding. Put otherwise, the only way a State may be assured the protection of its space assets, is to ensure that its activities remain compliant with international law, including space law and the *jus ad bellum*.

Id. at art. VI(2). This would mean that an aggressive military operation by launching State A that causes damage on the earth or in the air to claimant State B, will result in no exoneration of absolute liability for State A, even if State B contributed to the damage by acts done with an intent to cause damage.

[578] After observing that the U.S. ratified the Liability Convention only "after being advised by the Department of State that the Convention did not apply to international damage," Hurwitz concludes from this that "the U.S. has recognized the right to intentionally damage another State's space objects with impunity (as least as far as the 1972 Convention is concerned)." HURWITZ, *supra* note 289, at 149. Whether this overstates the U.S. position or not, it does seem clear that the Convention exonerates one State from liability only as against intentional damage caused by the *claimant* State or the natural or juridical persons it represents. Liability Convention, *supra* note 365, at art. VI(1). Thus, the U.S. Department of State was certainly correct that the Convention does not "apply" (that is, create liability), as against one State in cases where the claimant State has at least "partially" caused intentional damage.

[579] Outer Space Treaty, *supra* note 316, at art. VIII.

[580] U.N. Charter, *supra* note 262, at art. 51. Given the fact that Article 51 presupposes a previous customary right to self defense ("inherent right"), the right to respond by State Y may not even require the occurrence of an armed attack, depending on the nature of the customary right. For further discussion of article 51, see *supra* note 173. State Y's act of self defense must also be proportionate to State X's provocation.

C. National Policy, Military Space Doctrine, and Law of War Manuals

A review of the U.S. space policies at the Presidential and DOD levels reveals that the leadership invariably reserves a place for national security and military activity within its space policy statements. In fact, current U.S. national space policy directs the DOD to assume certain space missions that, when implemented, will have the effect of preparing the U.S. for armed conflict in space. As a result, U.S. space policy precipitates the need for an examination of the laws of war. Increasingly, prominent observers are calling for full implementation of U.S. military space policy which would result in a robust combat capability.[581] Taking the argument a step further, others argue for a fourth military department devoted to space.[582] Nonetheless, as one

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[581] For example, in arguing for an approach to space power that rests in part on the assertion that "America's future security and prosperity depend on our constant supremacy in space," United States Senator Smith advocated a shift of "substantial" national military resources into space. Sen. Bob Smith, *The Challenge of Space Power*, 13:1 AIRPOWER J. 32, 33 (1999) [hereinafter Smith]. He opined that "if we do, we will buy generations of security that all the ships, tanks, and airplanes in the world will not provide. This would be a real 'peace-dividend' – it would actually help keep the peace." *Id.* Subsequently, he specified that the use of space to secure information superiority does not constitute space warfare stating that "if we limit our approach to space just to information superiority, we will not have fully utilized space power." *Id.* at 34. Calling for a "space-power culture" within the U.S. military, Senator Smith warned against allowing a "blanket of political correctness and bureaucratic inertia" from smothering revolutionary ideas. *Id.* at 35, 36.

[582] Commentators, politicians, academics, and military members have been calling for such a move for years. For example, in 1970 Robert Salkeld provocatively claimed that space warfare was a virtual inevitability. "The concept which naturally suggests itself is the eventual creation and growth of a fourth major service, a United States Space Force, which might function at budgetary parity with the Army, Navy and Air Force." R. SALKELD, WAR AND SPACE 189 (1970). Later, another commentator observed that roles and missions debates for space between the existing services would reach a fevered pitch leading to an inevitable evolution toward a separate space service.

> Military space operations, much like U.S. tactical air combat power, probably will remain a specialty within several military services that squabble over respective budgets/prerogatives, until important space missions involve more than support for armed forces on Earth and powerful spokesmen present decisionmakers a persuasive case. A Solomon-style decision eventually will be unavoidable: senior officials must determine whether to deliver the military space 'baby' intact or divide it. . . . A separate armed service with centralized control over all military space activities, for example, might avoid most doctrinal disputes.

COLLINS, MILITARY SPACE FORCES, *supra* note 12, at 82, 83. In 1999, Senator Smith suggested the propriety of such a move: "The notion that the Air Force should have primary responsibility for space is not sacred. . . . [I]f the Air Force cannot or will not embrace space

military commentator observes, "[a]lthough the idea of space warfare is becoming prominent in Air Force thinking, little effort has been made to flesh out what it means."[583] It also appears that little thought has been given to the question "how will the law of war limit a State's ability to prosecute warfare in space?"

In establishing the current national space policy in 1996, President Clinton reiterated the requirement to use space for "peaceful purposes."[584] Consistent with the forty-year U.S. interpretation of the term, it does not exclude military activity such as intelligence-gathering or even armed defense: "'Peaceful purposes' allow defense and intelligence-related activities in pursuit of national security and other goals."[585] More recently, the President's National Security Strategy states that "our policy is to promote development of the full range of space-based capabilities in a manner that protects our vital national security interests."[586]

The U.S. National Space Policy directs U.S. space activity under several substantive areas comprising "Civil Space Guidelines," "National Security Space Guidelines," "Commercial Space Guidelines," and "Intersector Guidelines." The DOD is directed, *inter alia*, to "maintain the capability to execute the mission areas of space support, force enhancement, space control, and force application."[587] These four mission areas form the backbone of the DOD's military space activity, as executed by its unified command for space, USSPACECOM.

With respect to the law of war, the DOD explicitly states that it is U.S. defense policy to ensure that "[t]he law of war obligations of the United States are observed and enforced by the DOD Components."[588] Further, the heads of DOD Components are directed to ensure that "[t]he members of their Components comply with the law of war during all armed conflicts, however such conflicts are characterized, and with the principles and spirit of the law of war during all other operations."[589] At a minimum, these provisions mean that to the extent the law of war applies to space combat at all, and the U.S.

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power . . . we in Congress will have to establish an entirely new service." Smith, *supra* note 581, at 37-38.

[583] NEWBERRY, *supra* note 3, at 6. Major Newberry's point could be applied equally to the U.S. Army and Navy, and likely to the national security establishments of all other spacefaring States as well.

[584] National Science and Technology Council, *National Space Policy* ¶ 3 (Sept. 19, 1996) http://ast.faa.gov/licensing/regulations/nsp-pdd8.htm (on file with the *Air Force Law Review*) [hereinafter *National Space Policy*].

[585] *Id.*

[586] A National Security Strategy for a New Century (The White House, Office of the President 1998) at 25.

[587] *National Space Policy*, *supra* note 584, at "National Security Space Guidelines" ¶ (6)(a).

[588] Department of Defense Directive 5100.77, DOD Law of War Program ¶ 4.1 (Dec. 9, 1998)

[589] *Id.* ¶ 5.3.1.

develops the means for conducting space combat, the law of war will apply to U.S. forces in such combat.

As the titles to USSPACECOM's four major mission areas suggest, the first two, "space support" and "force enhancement," ensure that space assets facilitate the operations of combat forces on land, sea, and air. These missions are evolving rapidly and are leading to the "operationalization" of U.S. space forces.[590] The latter two missions, "space control," and "force application," are more controversial as they suggest the weaponization of space, and are most closely related to combat in a future theater of military space operations.

The notion of military "space control" strikes many observers as antithetical to the fundamental tenet of the Outer Space Treaty: that outer space is an environment free for use and exploration by all States. However, the current U.S. policy does not purport to establish areas of exclusive control by U.S. forces, but simply attempts to negate threats to U.S. assets. U.S. Deputy Secretary of Defense, John J. Hamre, recently explained that the space control mission is defensive in nature: "We fully believe that 'negation' in space–preventing the bad guys from using space against us–is fully authorized under international law, but we do want to take steps and actions that don't create instability in the world."[591]

The U.S. space control policy is based on a five-pronged approach which includes: "(1) assured access to space and operation once there; (2) surveillance of the space environment and space-based objects; (3) protection of spacecraft, ground stations and data links; (4) prevention of damage and interference to U.S. space infrastructure; and (5) negation of hostile space systems that place U.S. and allied assets at risk."[592] This translates to the following definition of space control, as articulated in USSPACECOM's long-range plan: "Control of Space is the ability to ensure un-interrupted access to space for U.S. forces and our allies, freedom of operations within the space medium and an ability to deny others the use of space, if required."[593]

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[590] W.B. Scott, *'Milspace' Maturing Into Warfighter Roles*, 147:9 AV. WK. & SPACE TECH., Sept. 1, 1997, at 46.

[591] W.B. Scott, *U.S. Adopts 'Tactical' Space Control Policy*, 150:13 AV. WK. & SPACE TECH., Mar. 29, 1999, at 35.

[592] United States Space Command, *Long Range Plan: Implementing USSPACECOM Vision for 2020* (March 1998) 21 [hereinafter *Long Range Plan*]. Following release of the *Long Range Plan*, DOD issued a space policy which expanded upon themes raised by USSPACECOM. For example, the DOD policy states: "Purposeful interference with U.S. space systems will be viewed as an infringement on our sovereign rights. The U.S. may take all appropriate self-defense measures, including, if directed by the National Command Authorities (NCA), the use of force, to respond to such an infringement on U.S. rights." Department of Defense Directive 3100.10, Space Policy ¶ 4.2.1 (July 9, 1999) [hereinafter DODD 3100.10].

[593] *Long Rang Plan*, *supra* note 592, at 11. The DOD definition of "space control" mirrors the USSPACECOM definition: "Combat and combat support operations to ensure freedom of action in space for the United States and its allies and, when directed, deny an adversary freedom of action in space. . . ." DODD 3100.10, *supra* note 592 ¶ E2.1.3.

Translated into legal terms, attempts to "ensure un-interrupted access to space" and to maintain "an ability to deny others the use of space,"[594] are simply expressions in the military space context of the right to self-defense in response to hostile action. As these policy goals are gradually implemented through practice they will require clarification as to the means and methods used.

Space force application contemplates the use of armed force originating from outer space. While the U.S. maintains limited space control options, it has no acknowledged space force application capabilities–this is to say it has no operational space-based weaponry.[595] The USSPACECOM Long Range Plan does not elaborate on this mission in nearly the detail it does for space control. According to General Richard B. Meyers, then-Commander, USSPACECOM, this is due in part to the fact that there is no national policy to weaponize space. While the President has assigned USSPACECOM the space force application mission, "[t]here's been no national action on this. . . . [O]ur focus now is looking at the concepts [of operation] and some of the basic technologies that would enable us to do that someday–*if* we're tasked by the national command authority to go do that. . . . Today there is relative harmony in space."[596] If the U.S. ever does proceed to the fielding of space force application options, it will most likely focus on missile defense.

Given the evolution of its national military doctrine, the U.S. may soon be positioned to begin a preliminary incorporation of combat space operations into its law of war manuals. The obvious starting point would be its manual on air warfare.[597] Not only would this course of action reflect the military's institutional acceptance of the law of war for space warfare, but it would allow the U.S. to encourage the progressive development of that law. Military manuals serve not only as evidence of State *opinio juris*, but can also serve a limited lawmaking role as well.

> Because international law notoriously lacks its own enforcement system, national implementation is often a critical factor in successful international lawmaking. . . . Certainly, both the absence of a manual or the use of manuals whose content does not include the relevant norms would strongly suggest that those norms have not been adopted.[598]

In addition, given sufficient uniformity, principles of law articulated in law of war manuals could be viewed as "general principles of law recognized

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[594] *Id.*
[595] W.B. Scott, *Space Ops Threatened By Launch Failures*, 150:20 *Av. Wk. & Space Tech.*, May 17, 1999, at 25, 26.
[596] *Id.* at 26.
[597] AFP 110-31, *supra* note 146.
[598] W.M. Reisman & W.K. Leitzau, *Moving International Law from Theory to Practice: the Role of Military Manuals in Effectuating the Law of Armed Conflict, in* 64 INTERNATIONAL LAW STUDIES, THE LAW OF NAVAL OPERATIONS 8 (H.B. Robertson, ed., 1991).

by civilized nations," and thus a formal source of international law as articulated by the Statute of the International Court of Justice.[599] The role of law of war manuals in making international law could be especially helpful for space warfare at its advent. A consensus among the leading States regarding acceptable limits on space warfare, as reflected in their law of war manuals, could prove as authoritative as a treaty. Meanwhile, incorporating existing norms for space warfare into a law of war manual, as well as defining the U.S. understanding of means and methods of space combat that are compliant with the law, would likely influence other States to adopt and act on them as well.

D. Information Warfare

As the technological information revolution that has characterized late twentieth and early twenty-first century life finds increasing military applications, military strategists are recognizing in new ways the age-old importance of information as a component of warfare.[600] Though it is a subject raising difficult legal questions well beyond the scope of this article, information warfare merits attention given its natural connection with space telecommunications systems. Because of heavy U.S. reliance on technology for its military effectiveness, potential threats to the information infrastructure will significantly affect combat readiness.[601] This fact led a recent Air Force study examining future concepts, capabilities, and technologies to conclude that "influence increasingly will be exerted by information more than by bombs."[602]

In conceptualizing its categories of activity, the U.S. military distinguishes between information operations, those actions taken to affect an adversary's information and information systems while defending one's own information and information systems,[603] and information warfare, which are

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[599] STAT. OF THE ICJ, *supra* note 261, at art. 38(1)c.

[600] General Fogleman, former Air Force Chief of Staff, asserted that "[d]ominating the information spectrum is as critical to conflict now as occupying the land or controlling the air has been in the past." Air Force Doctrine Document 2-5, Information Operations, 1 (Aug. 5, 1998) [hereinafter AFDD 2-5].

[601] Such potential threats have not escaped notice by the Department of Defense. For example, fears about potential unauthorized access have prompted serious debate over whether the military should withdraw from the Internet altogether. *DOD May Unplug from Internet Due to Security Worries at Century's End*, INSIDE THE ARMY, June 21, 1999, at 1.

[602] AIR FORCE 2025, *supra* note 7, at 4. The study went on to assert that "[t]he key to achieving and maintaining lasting superiority that cannot easily be duplicated by others lies in the integration of information, air, and space." *Id.* at 9.

[603] Department of Defense Directive S-3600.1, Information Operations (Dec. 9, 1996) [hereinafter DODD S-3600.1]. The Air Force broadens this definition for its forces, including space forces, as follows: "Those actions taken to gain, exploit, defend or attack information and information systems and include both information-in-warfare and information warfare." AFDD 2-5, *supra* note 600, at 41. Information-in-warfare is defined as "the Air Force's

information operations conducted during time of crises or conflict to achieve or promote specific objectives over a specific adversary or adversaries.[604] Because the narrower concept of information *warfare* applies during time of armed conflicts, it will be the more relevant of the two concepts as analyzed in the context of space warfare.

Examination of emerging principles of information warfare will benefit the analysis of space warfare under the law of war in two respects. First, because the tactics of information warfare rely heavily on space assets, information warfare can be loosely conceived as being a component of space warfare.[605] Whether classified as an active or passive manipulation of information, a State's information operations in war certainly qualify as a "means" or "method" of warfare. In this respect, information warfare is subject to regulation under the *jus in bello*. To the extent information operations involve the use of force in an armed conflict, such operations must be necessary,[606] proportional,[607] discriminate,[608] and humane.[609] They must also comply with applicable conventional restrictions imposed under the Hague and Geneva systems.[610]

In his 1998 Annual Report to the President and Congress, U.S. Secretary of Defense William S. Cohen highlighted this relationship between military space assets, and the acquisition and manipulation of information for strategic superiority.

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extensive capabilities to provide global awareness throughout the range of military operations based on integrated intelligence, surveillance and reconnaissance (ISR) assets; its information collection/dissemination activities; and its global navigation and positioning, weather, and communications capabilities." *Id.*

[604] DODD S-3600.1, *supra* note 603. As with "information operations," the Air Force expands this definition as it recognizes the continuing engagement of defensive information warfare systems even absent crises or armed conflict: "Information operations conducted to defend one's own information and information systems, or to attack and affect an adversary's information and information systems." AFDD 2-5, *supra* note 600, at 42. Thus, on either definition, information warfare is a specialized kind of information operations. Unlike previous definitions, it includes more than just attack of command and control systems. *Id.* at vii.

[605] Of course, information warfare and the multi-faceted operations it entails is not limited to the space environment. However, with the increasing reliance on space for telecommunications applications, the means of transmitting, intercepting, and corrupting information will entail use of satellite systems.

[606] For a discussion of the customary principle of military necessity, see *supra* notes 145-149 and accompanying text.

[607] For a discussion of the customary principle of proportionality, see *supra* notes 150-160 and accompanying text.

[608] For a discussion of the customary principle of discrimination, see *supra* notes 161-165 and accompanying text.

[609] For a discussion of the customary principle of humanity, see *supra* notes 166-177 and accompanying text.

[610] For a discussion of the Hague system, see *supra* Part III, § C.1. For a discussion of the Geneva system, see *supra* Part III, § C.2.

> DOD is moving into the information age and toward a totally integrated battlespace, where communications and intelligence space systems are no longer viewed as solely supporting capabilities to the warfighter, but *as instruments of combat.* The space force structure represents a major component of the information infrastructure and will become increasingly important in deterring conflict and conducting future military operations. Space forces provide the sole means to access otherwise denied areas of foreign countries without violating their sovereignty.[611] (emphasis added)

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[611] Department of Defense, *Annual Report to the President and the Congress*, 1998, Chapter 7, p.1. The most recent *Annual Report* continues this theme, "[m]ilitary operations rely heavily upon information lines of communication to, in, through, and from space." Department of Defense, *Annual Report to the President and the Congress*, 2000, Chapter 8, p.2. The observation from the 1998 *Annual Report* that space operations provide access to foreign countries "without violating their sovereignty," requires some clarification as it might apply to space warfare. It is certainly true that space surveillance and reconnaissance activities, even if conducted by foreign militaries, do not violate a sensed-State's sovereignty. This includes all manner of remote sensing and electronic interception. Yet as space operations evolve into instruments of combat, actual destruction of an adversary's space assets is likely to be accompanied by claims that its sovereignty has been violated. The implications under the *jus ad bellum* are obvious and the question will increasingly merit attention, particularly because a State's sovereignty is generally tied to its territory. The Outer Space Treaty outlaws national appropriation by claim of sovereignty of outer space, including the moon and other celestial bodies. Outer Space Treaty, *supra* note 316, at art. II. By itself, this does not mean that States will not have sovereign rights in space. Article II was tested in 1976 when eight equatorial States attempted to claim sovereignty in portions of the geosynchronous orbit by means of the dubious "Bogota Declaration." Predictably, such claims were roundly rejected by the international community which, on the authority of the Outer Space Treaty and common sense, refused to recognize sovereign rights in portions of outer space itself. The claims of these States (Colombia, Brazil, Ecuador, Congo, Kenya, Uganda, Zaire, Indonesia), four of whom had previously ratified the Outer Space Treaty, "has met with technically constructive as well as legally well-reasoned refutations by a majority of member states of the U.N. in those international fora where it has been reiterated." M.N. ANDEM, INTERNATIONAL LEGAL PROBLEMS IN THE PEACEFUL EXPLORATION AND USE OF OUTER SPACE 160 (1992).

Beyond assertions of sovereignty over natural resources from space, or portions of space itself, lies the question of whether the Outer Space Treaty allows for sovereignty in a space *asset* itself beyond an assertion of sovereignty as a property right. The Outer Space Treaty provides that States retain jurisdiction and control as well as "ownership" over the space objects on its registry. Outer Space Treaty, *supra* note 316, at art. VIII. The ISS Agreement uses similar language ("ownership," "jurisdiction and control") without vesting national sovereignty in the asset. ISS Agreement, *supra* note 342, at art. 5, 6. However, because Article II of the Outer Space Treaty focuses on national appropriation, only secondarily mentioning sovereignty as one of several means of effectuating an illegal claim of national appropriation, it appears that a limitation on State sovereignty over its space assets, if any, will not come by operation of Article II.

Certainly States have already appropriated objects that they own and control. In effect, States already maintain a national appropriation over their assets in space. A possible source limiting a State's sovereignty rights in its space assets comes from Article XII of the Outer Space Treaty which requires that all "stations, installations, equipment and space vehicles on the moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity." Outer Space Treaty, *supra* note 316, at art. XII.

A second reason for examining information warfare relates to the scholarly commentary suggesting means of applying established legal categories to this new way of waging war. As with information warfare, space warfare will require legal analyses that either convincingly demonstrate how current international law will regulate anticipated space operations, or conclude that international law is currently insufficient to the task. The increasing appearance of innovative analyses applying traditional legal categories to developing information warfare tactics could contribute greatly to the clarification of the *jus in bello* for space.[612]

E. Other Selected Issues

After considering the general application of the law of war to military space activities, several problems related to space warfare remain. The following are simply representative of many others that have been raised (and will be raised) as the prospect of space warfare moves from theory into the fielding of forces.

1. Military Interaction With Intergovernmental Agencies and "Dual Use" Assets

Because space warfare will be very hardware-intensive,[613] the status of the assets used in combat will become all-important. In isolating the legal status of a space system to be used in combat, the answers to two preliminary questions can assist in clarifying an otherwise complicated analysis. First, who owns the asset? And second, is the asset used solely for military purposes, or *both* civilian and military purposes?[614]

Typically, spaces over which a State exercises its sovereignty may be closed to foreign entrance. However, although with this provision States Parties give up a measure of exclusive occupation and privacy in their space objects on the moon and other celestial bodies, such does not necessarily imply a loss of sovereignty. As a practical matter, the question of State sovereignty in its space objects is relatively unimportant for civil and commercial activities given the "jurisdiction and control" and "ownership" provisions of Article VIII, Outer Space Treaty. However, the question may become acute as the prospect of military confrontation in space increases and States engage in hostilities that may constitute an act of war. For an interesting recent discussion of State jurisdiction in outer space, see W.P. Heere, *Problems of Jurisdiction in Air and Outer Space* XXIV:2 AIR & SPACE L. 70 (April 1999).

[612] *See, e.g.*, R.G. Hanseman, *The Realities and Legalities of Information Warfare* 45 A.F. L. REV. 173 (1997); S.P. Kanuck, *Information Warfare: New Challenges for Public International Law* (1996) 37 Harv. INT'L L. J. 272; and Schmitt, *supra* note 527.

[613] As the practice of space warfare is currently evolving, for the near future it will likely entail principally the targeting and destruction of unmanned assets both within airspace and outer space.

[614] Phrasing the issues in this way is intended to illustrate that the problem of "dual use" assets can be understood in two different ways. The *use* of the asset can be "dual," as for example a

When ownership of a space asset is shared among several States, the use of the asset becomes subject to the international agreement creating the joint ownership. The complexity of the analysis increases in part because there are more decision-makers with a voice in the decision as to how the asset will be used. When it comes to the use of a space asset in an armed conflict, the status of the owner largely determines the status of the asset. For example, the telecommunication network known as INTELSAT[615] is jointly owned by over one hundred sovereign States. Each of these States has a weighted vote in determining the future of the organization and the uses to which its assets are put.

Similarly, the former International Mobile Satellite Organization (INMARSAT, previously the International Maritime Satellite Organization) was an intergovernmental body owning a network of satellites supporting mobile telecommunications. Now privatized, INMARSAT had been used in support of several previous armed conflicts though its use among coalition forces during Operation Desert Storm in 1991 was the most widely publicized. This might not have been significant but for the "peaceful purposes" objective mandated by the INMARSAT Convention.[616] Unlike the term in the Outer Space Treaty, Moon Agreement, and other selected international instruments, the term in the INMARSAT convention has been widely interpreted outside the U.S. to mean those purposes unrelated to armed conflict.[617] Attempting a position that was "overly careful and conservative," States making up the former INMARSAT organization, which included NATO, former Warsaw Pact, and developing nations, took the view that while "peaceful purposes" as used in the Convention did not exclude "military uses" *per se*, it did exclude uses in armed conflict even if conducted in self-defense.[618] As reported by

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remote sensing satellite used both for agricultural research as well as for evidence of war crimes. In this regard the NATO use of satellite imagery to establish the creation of mass graves could have come from civilian, commercially available remote sensing systems. Further the *ownership* of the satellite can be dual as between several States directly, or through participation in intergovernmental organizations such as the International Telecommunications Satellite Organization (INTELSAT) and the former International Mobile Satellite Organization (INMARSAT).

[615] *See* Agreement Relating to the International Telecommunications Satellite Organization "INTELSAT," Aug. 20, 1971, 23 U.S.T. 3813 (entered into force Feb. 12, 1973).

[616] Article 3 of the INMARSAT treaty requires that the uses of its assets be reserved for "peaceful purposes." Convention on the International Maritime Satellite Organization, Sept. 3, 1976, art. 3, 31 U.S.T. 1, 1143 U.N.T.S. 105 (entered into force July 16, 1979).

[617] W.D. von Noorden, *INMARSAT Use By Armed Forces: A Question of Treaty Interpretation*, 23:1 J. SPACE L. 1, 2 (1995) [hereinafter von Noorden].

[618] *Id.* As for military uses authorized by the treaty, the member nations of INMARSAT, as well the INMARSAT staff itself, have concluded that the treaty's language "permits the use of INMARSAT assets by UN peacekeeping or peacemaking forces acting under the auspices of the UN Security Council, even if they are engaged in armed conflict to accomplish their missions." Department of Defense, Office of General Counsel, *An Assessment of International Legal Issues in Information Operations* (May 1999) at 15.

INMARSAT's General Counsel during the 1991 Persian Gulf War, when INMARSAT notified the U.S. of its concerns related to use of the Organization's assets in furtherance of armed conflict, the State Department responded by assuring INMARSAT "that appropriate steps have been taken to avoid recurrence of such publicity."[619] Without so stating, the distinct impression left by this and other commentators[620] is that uses of the network during armed conflicts were inconsistent with the Convention's terms.

Because privately-owned global mobile personal telecommunications systems (such as the former Iridium system, as well as ICO, Teledesic, Odyssey, and SkyBridge networks) are rapidly proliferating, it is doubtful military forces will need to rely heavily on intergovernmental organizations such as INTELSAT for communication support in future conflicts. Despite numerous new legal issues they are creating, commercial satellite systems are increasingly servicing military communications needs.[621] However, to the extent military forces continue to use intergovernmental assets, an equally difficult question relates to the status of those owner States that are not party to the armed conflict. As occurred with "neutral"[622] INMARSAT States in

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[619] von Noorden, *supra* note 617, at 2. The author strongly implies that the U.S. simply avoided the "peaceful purposes" issue by focusing instead on unwanted publicity.

[620] *See, e.g.*, R.A. Morgan, *Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and 'Peaceful Purposes'* 60 J. AIR L. & COM. 237 (1994).

[621] Once again, military wargames are precipitating discussion of potential legal issues. In the Army's 1998 "Space Game 2" an issue arose as to the use of commercial satellites and whether the U.S. could or should attack either the space or ground segment. The now-familiar question "which of these options constitute an act of war?" also was raised. W.B. Scott, *Wargame Raises New Space Policy Dilemmas*, 148:8 AV. WK. & SPACE TECH., Feb. 23, 1998, at 98.

[622] The following discussion describes neutrality as a specific legal category within the law of war:

> The term 'neutrality' designates the legal status of a State which does not participate in a war being waged by other States. A precondition, therefore, is the existence of a war between sovereign States or a civil war in which the rebels have been recognized as belligerents. . . . In the case of a use of force which falls short of actual war, the laws of neutrality do not apply. . . . Neutrality ends when the neutral State enters the war, but not if it uses force to counter a violation of its neutrality. . . . A neutral State has the right to demand respect for its independence and above all for its territorial sovereignty, including its air space. . . . The supreme precept is that the neutral State may not, by governmental measures, intervene in the conflict to the advantage of one of the belligerents. Measures that would assist a belligerent and those that would harm it are alike forbidden. This prohibition applies even if equal treatment for both parties is contemplated. Equality of treatment and impartiality are in this respect irrelevant. It is an obligation imposed on the government of the neutral State, but not on its nationals. . . . Basically, neutral obligations are only of a political or a military nature.

R.L. Bindschedler, *Neutrality, Concept and General Rules*, *in* 4 ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 9-13 (Bernhardt, ed., 1982).

Operation Desert Storm, use of the system by belligerent States meant that neutral (co-owner) States risked loss of their rights as neutral States under the law of war, at least as to their investment in the INMARSAT system if it had been lawfully targeted by enemy forces.

Reference to a specific law of war analogy may prove helpful in the analysis of the use and targeting of assets jointly owned by belligerents and neutrals alike. Under the law of war, an otherwise inviolable object or person, such as a church or non-combatant, may become a legitimate target for attack if used for military ends. Thus, the storage of weapons or the housing of soldiers in a church, or engagement in active combat by a non-combatant, renders both subject to attack. Similarly, an object owned by a neutral, which would be otherwise inviolable as neutral property, becomes properly subject to attack if used by a co-owner for belligerent purposes. With one exception, this analogy would seem to apply to the vast majority of space assets co-owned by intergovernmental organizations, particularly telecommunications satellites.

A possible limitation of this analogy arises with reference to Hague Conventions V and XIII respecting the rights and duties of neutral powers and persons in case of war on land and sea, respectively.[623] Although the titles suggest that each Treaty's scope is specifically limited to warfare on land or sea, such apparent limitations have not hindered application of *jus in bello* principles from the Hague Conventions to aerial warfare.[624] Similarly, the provisions of both Treaties could logically be applied to space warfare. Article 8 of Convention V allows that neutral States need not "forbid or restrict the use on behalf of the belligerents of telegraph or telephone cables or of wireless telegraphy apparatus belonging to it or to companies or private individuals."[625] Nonetheless, while the neutral State need not restrict the use of its assets to only non-belligerent States for "telegraph or telephone cables," Article 9 requires that any allowance by the neutral State for belligerent use be "impartially applied by it to both belligerents."[626] Thus, in keeping with customary principles of State neutrality, the Treaty forbids a neutral to give preferential treatment to one belligerent if it allows access to any. By clear inference, this means that to the extent the neutral State does give preference,

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[623] *See* Hague Convention (V) Respecting the Rights and Duties of Neutral Powers and Persons in Case of War on Land, Oct. 18, 1907 (1908 Supp.) 2 AM. J. INT'L L. 117 [hereinafter Hague Convention (V)]; *See* Hague Convention (XIII) Concerning the Rights and Duties of Neutral Powers in Naval War, Oct. 18, 1907 (1908 Supp.) 2 AM. J. INT'L L. 202.

[624] As previously suggested, references to "bombardment" where used in the conventions governing land (IV) and sea (IX) warfare have been widely read to effect limits on means and methods of prosecuting air war. *See, e.g.*, Parks, *supra* note 123.

[625] Hague Convention (V), *supra* note 623, at art. 8. The specific reference to early instruments of telecommunications is particularly apt as applied to space warfare. The principal assets in which the "dual use" problem for neutral and belligerent co-ownership arises in space warfare will be for telecommunications satellites.

[626] *Id.* at art. 9.

the preferential access to the asset for one belligerent renders the "neutral's" property non-neutral, and thus subject to attack.

An additional issue arises under Hague Convention V's "general participation clause." Article 20 provides that "[t]he provisions of the present Convention do not apply except between contracting Powers, and then only if all the belligerents are parties to the Convention."[627] Because, for example, the United Kingdom is not a party to the Convention, Article 20 operated to render its specific provisions inapplicable to the Persian Gulf War conflict.[628] Nonetheless, when drafted, Hague Convention V, as well as Hague Convention XIII, were viewed as declaratory of customary international law. Thus, without asserting that the Hague conventions on neutrality do in fact amount to restatements of customary law, Roberts and Guelff accurately point out that "[t]o the extent that [ ] Convention [V] may be considered customary international law, it would be binding on all States and its 'general participation clause' . . . would cease to be relevant. In hostilities since 1907, including both world wars, the Convention was frequently referred to by both neutrals and belligerents."[629] Among other things, this simply illustrates that the law is unspecific on this point. How the Hague Conventions on neutrality or the principles of customary international law would restrict targeting of jointly-owned satellites in space warfare is as yet unclear. While this problem of "neutral" ownership of implements of war is not unique to space assets, it is an issue widely applicable to space assets given widespread intergovernmental cooperation in space, and is thus likely to become a concern in space warfare.

A second major problem related to the status of space assets in combat is the use to which they are put. In many cases, implements of space warfare can be converted fairly easily to valuable non-military uses.[630] For example, remote sensing satellites are functionally equivalent to military reconnaissance satellites. While the former do not require the same precision, the process of

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[627] *Id.* at art. 20.

[628] Other non-parties to the Convention that were active to some degree in the 1991 Persian Gulf War include Canada, Italy and Turkey.

[629] Roberts & Guelff, *supra* note 131, at 61.

[630] In addition to those cited below, perhaps the most obvious example of dual-use technology pertains to launch vehicles. In the civilian context, launch vehicles are also termed boosters or simply transportation systems. In the military context, virtually the same launch vehicles become missiles and rockets. This dual use potential for the same launch vehicle creates tension given the rise of commercial use of space. For example, the joint venture between U.S., Russian, Norwegian, and Ukrainian corporations to launch commercial satellites from an ocean-going oil rig was suspended in 1998 over missile technology concerns. The effort, popularly known as Sea Launch, uses a Russian Zenit rocket to boost the commercial payloads to orbit. The U.S. State Department, fearful that Boeing was educating Russia on improvements to its missile design, halted work on the project. The Zenit rocket is a modified version of the Russian SS-18 ICBM. *See* J. Mintz, *U.S. Suspends Boeing-Ukraine Rocket Launch*, WASH. POST, Aug. 8, 1998, at A14. The U.S. has subsequently allowed work to resume.

acquiring earth-based data is roughly the same.[631] Even more closely related are the uses put to weather and telecommunications satellites. The military may use such a satellite to support the prosecution of its wartime objectives while the same satellite is being used *simultaneously* for non-military purposes.[632] This raises the question whether such an asset may be lawfully targeted by an opposing belligerent.[633]

The general rule provided by the law of war allows destruction of targets that are military objectives when doing so is not disproportionate to the military objective sought by the destruction. On this basis, major infrastructure targets were lawfully destroyed during the 1991 Persian Gulf War that provided, for example, electricity both to the civilian populations and to the command and control functions of the Iraqi military.[634] A similar rationale

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[631] The dual-use character of remote sensing satellites benefits military and civilian organizations in both directions. Thus, military imagery finds useful civilian application as well. For example, declassification of photoreconnaisance from the early U.S. Corona satellites has allowed for surface water studies. Recently-released imagery showed the size of the Soviet Aral Sea in 1962. By comparison with 1990s imagery, the considerable extent to which the sea has shrunk due to the diversion of water for irrigation becomes clear. PEEBLES, THE CORONA PROJECT, *supra* note 49, at 266. Peebles also notes that

> [t]he first NASA Landsat earth resources satellite was launched in 1972 – a month after the end of Corona. With the Corona photos, environmental studies could be extended back another twelve years, helping to separate long-term changes from normal variations in such areas as movement of sand dunes, loss of forest areas, and shifts in the courses of tropical rivers.

Id.

[632] Christol argues that this dual-use aspect of most space assets contributed "to the demise of the position that military activities in the space environment were inherently aggressive. . . . Space objects engaged in communications, observations of earth from space, weather observation, and geodesy could be engaged in either a military, a non-military, or both military and non-military activities." CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, *supra* note 338, at 28.

[633] A further permutation of the issue arises when several opposing belligerents simultaneously use the same asset. During Operation Desert Storm, both the coalition *and* Iraq were using transponders off the ARABSAT telecommunication system. F.R. Cleminson, *Banning the Stationing of Weapons in Space Through Arms Control: A Major Step in the Promotion of Strategic Stability in the 21st Century*, *in* ARMS CONTROL AND THE RULE OF LAW: A FRAMEWORK FOR PEACE AND SECURITY IN OUTER SPACE 39 (J.M Beier & S. Mataija, eds., 1998). Aside from the issue of neutral State partial ownership of the system, there appears to be no *jus in bello* reason why either side could not have attacked the satellite. Though each side would have had to calculate whether it stood to gain more than it lost by the attack, this amounts to a question of military tactics and strategy rather than permissible conduct under the law.

[634] Thus, in its Report to Congress on the conduct of the Gulf War, the Department of Defense discussed the coalition attacks on major utilities, the Iraqi communications system, and bridges. The Report affirms that

applies equally to dual-use satellites. To the extent a satellite is used for the support of a military purpose, be it communications, weather, early warning of missile launch, or reconnaissance, it becomes a military objective and is lawfully subject to attack. This of course assumes that the space asset is actually used for such military purpose and is not merely targeted for having the potential to be so used.[635]

2. *The Status of Astronauts as Both "Envoys of Mankind" and Combatants*

The trend for the past few decades suggests that military manned space missions will not carry the significance of unmanned missions in the near term. Nonetheless, there will undoubtedly be some role for military astronauts in space combat. This raises a few obvious questions in light of language used by the Outer Space Treaty and the Rescue and Return Agreement. In his account of the reception he received following the Apollo 11 manned mission to the surface of the moon, command module pilot Michael Collins made the following observations:

> Travelling around the world several months after the flight, I was continually impressed by the fact that no matter where we were, the reaction was the same and, to me, unexpected. Never did I hear, 'Well, you Americans finally did it.' Always it was 'we,' we human beings drawn together for one fleeting moment watching two of us walk that alien surface.[636]

This reception correlates with the status astronauts bear under international law: "envoys of mankind."[637] The lofty phrase reserved for

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> [w]hen objects are used concurrently for civilian and military purposes, they are liable to attack if there is a military advantage to be gained in their attack. ('Military advantage' is not restricted to tactical gains, but is linked to the full context of a war strategy, in this instance, the execution of the Coalition war plan for liberation of Kuwait.)

Department of Defense Report to Congress on the Conduct of the Persian Gulf War: Appendix O on the Role of the Law of War, 31 I.L.M. 612, 623 (1992).

[635] If all that were required were a potential military use, *any* asset could be targeted. The homes of civilians far from the battlespace could potentially be used by military forces, but such are not lawful targets unless so used. Similarly, any satellite with a system of on-orbit propulsion is a potential kinetic ASAT for another satellite. This, by itself, does not make the satellite a military objective.

[636] M. COLLINS, LIFTOFF: THE STORY OF AMERICA'S ADVENTURE IN SPACE 161 (1988).

[637] Outer Space Treaty, *supra* note 316, at art. V. Though "astronaut" was originally a U.S. term referring to human beings in space, it can apply equally to humans in space from other countries, including those that may prefer the term "cosmonaut." As used here, the two terms are synonymous and use of the one constitutes reference to both. The phrase "envoys of mankind" comes from the Outer Space Treaty which declares "States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render them all possible

astronauts appears to suggest that they are given the legal status of diplomats.[638] However, a significant tension will arise as military astronauts move from activities that are scientific in nature, to those that are warlike. Interestingly, the language immediately preceding the "envoys" phrase from the Outer Space Treaty states the permissibility of military personnel in space for scientific or other peaceful purposes.[639] This juxtaposition suggests, along with the fact that the term "astronaut" applies to all humans in space[640] and that the term envoy makes no distinction between military and civilian astronauts, that the term envoy as used in the Outer Space Treaty certainly applies to military personnel in space. However, the Outer Space Treaty does not countenance armed conflict in space.

Under the law of war there is no reason the term combatant could not apply to military personnel in space just as it does to individuals on land, sea, and air if authorized to engage in armed conflict.[641] Formally speaking, in order to be accorded all legal protections under the *jus in bello* as belligerents, it seems that such combatant astronauts would be required to adhere to the requirements set forth under Article 1 of the annexed regulations to Hague Convention (IV), namely, (a) commanded by a person responsible for his subordinates; (b) have a fixed distinctive emblem recognizable at a distance; (c) carry arms openly; and (d) conduct operations in accord with the laws and customs of war.[642] Under such conditions, the legal tension between a person

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assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas." *Id.*

[638] Commenting on this term, Cocca writes

> The term 'envoy' has a precedent in diplomatic law, that of an envoy extraordinary. An envoy ranks just below an ambassador and always is an agent, a messenger. The reason for this unique concept lies in the fact that astronauts have been vested with the legal representation of all mankind in outer space and celestial bodies. No former representation has ever been as wide and politically, it goes beyond the most audacious ambition. On the other hand, this investment was recognized in the General Assembly by unanimity and acclamation.

A.A. Cocca, *Prospective Space Law*, 26:1 J. OF SPACE L. 51, 54 (1998).

[639] Outer Space Treaty, *supra* note 316, at art. IV ("The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited.")

[640] At the time of the adoption of the Outer Space Treaty, virtually all U.S. astronauts in space from the Mercury and Gemini projects had all been members of the U.S. military.

[641] It appears to be of little significance that the Outer Space Treaty requires that astronauts be regarded as envoys of mankind "in outer space." When read in context, this is not a geographic limitation for the exclusive area in which astronauts are to be regarded as envoys, but rather a claim that when away from earth, that is, in outer space, astronauts represent the human race.

[642] Hague Convention (IV) Annex, *supra* note 154, at art. 1. Although the requirements to have a distinctive emblem "recognizable at a distance" and to "carry arms openly" certainly assume new meaning as applied to outer space, such requirements could be complied with in

being accorded a quasi-diplomatic status, as well as being given the right to use force might appear to be acute. Because the term "combatant" is fairly well established under the law of war, full resolution of this potential tension requires placement of the term envoy in its proper context within the Outer Space Treaty.

The term as used requires an interpretation that is consistent with relevant assumptions made elsewhere in the Treaty and with its object and purpose. Indeed, this is a requirement imposed on the interpretation of any treaty.[643] The same treaty that designates astronauts as envoys also presupposes that States will abide by their obligation to limit national activity to peaceful purposes. A necessary precondition for any astronaut claiming combatant status will be some violation of the "peaceful purposes" injunction. That being the case, it is implausible to assert that any astronaut qualifying as a combatant, whether acting in an aggressive, non-peaceful role, or a defensive, peaceful role, will be accorded the diplomatic status due an envoy. This conclusion is further supported by the fact that those accorded diplomatic immunity may not engage in armed hostilities.[644] From this, two commentators have helpfully pointed out that "[a] military astronaut [who] participates in hostile acts does not exercise diplomatic functions."[645] It would simply be incongruous for one person to simultaneously constitute a combatant and an "envoy of mankind."[646] The practical interpretation of the Outer Space Treaty then becomes this: States Parties "shall regard astronauts

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space just as they are on land, sea, or in the air. The central point of these requirements is to allow clear distinction between combatants and civilians, legitimate and illegitimate military targets. Failure to so identify oneself if done to take advantage of the enemy's goodwill, amounts to an act of perfidy, one of the most serious law of war violations as it undermines the entire system and the mutual "confidence" on which it is based. For a discussion of perfidy under Protocol I to the Geneva Conventions, see *supra* note 166.

[643] Article 31 of the Vienna Convention requires that a treaty be interpreted "in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context *and in light of its object and purpose.*" Vienna Convention, *supra* note 265, at art. 31 (emphasis added). Though the Vienna Convention came into force well after adoption of the Outer Space Treaty, the U.S. views its provisions as simply codifying preexisting customary international law.

[644] It is for this reason that diplomats stationed in foreign countries are accorded such wide protections under international law. Not only are their personal and professional premises, archives and documents, and persons deemed "inviolable," but they are free from the criminal jurisdiction of the receiving State. Vienna Convention On Diplomatic Relations, Apr. 18, 1961, 500 U.N.T.S. 95 (entered into force June 24, 1964).

[645] M. Bourbonniere, & L. Haeck, *Jus in Bello Spatialis*, 1999 PROCEEDINGS OF THE SPACE STUDIES INSTITUTE 8 (1999) (conference on space manufacturing). Once a diplomat takes up arms, he arguably loses his diplomatic protections. *See* J.S. Beaumont, *Self-Defense as a Justification for Disregarding Diplomatic Immunity*, 1991 CAN. Y.B. INT'L L. 391 (1992).

[646] The Outer Space Treaty itself hints at this by requiring that States Parties regard astronauts as envoys. This raises the subtle distinction between an astronaut actually being an envoy, and simply being regarded as one.

as envoys of mankind" only when engaged in "peaceful" activities, as the Outer Space Treaty assumes them to. When such conditions do not exist, it makes no logical or textual sense for astronauts to be regarded as "envoys" by opposing belligerent States.

3. Return of Astronauts Engaged in Combatant Activities

At least two treaties within the *corpus juris spatialis* require the prompt return of astronauts. In the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas, the Outer Space Treaty requires that astronauts be "safely and promptly returned to the State of registry of their space vehicle."[647] The Rescue and Return Agreement makes the duty even more expansive, applying even to cases of unintended landing. Article 4 uses language suggesting that the duty to return is unconditional:

> If, owing to accident, distress, emergency or unintended landing, the personnel of a spacecraft land in territory under the jurisdiction of a Contracting Party or have been found on the high seas or in any other place not under the jurisdiction of any State, they shall be safely and promptly returned to representatives of the launching authority.[648]

These provisions precipitate the question: "must combatant astronauts be returned in time of war?"

The answer is plainly "no" for reasons similar to those justifying the conclusion that astronauts engaged in armed conflict will not be accorded diplomatic immunity. In both cases, the terms of the Rescue and Return Agreement assume that the space activities of astronauts, even if military in nature, will be scientific and non-aggressive–that is, peaceful. Once the outbreak of armed hostilities occurs in space, at least one of the States involved will have violated the peaceful purposes limitation. Whatever else the astronaut-combatants may be at that point, they most certainly will be prisoners of war if captured by virtue of accident, distress, emergency or unintended landing. The opposing belligerent will owe no greater duty to return the prisoner of war from space than it would the prisoner of war from the land, sea, or air.

4. Innocent Passage through Airspace for Destinations to and Return from Space

Beyond the question of where airspace ends and outer space begins, lies a problem many States face related to space access. States such as the U.S.,

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[647] Outer Space Treaty, *supra* note 316, at art. V.
[648] Rescue and Return Agreement, *supra* note 358, at art. IV.

with great land masses bounded by vast expanses of the oceans, have a certain degree of independence in the launch and recovery of their space objects. Because many States are entirely landlocked, or possess territory too small to launch objects into space using only their own airspace or that over the high seas, a question arises as to the possibility of incorporating into space law another feature from the law of the sea–innocent passage. In this case, several commentators have been proposing that for some States to truly enjoy the free exploration and use of outer space guaranteed by the Outer Space Treaty, they must be accorded a right of innocent passage through the national airspace of other States. Some have gone even further to suggest that such a right exists in customary international law.[649]

As suggested previously, such a right does not exist in the law and is not likely to emerge in the near future given traditional State interests in territorial sovereignty.[650] However, even if it did, it would not serve the ends of belligerent States in the midst of armed conflict during which passage would not be innocent. For passage to be "innocent" under the Law of the Sea Convention, it cannot be "prejudicial to the peace, good order or security of the coastal State."[651] It is self-evident that foreign military activity in support of armed conflict in the territory of the host State (whether territorial seas or superjacent national airspace), absent explicit permission, will be prejudicial to the peace of that State. States may always attempt to secure prior permission before entering the national airspace of another State. This could certainly occur during an armed conflict. However, as long as the law of the sea remains the controlling analogy, any future recognition of rights to innocent

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[649] *See* S. Gorove, *Legal and Policy Issues Raised by the Proposed Notion of 'Aerospace Object,' in* PROCEEDINGS OF THE FORTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE 411 (1998); C.Q. CHRISTOL, SPACE LAW: PAST, PRESENT, AND FUTURE 339 (1991); M. LACHS, THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING 59, 60 (1972). Generally, the arguments rests on anecdotal evidence of spacecraft entering the national airspace of a foreign State without incident or objection.

[650] For additional discussion of the question of innocent passage as a customary norm of international law, see *supra* note 312. In addition to the arguments of Malanczuk and Wassenberg, additional space law commentators have made the argument cogently, including A.D. Terekhov, *Passage of Space Objects Through Foreign Airspace: International Custom?*, 25:1 J. SPACE L. 1 (1997); P. Haanappel, *The Aerospace Plane: Analogies with Other Modes of Transportation, in* PROCEEDINGS OF THE THIRTY-SECOND COLLOQUIUM ON THE LAW OF OUTER SPACE 341, 342 (1990); B. Cheng, *The Legal Regime of Airspace and Outer Space: The Boundary Problem Functionalism Versus Spatialism: The Major Premises*, V ANNALS AIR & SPACE L. 323, 357 (1980). Indeed, while backing away from its earlier unequivocal assertions that such a right exists, Russia more recently stated that "[p]rovisions of international customary law with respect to the passage of aerospace objects after re-entry into Earth's atmosphere are currently in the process of being elaborated." *Questionnaire On Possible Legal Issues with Regard to Aerospace Objects: Replies from Member States*, U.N. Doc. A/AC.105/635 (1996).

[651] LOS Convention, *supra* note 467, at art. 19.

passage into foreign national airspace for space objects, will not apply to belligerents during armed conflict.

VII. CONCLUSION

> [I]f there was ever a threat to our national security [in space], the best–the only–way to solve the problem is to take weapons into space.[652]
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> General Howell M. Estes, III
> USAF (1997)

Before examining how the law of war will restrict means and methods of space warfare, it is necessary to determine whether it applies to military space operations in the first place. Given the evolution of aerial warfare–gradual restrictions on means and methods applied from the existing law of war–and the apparent similarity of certain aspects of the maritime environment to that of outer space, one can apply the traditional set of norms known as the law of war to space warfare by employing a process of analogical reasoning. The conclusion that the existing law of war will apply to space warfare is further supported by treaty bases in the Outer Space Treaty and the law of war's Martens' clause.

That said, when it comes to outlining permissible military activity during the course of space combat, it appears equally clear that the near-total atmospheric vacuum characterizing outer space is matched by a similar legal vacuum with respect to the *jus in bello* for space warfare. Academicians and practitioners are left to making educated but uncertain guesses based on analogies with other legal regimes. As with any attempt to predict the application of current (though insufficient) legal regimes to future phenomena, it is extremely difficult to articulate with any precision how this application should occur. The difficulty is largely a function of developing warfare technologies that continue to outpace the progressive development of international law. Ideally however, the task should fall to diplomats and international legislators having the authority to negotiate clarifications to international law before the relevant issues are unilaterally decided by States in the context of actual combat.[653]

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[652] Scott, *Space As New Area of Responsibility*, *supra* note 2, at 55. While General Estes' point appears self-evident, the U.S. is not likely to deploy weapons for some time. "[W]e don't foresee weaponization in space between now and the 2020 timeframe." Robert Wall, *Space Weapons Fall from USAF Vision*, 153:2 AV. WK. & SPACE TECH., July 20, 2000, at 86 (quoting Secretary of the Air Force, F. Whitten Peters).

[653] This prospect appears unlikely. Following his discussion of events at the U.N. Conference on Disarmament, Professor Vlasic plausibly asserts:

The prospect of space warfare requires the formulation of a new perspective on the law of war. The law of war contains prescriptive norms derived from a wide variety of sources. With respect to space warfare, the *corpus juris spatialis*, in addition to a variety of arms control treaties, contributes additional restrictions to the existing law of war. Having concluded that the traditional law of war will apply to space warfare, and employing the most widely accepted understandings of the terms "peaceful" and "space weapon," an examination of relevant legal sources demonstrates that the following military activities are prohibited at this time:

- Interference with space-based "national technical means" (space based sensors) for arms control verification as between the U.S. and Russian Federation;
- Placement of nuclear weapons and other weapons of mass destruction in orbit around the earth and on celestial bodies or in orbit around them;
- Testing or other detonation of nuclear weapons in outer space;
- Placement of military bases and conduct of military tests or maneuvers on celestial bodies and in orbits around them;
- Destruction of targets that are not military objects or militarily necessary, and are specifically prohibited such as hospitals, churches, and non-combatants;
- Use of space weapons or tactics that are "inhumane," "disproportionate" to the militarily necessary objective sought, or are incapable of use so as to "distinguish" between legitimate and illegitimate targets (as the terms are used under the traditional *jus in bello*);
- Development, testing, and deployment of space-based or other anti-ballistic missile systems and components (with a single limited exception);
- Military or hostile use of environmental modification techniques in outer space.

> It may not be too far-fetched to conclude that the position of certain States on the issue of space weapons reflects their desire not to be subject to restrictions, at least not yet, by an international legal instrument, even if only a U.N.G.A. resolution, condemning in unambiguous terms the development, testing and deployment of devices, wherever based, designed to attack or interfere with space assets.

Vlasic, *Space Law and Military Technology*, *supra* note 11, at 407.

By contrast, an examination of the same sources discloses that, at a minimum, the following military activities in outer space are not prohibited:[654]

- The use of military personnel;
- The use of space-based remote sensors in support of combat or other military purposes;
- The use of space-based communication, navigation, and meteorological systems for combat or other military purposes;
- The deployment and non-aggressive use of conventional space weapons; and
- The transiting of nuclear and other weapons of mass destruction in non-orbital trajectories.[655]

Despite nearly forty years of research into space weaponry there is no binding international instrument limiting the use of such weapons. With two isolated examples, such weapons have not been fielded, contributing to State reluctance to foreclose further study into effective deterrents.[656] However there will come a day when a treaty governing means and methods of space warfare will be desirable. In addition to the certainty written law brings to the legal structures governing human conduct, formal agreements most clearly evince the consent of the governed. Of course, any treaty developments for space warfare must strike a pragmatic balance between national security, international legal order, and human rights–a balance for which the *jus in bello* has striven for at least 100 years.

To a certain degree, this review of the law of war and its application to space warfare serves as a call for further analysis of the topic. Though armed conflicts apparently have not occurred in space to date, the rudimentary means for engaging in such conflicts now exist. As each armed conflict since Vietnam makes greater use of space assets, it is undoubtedly only a matter of time before a future conflict witnesses the application of force both from and within the space environment. When it does, and in the absence of specific

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[654] As stated previously, given the continuing implications of State sovereignty in international relations, it is important to conceive State behavior not as *authorized* by international law, but rather inherently lawful unless proscribed by international law. *See supra* note 141. Accordingly, it is appropriate to speak of activity that is "not prohibited" or "consistent with international law."

[655] Several of the items on these prohibited and not prohibited lists were taken from a July 1985 working paper entitled "Survey of International Law Relevant to Arms Control and Outer Space" submitted by the government of Canada to the U.N. Conference on Disarmament. Stojak, *supra* note 354, at 45, 46.

[656] The two publicly-acknowledged exceptions include the U.S. and Russian ASAT systems. States have historically been reluctant to agree to restrictions on their use of potential weaponry before it has been developed and fielded. The notable exception is the recent restriction on blinding lasers. *See supra* note 172.